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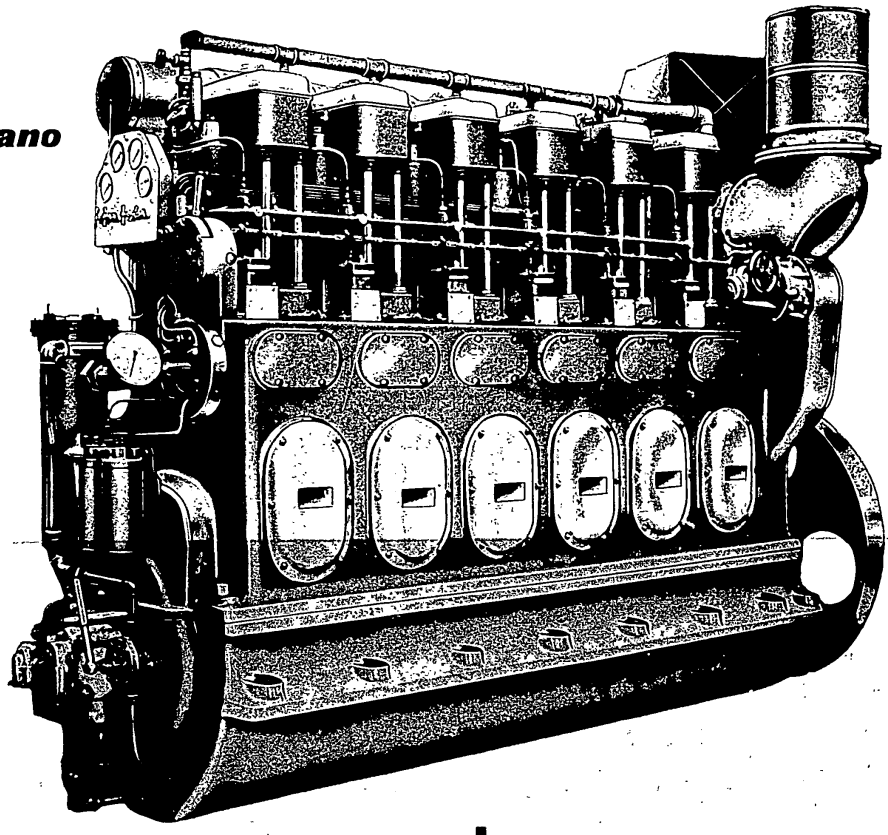
Diesel Engines
Steam Boilers and Turbines
Gas Turbines
Hydraulic Turbines - Valves and Penstocks
Pumps - Equipment for Cement Works
Blowers - Compressors
Forgings and Castings



Diesel Engines Type

Four-stroke Engine:

Diesel cycle . . . . . ▌ Plunger pistons
Vertical disposition . . . . . ▌ Direct injection

It may be designed both naturally aspirated and pressure charged.

Cylinder bore	=	220		mm. (8.66")
Piston stroke	=	320		mm. (12.60")
Speed	=	600	750	r.p.m.
Mean piston speed	=	6.4	8	m/s.
	(=	252	315	in/sec.)
B.H.P. rating of aspirated engine	=	50	60	BHP/cyl.
B.H.P. rating of pressure charged engine	=	85	100	BHP/cyl.
b.m.e p. of aspirated engine	=	6.15	5.92	Kg./sq.cm.
	(=	87.5	84.1	lb/sq.in.)
b.m.e p. of pressure charged engine	=	10.5	9.85	Kg./sq.cm.
	(=	149	140	lb/sq.in.)

Model designation	Tosi Q. 12 T. 4		Tosi Q. 12 T. 5		Tosi Q. 12 T. 6		Tosi Q. 12 T. 7		Tosi Q. 12 T. 8	
Speed RPM	600	750	600	750	600	750	600	750	600	750
B.H.P. rating asp. engine	200	240	250	300	300	360	350	420	400	480
B. H. P. rating press. charged engine	340	400	425	500	510	600	600	700	680	800
Number of cylinders	4		5		6		7		8	

These ratings apply to normal ambient conditions in accordance with British Standards n. 649 of 1949, i e..

— altitude = 159 m. (522 ft.) a.s.l.
— atmospheric temperature = 29.4° C (85° F)
— humidity = 50% at 29.4° C temperature.

The ratings listed above are those obtained by using Gas-oil fuel. In case it is desired to use Diesel oil, the engine output will be sligthly lower and will be specified each time by the manufacturer

DESCRIPTION

Bedplate

of cast-iron. It is machined for the main bearings It acts as a sump for the lubricating oil and carries the lubricating and fuel oil pump

Frame

is of cast-iron. It is bolted to the bedplate and carries the housings for the cylinder liners It is provided with large inspection doors.

Liners

are of special alloy cast-iron and built in the cylinders They are accurately honed to provide an extra finish of the internal surface

Pistons

are of light alloy and designed according to the latest principles.

Connecting rods

are die forged in high-tensile steel.

Cylinder heads

are of special cast-iron and cast individually. They are secured to the frame by means of steel studs. They carry the seats for two suction valves and two exhaust valves. Large inspection doors permit cleaning of the cooling water chamber.

Crankshaft

is of high-tensile carbon steel. It carries the bores for the circulation of lubricating oil. It is provided with a flange on connection side of engine.

Camshaft

consists of a sturdy forged shaft with cams. The shaft is introduced into the engine at one end and owing to a special feature embodied in the design the space required for dismantling is reduced to the minimum.

An extension shaft

flanged at one end for connection to the crankshaft and a bearing are normally included in the supply

Flywheel

is designed to suit each individual requirement based on the calculation of the torsic . critical speed of the entire revolving mass, as well as on the degree of irregularity desired by the customer.

Speed governor

is of the centrifugal type and acts on the racks of the injection pumps
A manually-operated speed-changer permits an adjustment of 10% more or less of the operating speed of the engine compared with the normal operating speed.
Where the particular service requires it, a device for control from the instrument panel through electric motor is provided.

Fuel injection.

A rotary pump actuated directly by the engine and fed by gravity from the day tank supplies fuel to the injection pumps. Fuel injection is by Bosch pumps (one per cylinder) and Bosch injectors.

Lubrication

The gear type pump actuated by the engine takes oil from the sump in the crankcase and delivers it under pressure to the cooler, the crankshaft and the distribution gear. The cylinders are lubricated by splash from the crankcase

Starting

is by compressed air furnished by a tank charged at 30-35 Kg/sq.cm. (428-500 lb/sq in.) through a charging valve located on one cylinder head. The tank is furnished as outfit to the engine A spare electrically-operated or engine-operated compressor is supplied on demand.

Cooling

is effected by water circulation. Adeguate flanges are provided for the inlet and discharge of the cooling water.

Pipings

Standard equipment includes the following pipings:

— fuel pipings, mounted directly on the engine;
— lubricating oil piping which draws oil from the crankcase and takes it to the cooler and engine;
— cooling water pipings, in addition to those mounted on the engine, 4 meters of feed piping and 4 meters of discharge piping;
— compressed air piping, from the charging valve to the tank and from this to the starting system of the engine.

Silencer

An exhaust gas silincer is supplied for the aspirated engines. In the pressure charged engines the turbine acts as a silencer.

Turbocharger

The pressure charging system consists normally of a turbine operated by the engine exhaust gases under the Büchi system, and of a blower arranged on the same axis of the turbine, which supplies the compressed air for the engine

Coolers

A lubricating oil surface type cooler is fitted on each engine.
In some particular cases on pressure charged engines, the compressed air is cooled by means of an adequate cooler.
In these cases it is necessary to have water at approximately 25° C (77° F) or less at a rate of 10 lt. (2.20 gal) per effective horsepower and per hour.

Filters

Fuel - Each engine is provided with an efficient filter made by a specialized manufacturer.
Lubricating oil - An apparatus for the total filtration of the lubricating oil is fitted on each engine.
Air - Where the service requires it, an air filter is provided.
Lubricating oil purifying equipment - Each engine is normally supplied with a lubricating oil conditioner connected parallel with the main oil system.

Measuring instruments

include gauges and thermometers for measuring the pressures and temperatures of the circulating liquids, as well as a tachometer.

The following ACCESSORIES and SPARES are furnished with the engine:

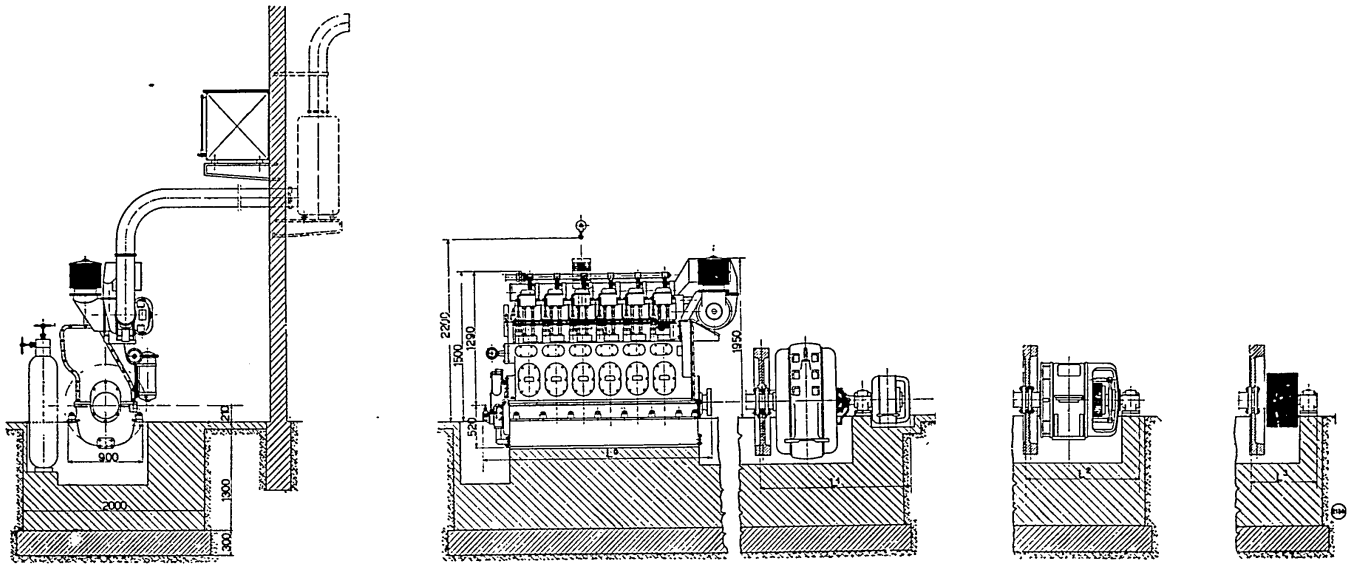
— foundation screws
— a set of standard wrenches and all special wrenches
— eyebolts
— a hand-operated pump for testing injectors
— a thermometer and a gauge
— a stock of spare parts including: a set of valves for one cylinder head, a set of rings for one piston, a plunger with barrel for injection pump with delivery valve and spring, a needle with nozzle for atomizer, a set of gaskets for use in the engine, a pipe for oil cooler, spares for the turbocharger.

The following accessories will be furnished on demand: the pipings required for the installation, day tanks, channeled plate for covering underground passages, guards, etc.

WEIGHTS AND VOLUMES

A = Naturally aspirated
S = Pressure charged

Number of cyl.	4		5		6		7		8	
	A	S	A	S	A	S	A	S	A	S
Weight of eng. (dry) with acc. excl flywheel T.	4.5	4.9	5.3	5 7	6	6 4	6.8	7 3	7.6	8.5
Weight of heaviest piece T.	1.1	1.3	1.3	1.5	1.5	1 8	1.7	2.2	1.9	2.4
Shipping volume (by sea) cu mt.	14	14	15	15	16	16	17	17	18	18
cu.yd.	18.35	18.35	19 65	19.65	20.95	20.95	22.25	22 25	23 55	23.55
Capacity of maintenance crane T.	1.5	1.5	1.5	2	2	2	2	2.5	2.5	2.7



CONSUMPTION OF FUEL

ENGINE TYPE		LOAD		
		4/4	3/4	1/2
Naturally aspirated	gr/BHP. hr	160	165	170
	lbs/BHP. hr	0.353	0.364	0.375
Pressure charged	gr/BHP. hr	155	155	160
	lbs/BHP. hr	0.342	0.342	0.353

CONSUMPTION OF LUBRICATING OIL

(Referred to engine full rating)

Naturally aspirated 2.5 gr/BHP. hr (0,005 lbs/BHP. hr)
Pressure charged 2.0 gr/BHP. hr (0.0044 lbs/BHP hr)
Allowances on above consumptions: 5%

OVERALL DIMENSIONS OF ENGINES

ENGINE TYPE		L^0	L^1	L^2	L^3
Q 12 T 4 (S) . . .	mm.	2150	1600	1100	850
	in.	84	63	43.3	33.5
Q 12 T 5 (S) . . .	mm.	2480	1700	1200	1000
	in.	97	67	47.2	39.4
Q 12 T 6 (S) . . .	mm.	2810	1800	1300	1150
	in	110	70.8	51.2	45.3
Q 12 T 7 (S) . . .	mm.	3140	1900	1400	1300
	in	123	74.8	55.1	51.2
Q 12 T 8 (S) . . .	mm.	3470	2000	1500	1450
	in.	136	78.8	59	57.1

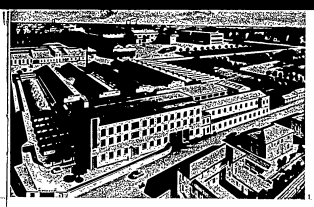
Circ. 113 - 1957

STAB. POL. G. COLOMBI S.P.A. - MILANO

MAGRINI

società per azioni / Bergamo-Italia

MAGRINI



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MAGRINI

1 General view of the factory, offices and workmen social buildings
1 Vue générale des établissement et des bâtiments annexés
1 Ansicht des Fabrikgeländes und der Verwaltungsgebäude

Magrini is an industrial company specialized in the manufacture of electric switchgear for low, medium and high voltages up to 380 kV.

The main offices and the factory are in Bergamo and take up about 42 000 sq. yards. most of which are covered with buildings of two stories or more, where nearly 2.000 employees are accomodated.

The company was established in 1901 as the first in Italy to manufacture this kind of equipment.

During 1929 Magrini has arranged an agreement for technical collaboration with Messrs. Westinghouse Electric Corporation of East Pittsburgh, Pa. U.S.A. This enables Magrini to take advantage of the great experience of the outstanding American firm in switchgear design and manufacture and to be always in the van of technical progress.

More recently a similar agreement has been stipulated with Messrs. Merlin & Gerin, Grenoble, France for air blast circuit breakers.

Magrini's modern organization and industrial equipment, the skill of its experts, its research and testing facilities, its extensive trade organization in Italy and abroad make of it one of the prominent companies in its line.

La Société Magrini est une industrie spécialisée dans la construction d'appareillage électrique pour basse, moyenne et haute tension jusqu'à 380.000 V.

Le siège de la Société et les usines sont situés à Bergame et s'étendent sur 35.000 mètres carrés environ, occupés en majeure partie par des bâtiments à deux étages ou plus. Environ 2.000 personnes y sont employées.

La Société a été fondée en 1901 et a été la première, en Italie, dans cette branche de production.

Depuis 1929, la Magrini a établi, avec la « Westinghouse Electric Corporation » de East Pittsburgh U.S.A., un accord de collaboration technique qui lui permet d'utiliser l'expérience de la grande firme américaine et de se maintenir à l'avant-garde du progrès technique. Plus récemment, un accord analogue a été conclu avec la Société Merlin et Gerin, à Grenoble (France) pour les disjoncteurs à air comprimé.

Son organisation moderne et son équipment industriel, la spécialisation de son personnel, ses moyens de recherches et d'essais, ainsi que son organization commerciale étendue en Italie et à l'Etranger placent la Société Magrini au premier rang de l'industrie électro-mécanique.

Der Name Magrini bezeichnet eine spezialisierte Industrie für die Herstellung von elektrischen Schaltgeräten für Nieder- Mittel- und Hochspannung bis zu 380 kV.

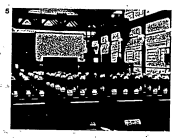
Der Sitz der Gesellschaft und die Fabrik befinden sich in Bergamo.

Das Fabrikgelände umfast eine Oberfläche von 35.000 m², meist mit zwei- oder mehrstöckigen Gebäuden überbaut, in denen ungefähr zweitausend Arbeiter und Angestellte beschäftigt sind.

Die Gesellschaft wurde im Jahre 1901 als erste in Italien für diese Art von Apparaten gegründet. Seit dem Jahre 1929 hat Magrini mit der «Westinghouse Electric Corporation» von East Pittsburgh (USA) ein Abkommen getroffen, welches ihr erlaubt, die grosse Erfahrung des amerikanischen Hauses zu benutzen und über alle technischen Fortschritte stets auf dem Laufenden zu sein.

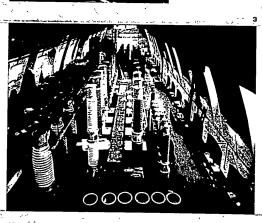
Später wurde ein ähnliches Abkommen auch mit der Firma « Merlin & Gerin » von Grenoble (Frankreich) für Druckluftschalter abgeschlossen.

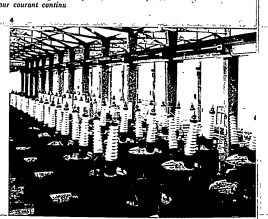
Die moderne Organisation und industrielle Ausrüstung, die Prüf- und Versuchungsanlagen, die Ausbildung des Personals, die ausgedehnte Handelsorganisation in Italien und im Ausland machen die Firma Magrini zu einer hervorragenden Industrie auf ihrem Gebiet.



2 Switchboard assembly
3 Assembly of high voltage low-oil-content circuit breakers
4 Assembly of high voltage bulk oil circuit breakers
5 Assembly of air-blast circuit breakers
6 Assembly of high-speed D.C. circuit breakers

2 Hall d'assemblage des tableaux
3 Hall d'assemblage des disjoncteurs à faible volume d'huile pour haute tension
4 Halle d'assemblage des disjoncteurs à huile pour haute tension
5 Hall d'assemblage des disjoncteurs à air comprimé
6 Hall d'assemblage des disjoncteurs ultra-rapides pour courant continu





2 Zusammenbau von Schalttafeln
3 Zusammenbau von offenen Leistungsschaltern für Hochspannung
4 Zusammenbau von Oelleistungsschaltern für Hochspannung
5 Zusammenbau von Druckluftschaltern
6 Zusammenbau von Schnellschaltern für Gleichstrom

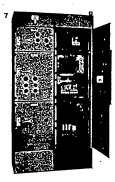
Normalized control desks and switchboards.
Normalized metal clad switchboards for indoor and outdoor service for low and medium voltages with draw-out equipment.
Air circuit breakers, contactors, line starters, power fuses, disconnecting switches and other low voltage equipment.
Medium and high voltage Deion, air blast, bulk oil and low-oil-content circuit breakers.
High-speed and semi-high-speed D.C. circuit breakers.
Disconnecting switches, power fuses and on-load disconnecting switches for medium and high voltages.
Relays.
Lightning arresters for overvoltage protection.

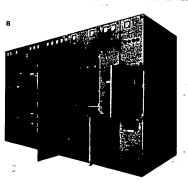
the production

la production · Fabrikations-programm

9 Low voltage de-ion air circuit breakers
9 Disjoncteurs automatiques dans l'air pour basse tension
9 Luftschalter für Niederspannung

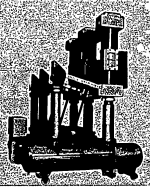
Tableaux et pupitres de manœuvre à éléments normalisés.
Tableaux blindés normalisés pour installations intérieures et extérieures pour basse et moyenne tension, avec appareillage sectionnable et extractible.
Disjoncteurs automatiques dans l'air, contacteurs, télérupteurs, coup-circuits, sectionneurs et autre appareillage pour basse tension.
Disjoncteurs pour moyenne et haute tension dans l'air, à déionisation magnétique, à air comprimé, à gros volume d'huile et à faible volume d'huile.
Disjoncteurs ultra-rapides et semi-rapides pour courant continu.
Sectionneurs, coupe-circuit et sectionneurs en charge pour moyenne et haute tension.
Relais.
Parafoudres pour la protection des surtensions.

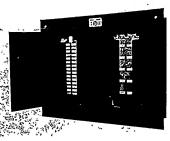


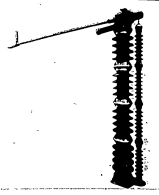


Normalisierte Schalttafeln und Schaltpulte.
Normalisierte geschützte Schalttafeln für Innenraum- und Freiluftaufstellung, für Nieder- und Mittelspannung, mit ausziehbaren und trennbaren Geräten.
Luftstellstschalter, Schützen, Fernschalter, Sicherungen, Trennschalter und andere Geräte für Niederspannung, Luftleistungsschalter mit magnetischer Blasung, Druckluftschalter, Olschalter und ölarme Schalter für Nieder- und Mittelspannung
Schnellschalter für Gleichstrom.
Trennschalter, Sicherungen und Lasttrennschalter für Mittel- und Niederspannung.
Ausloser.
Überspannungsableiter.

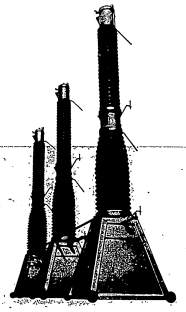
7 Low voltage switchboard type «Control Center», consisting of normalized elements, with drawout switchgear
8 Low voltage switchboard type «Power Center», consisting of normalized elements, with drawout switchgear
7 Tableau pour basse tension type «control-center» à éléments normalisés avec appareils extractibles
8 Tableau pour basse tension type «Power-center» à éléments normalisés avec appareils extractibles
7 Schaltafel für Niederspannung Bauart «Control-Center» bestehend aus normalisierten Elementen mit ausziehbaren Geräten
8 Schaltafel für Niederspannung Bauart «Power-Center» bestehend aus normalisierten Elementen mit ausziehbaren Geräten

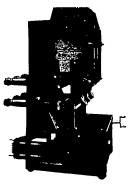


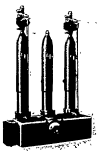




MAGHINI S. p. A. - BERGAMO



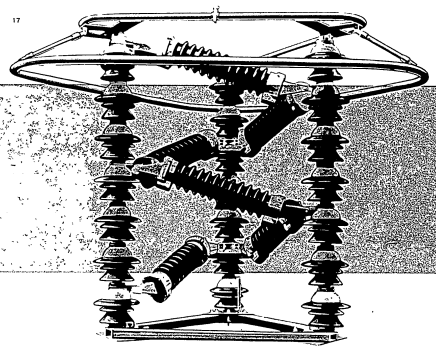




10 Indoor air-blast circuit breaker type A for 70 kV
11 Light distribution and auxiliary services switchboard
12 Disconnecting switch type SEM with vertical closing blade for 220 kV
13 Normalized high voltage switchboard with draw-out de-ion air circuit breaker type DH
14 Outdoor low-oil-content circuit breakers type MFS for 220 kV
15 Indoor de-ion air circuit breaker type DH for 15 kV
16 Indoor low-oil-content circuit breaker type Mg for 12 kV
17 Autovalve lightning arrester, type SV, for 220 kV grounded neutral systems

10 Disjoncteur pour installation intérieure à air comprimé type A1 par 70 kV
11 Tableau de distribution pour illumination et services auxiliaires
12 Sectionneur type SEM à lame verticale pour 220 kV
13 Tableau pour haute tension, normalisé avec disjoncteur dans l'air, type DH extractible
14 Disjoncteur pour installation extérieure, à faible volume d'huile, type MFS pour 220 kV
15 Disjoncteur pour installation intérieure à coupure sèche type DH pour 15 kV
16 Disjoncteur pour installation intérieure, à faible volume d'huile type Mg pour 12 kV
17 Parafoudre type SV pour systèmes à 220 kV avec neutre à la terre

10 Druckluftschalter für Innenraum 70 kV
11 Schalttafel für Lichtverteilung und Hilfskreise
12 Trennschalter Reihe SEM mit senkrechter Schaltbewegung für 220 kV
13 Schalttafel für Hochspannung mit ausziehbarem Luftleistungsschalter mit magnetischer Blasung Reihe DH
14 Ölarme Leistungsschalter Reihe MFS für 220 kV
15 Luftleistungsschalter mit magnetischer Blasung für Innenraum Reihe DH für 15 kV
16 Ölarmer Leistungsschalter für Innenraum Reihe Mg für 12 kV
17 Überspannungsableiter Reihe SV für starrgeerdete Netze 220 kV



the research and testing facilities

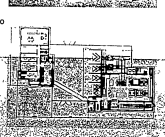
les moyens d'essais et de recherches | Prüf- und Versuchsanlagen

High-power short-circuit test laboratory to verify the interrupting capacity of the circuit breakers or to effect researches during new design and technical development.
Disconnecting switches, power fuses, lightning arresters, reactors, current tranformers and bus-bars can also be tested.
The maximum short circuit capacitie is 660 MVA at 11 kV. The tests can be effected at voltages ranging from 125 to 200,000 V. The testing currents can reach 100,000 A. (symmetrical, for 5 seconds).
The laboratory is equipped with all the up to date instruments and oscillographs for recording test results.

18

19

Laboratoire à grande puissance pour les essais de court-circuit. *Ce laboratoire permet de contrôler le pouvoir de coupure des disjoncteurs à la sortie des ateliers de fabrication ou d'étudier les projets pendant la phase expérimentale. On peut y effectuer, en outre, des essais sur les sectionneurs, les coupe circuit, les parafoudres, les réacteurs limiteurs de courant, les transformateurs de courant, les jeux de barres, etc.*
La puissance maximum de court-circuit est de 660 MVA à la tension de 11 kV. Les tensions auxquelles les essais peuvent être effectués vont de 125 V à 200.000 V. Les courants d'essai peuvent atteindre 100.000 A (symétriques pendant 5 sec).
Le laboratoire est doté des instruments les plus modernes ainsi que des oscillographes pour le relèvement et l'enregistrement des résultats des essais.



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18 Generator room of the short-circuit testing laboratory
19 Test bays of the short-circuit testing laboratory

18 Salle des machines du laboratoire pour essais de court-circuit
19 « Boxes » d'essai du laboratoire pour essais de court circuit

18 Maschinensaal der Kurzschlussprüfanlage
19 Prüfzellen der Kurzschlussprüfanlage

Kurzschlussprüfanlage für die Ermittlung der Abschaltleistung von Leistungsschaltern als Abnahmeprüfung oder zur experimentellen Erforschung der Probleme im Rahmen der Entwicklung.
Ausserdem kann die Anlage auch für Versuche an Trennschaltern, Sicherungen, Überspannungsableitern, strombegrenzenden Reaktoren, Stromwandlern, Sammelschienensystemen u.s.w. zur Anwendung kommen.
Die höchste Kurzschlussleistung ist 660 MVA bei einer Spannung von 11 kV. Die Prüfungen können bei Spannungen von 15 V bis 200000 V durchgeführt werden. Die Prüfstromstärke reicht bis 100000 A (symmetrisch für 5").
Die Prüfanlage ist mit den modernsten Instrumenten sowie mit Oscillographen für die Registrierung der Prüfwerte ausgestattet.

22

High-voltage and impulse test laboratory for voltage tests, dry or wet, at 50 Hz up to 800,000 V.; voltag and impulse tests with normalized waves 1/50 and 1,5/40 up to 3,000,000 V.; current tests with impulse wave 10/20 up to 45.000 A.; with a charging voltage of 100.000 V.; combined simultaneous tests with impulse voltage wave and industrial frequency voltage to reproduce fully the stresses due to lightnings; puncturing tests a.s.o.
In this laboratory besides the tests on circuit breakers manufactured by Magrini S.p.A. also studies and experiences on trausformers, post insulators, suspension insulators, steel towers for high voltage lines are effected.

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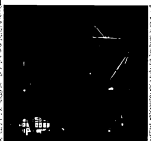
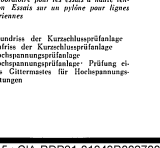


23

20 Plan of the short-circuit testing laboratory
21 Vertical cross-section of the short-circuit testing laboratory
22 High-voltage testing laboratory
23 High-voltage testing laboratory; tests on actual 220 kV transmission line tower

Laboratoire pour les essais à haute tension. *Il permet d'effectuer des essais de tension à sec et sous pluie artificielle, à 50 Hz jusqu'à 800.000 V.; des essais de tension sous ondes de choc normalisées 1/50 et 1,2/40 jusqu'à 3.000.000 V.; des essais de courant sous ondes de choc 10/20 jusqu'à 45.000 A.; avec tension de charge de 100.000 V.; des essais combinés et simultanés de tension sous onde de choc et à fréquence industrielle qui reproduisent fidèlement les sollicitations dues aux décharges atmosphériques; essais de perforation, etc.*
Le laboratoire est utilisé non seulement pour les essais sur l'appareillage de la Magrini, mais aussi pour effectuer des études et des expériences, pour des essais sur des transformateurs, isolateurs, suspensions isolantes, pylônes pour lignes aériennes, etc.



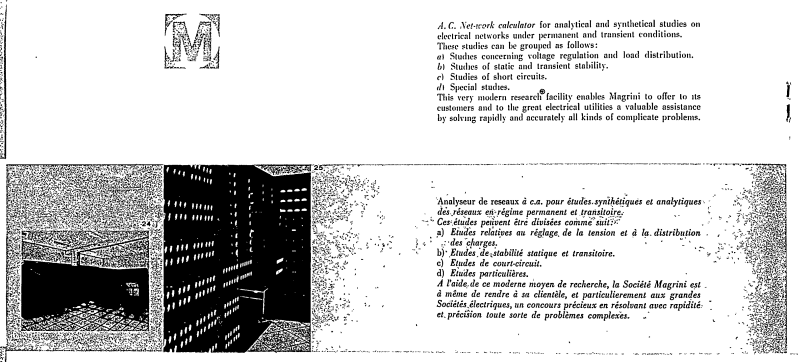
21

22

20 *Plan du laboratoire pour essais de court circuit*
21 *Section verticale du laboratoire pour essais de cour circuit*
22 *Laboratoire pour essais à haute tension*
23 *Laboratoire pour les essais à haute tension Essais sur un pylône pour lignes aériennes*

20 Grundriss der Kurzschlussprüfanlage
21 Aufriss der Kurzschlussprüfanlage
22 Hochspannungsprüfanlage
23 Hochspannungsprüfanlage· Prüfung eines Gittermastes für Hochspannungsleitungen

Hochspannungs-Prüfanlage für Spannungsprüfungen trocken und unter Regen bis zu 800000 V bei 50 Hz: Stossspannungsprüfungen mit normalisierten Stosswellen 1/50 und 1,5/40 bis zu 3000000 V; Stromstossprüfungen mit Stosswellen 10/20 bis 45000 A: mit Ladespannungen von 100000 V: für gleichzeitige Stossspannungs- und Normalfrequenzprüfungen, welche die bei atmosphärischen Entladungen auftretenden Beanspruchungen vollständig wiedergeben; für Durchschlagversuche u.s.w.
Die Prüfanlage dient nicht nur für die Prüfung der von Magrini hergestellten Geräte, sondern auch für Untersuchungen und Prüfungen an Transformatoren, Isolatoren, Isolatorenketten, Gittermasten für Hochspannungsleitungen u.s.w.



24 A C. Network calculator
25 Details of network calculator

24 Analyseur de reseaux a c.a
25 Détail de l'analyseur de reseaux

24 Netzmodell
25 Teilansicht des Netzmodells

A. C. Net-work calculator for analytical and synthetical studies on electrical networks under permanent and transient conditions.
These studies can be grouped as follows:
a) Studies concerning voltage regulation and load distribution.
b) Studies of static and transient stability.
c) Studies of short circuits.
d) Special studies.
This very modern research facility enables Magrini to offer to its customers and to the great electrical utilities a valuable assistance by solving rapidly and accurately all kinds of complicate problems.

Analyseur de reseaux à c.a. pour études synthétiques et analytiques des réseaux en régime permanent et transitoire.
Ces études peuvent être divisées comme suit:
a) *Etudes relatives au réglage de la tension et à la distribution des charges.*
b) *Etudes de stabilité statique et transitoire.*
c) *Etudes de court-circuit.*
d) *Etudes particulières.*
A l'aide de ce moderne moyen de recherche, la Société Magrini est à même de rendre à sa clientèle, et particulierement aux grandes Sociétés électriques, un concours précieux en résolvant avec rapidité et précision toute sorte de problèmes complexes.

Netzmodell für synthetische und analytische Forschungsarbeiten über elektrische Netze bei stationären und veränderlichen Betriebzuständen.
Diese Forschungen können sich auf folgende Teilgebiete erstrecken:
a) Forschungen über die Spannungsregulierung und die Lastverteilung.
b) Forschungen über die stationäre Stabilität sowie die Stabilität bei Belastungsschwankungen.
c) Kurzschlussuntersuchungen
d) Besondere Forschungen.
Dank dieser modernen Prüfanlage ist die Firma Magrini im Stande ihrer Kundschaft und besonders den grossen Elektrizitäts-Versorgungs-Unternehmen wertvolle Beratungsdienste zu leisten und schwierige Probleme rasch und genau zu lösen.

26

references from Italy

références en Italie — Referenzen in Italien

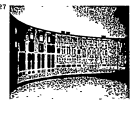
Hereunder are listed, distributed according to various industrial lines, the companies to which MAGRINI has supplied important equipment.
These are the best known names of the Italian industry: the preference they have given to MAGRINI's switchgear confirms its reputation of high technical quality.

Nous donnons, ci-après, une liste de Sociétés, groupées par activités industrielles, auxquelles la Magrini a livré des quantités considérables de ses appareils. Il s'agit des plus grandes firmes de l'industrie italienne. La préférence que celles-ci accordent à l'appareillage Magrini en confirme la renommée.

Es folgt eine nach industriellen Branchen geteilte Aufstellung der Unternehmen, die von der Firma Magrini bedeutende Mengen von Geräten bezogen haben.
Es handelt sich um die besten Namen der Italienischen Industrie. Die Bevorzugung des Fabrikates Magrini legt Zeugnis ab für seine technische Qualität.

ELECTRICAL UTILITIES
Sociétés Electriques
Elektrizitäts-Versorgungs-Unternehmen

S.I.P. - Società Idroelettrica Piemontese e Consociate . . Torino
Azienda Elettrica Municipale . . . . . Torino
Consorzio Idroelettrico del Bathier . . . . . Torino



27

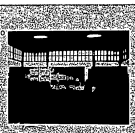
28

29

26 Montecatini - Control switchboard and desk of the Castelbello Power Station.
27 Selt Valdarno - Control switchboard of the Casellina Sub-station
28 STANIC - Control switchboard of refineries at Leghorn
29 SQUIBB - Outdoor switchboard for a factory Sub-station in Rome
30 Switchboards type «Control Center» and «Power Center», for control of the rolling mill of a large steel plant.

26 *Montecatini - Tableau et pupitre de manœuvre de la centrale de Castelbello*
27 *Selt-Valdarno - Tableau de manœuvre de la sous-station de Casellina*
28 *STANIC - Tableau de manœuvre des réfineries de Livourne*
29 *SQUIBB - Tableau pour installation extérieure de la sous-station des Etablissements de Rome*
30 *Tableaux type «Control-centers et «Power-centers» pour la commande du laminoir dans une grande aciérie*

26 Montecatini - Schaltafel und Pult im Kraftwerk Castelbello
27 Selt - Valdarno - Schaltafel des Unterwerkes Casellina
28 STANIC - Schaltafel der Raffinerien in Livorno
29 SQUIBB - Schaltafel für Freiluftaufstellung im Unterwerk der Fabrik in Rom
30 Schaltafeln - Bauart «Control Center» und «Power Center» für Beteiligung eines Walzwerkes in einem grossen Eisenhüttenwerk



Società Edison e Consociate	Milano
Società Vizzola	Milano
Azienda Elettrica Municipale	Milano
S.T.E.I. - Società Termoelettrica Italiana	Milano
Società Trentino di Elettricità	Milano
Azienda Elettrica Consorziale di Bolzano e Merano	Bolzano
Società Idroelettrica Avisio	Trento
S.A.D.E. - Società Adriatica di Elettricità	Venezia
Società Elettrica Selt-Valdarno	Firenze
Azienda Elettrica Maremmana	Firenze
Società Romana di Elettricità	Roma
Società Termoelettrica Tirrena	Roma
U.N.E.S. - Unione Esercizi Elettrici	Roma
Azienda Comunale Elettricità Acque	Roma
S.M.E. - Consociate	Napoli
Ente Autonomo Volturno	Napoli
S.G.E.S. - Società Generale Elettrica della Sicilia	Palermo
Società TIFEO	Palermo
S.T.E.S. - Società Termoelettrica Siciliana	Palermo
Ente Siciliano di Elettricità	Catania
Società Elettrica Sarda	Cagliari

IRON MILLS AND MECHANICAL INDUSTRIES
Industries Sidérurgiques et Mécaniques
Eisenhütten und Mechanische Industrien

Società FIAT e Consociate	Torino
Società COGNE	Torino
Società Olivetti	Ivrea
Acciaierie e Ferriere Lombarde FALCK	Milano
Società Dalmine	Milano
Società Innocenti	Milano
Società Ing. L. Taglialferri	Milano
Società Auto Bianchi	Milano
Officine Meccaniche	Milano
S.I.A.C.	Genova
Società ILVA	Genova
Società Ansaldo	Genova
Società Cornigliano	Genova
Società Terni	Roma

SHIPYARDS
Chantiers Maritimes
Werften

Cantieri Riuniti dell'Adriatico	Trieste
Cantieri Ansaldo	Genova
Cantieri Navali Riuniti	Genova

CHEMICAL, MINING AND OIL INDUSTRIES
Industries Chimiques, Pétrolifères et Minières
Chemische, Erdöl und Bergwerkindustrien

Vetrocoke	Torino
Società Montecatini	Milano
Società Pirelli	Milano
ANIC	Milano
Società Snia Viscosa e Consociate	Milano
Società Italcementi	Bergamo
Società Condor	Milano
RASIOM	Milano
Società Aquila	Trieste
Zuccherificio e Raffinerie di Pontelongo	Padova
Società Italiana Industria Zuccheri	Genova
STANIC	Roma
Società SQUIBB	Roma
Mobiloil Italiana	Napoli

TEXTILE INDUSTRY
Industries Textiles
Textil Industrie

Cotonificio Valle di Susa	Torino
Lanificio Rossi	Milano
Cotonificio Valle Ticino	Milano
Società Bemberg	Milano
Cotonificio Dell'Acqua	Legnano
Cotonificio Bellora	Gazzaniga
Cotonificio Cantoni	Legnano
Lanificio di Gavardo	Bostone
Lanificio Marzotto	Valdagno
Cotonificio Rossi	Schio
Manifatture Cotoniere Meridionali	Napoli

ELECTRICAL INDUSTRY
Industries électromécaniques
Elektromechanische Industrien

SIET	Torino
Società Marelli & C.	Milano
Società Ansaldo-San Giorgio	Genova
Società Standard Elettric	Roma
OCREN	Napoli

PAPER AND PUBLISHING INDUSTRIES
Industries du papier et éditoriales
Papier- und Verlagsindustrien

Cartiere Burgo	Torino
Cartiere Donzelli	Milano
Cartiere Fagioli	Milano
SAFFA	Milano
A. Mondadori - Editore	Milano

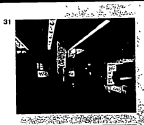
RAILWAYS
Chemins de Fer
Eisenbahnen

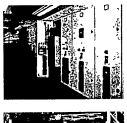
Ferrovie dello Stato	Roma
Ferrovia Centrale Umbra	Roma

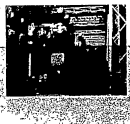
31 Metal-clad switchboards for high and low voltage, with drawout de-ion air circuit breakers for the Chivasso Power Station (SIP).
32 Metal-clad high voltage switchboards with drawout de-ion air circuit breakers for the Palermo Power Station (Soc. Termoelettrica Siciliana)
33 Metal-clad high voltage switchboards with draw-out de-ion air circuit breakers for the Power Station of Chivasso (SIP).
34 Airblast circuit breakers type P. for 70 kV at S. Gilla Substation (Elettrica Sarda)
35 Vertical break disconnecting switches, type V, at Frattamaggiore Substation (Soc. Meridionale di Elettricità)

31 SIP - Tableaux blindés pour haute et basse tension avec disjoncteurs à coupure sèche, débrochables pour la centrale de Chivasso
32 STES - Tableaux blindés pour haute tension avec disjoncteurs à coupure sèche, débrochables pour la centrale thermique de Palerme
33 SIP - Tableaux blindés pour haute tension avec disjoncteurs à coupure sèche, débrochables pour la centrale de Chivasso
34 Elettrica Sarda - Disjoncteurs à air comprimé, type P pour 70 kV de la sous-station de S. Gilla
35 SME - Sectionneurs à ouverture verticale, type V de la sous-station de Frattamaggiore

31 SIP: Geschützte Schalttafeln für Hoch- und Niederspannung mit trennbaren Luftleistungsschaltern im Kraftwerk Chivasso
32 STES: Geschützte Schalttafeln für Hochspannung mit trennbaren Luftleistungsschaltern im Dampfkraftwerk Palermo
33 SIP: Geschützte Schalttafeln für Hochspannung mit trennbaren Luftleistungsschaltern im Kraftwerk Chivasso
34 ELETTRICA SARDA: Druckluftschalter Reihe P für 70 kV im Unterwerk S. Gilla
35 SME: Trennschalter mit senkrechter Schaltbewegung Type V im Unterwerk Frattamaggiore







36 Low-oil-content circuit breakers type MFS for 220 kV at Cislago Substation (Soc. Vizzola)

37 Low-oil-content circuit breakers type MF and disconnecting switches type SER at Ancona Substation

38 Low-oil-content circuit breakers type MF and disconnecting switches type SER for 80 kV (Idroelettrica dell'Ossola)

39 Low-oil-content circuit breakers type MFA and disconnecting switches type SER for 150 kV at Turin Substation (FIAT)

40 Portable 150 kV Substation for the Italian State Railways, with oil circuit breaker type CDB and disconnecting switches type V

41 Low-oil-content circuit breakers type MFA and disconnecting switches type SER for 150 kV at Bari steam Power Station (SME)

42 Low-oil-content circuit breakers type MFS for 220 kV at Luzzi Power Station (SME)

36 Vizzola - Disjoncteurs à faible volume d'huile, type MFS, pour 220 kV, de la sous-station de Cislago

37 UNES - Disjoncteurs à faible volume d'huile, type MF, et sectionneurs type SER, dans la sous-station de Ancône

38 Idroelettrica dell'Ossola - Disjoncteurs à faible volume d'huile, type MF, et sectionneurs type SER, pour 80 kV

39 FIAT - Disjoncteurs à faible volume d'huile, type MFA, et sectionneurs type SER, pour 150 kV, dans la sous-station de Turin

40 Sous-station mobile, pour les Chemins de Fer Italiens, avec disjoncteur à huile type CBD et sectionneurs type V, pour 160 kV

41 SME - Disjoncteurs à faible volume d'huile type MFA et sectionneurs type SER, pour 150 kV, de la centrale thermique de Bari

42 SME - Disjoncteurs à faible volume d'huile type MFS pour 220 kV, de la centrale de Luzzi

36 VIZZOLA: Ölarme Leistungsschalter Reihe MFS für 220 kV im Unterwerk Cislago

37 UNES: Ölarme Leistungsschalter Reihe MF und Trennschalter Reihe SER im Unterwerk Ancona

38 IDROELETTRICA DELL'OSSOLA: Ölarme Leistungsschalter Reihe MF und Trennschalter Reihe SER für 80 kV

39 FIAT: Ölarme Leistungsschalter Reihe MFA und Trennschalter Reihe SER für 150 kV im Unterwerk Turin

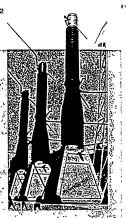
40 Fahrbare Unterstation für die Italienische Staatseisenbahn mit Ölleistungsschaltern Reihe CDB und Trennschaltern Reihe V für 160 kV

41 SME: Ölarme Leistungsschalter Reihe MFA und Trennschalter Reihe SER für 150 kV im Dampfkraftwerk Bari

42 SME: Ölarme Leistungsschalter Reihe MFS für 220 kV im Kraftwerk Luzzi





The export of Magrini's switchgear to all countries of Europe, Africa, Asia, Australia and America has been continuously increasing during the recent years.
Most supplies have been the result of international tenders, in which the most important industrial firms specialized on switchgear have participated. This is why references abroad are particularly significant.

L'exportation des appareillages Magrini vers les cinq continents s'est continuellement accrue pendant ces dernières années. Il s'agit, dans la plupart des cas, de fournitures importantes qui sont allouées à la suite de concours internationaux auxquels participent les industries les plus qualifiées de notre branche. C'est pourquoi nos références à l'étranger ont une importance significative, à tous points de vue.

Die Ausfuhr der Firma Magrini nach allen Ländern von Europa, Africa, Asien, Australien und Amerika hat in den letzten Jahren fortwährend zugenommen. Es handelt sich meistens um grosse Aufträge auf Grund von internationalen Ausschreibungen, an welchen die bedeutendsten Industrien der Branche teilnehmen. Aus diesem Grunde sind die Referenzen im Ausland besonders wichtig.

43 Imatran Voima - Finland, Low-oil-content circuit breakers type MFR for 120 kV at Mantta Sub-station

44 Madras Government, India - Low-oil-content circuit breakers type MF for 80 kV at Melakallur Sub-station

45 Andhra Government, India - Low-oil-content circuit breakers type MFA for 150 kV at Bhimadolu Sub-station

46 Andhra Government, India - Low-oil-content circuit breakers type MFR for 35 kV at Bhimadolu Sub-station

43 Imatran Voima - Disjoncteurs à faible volume d'huile type MFR, pour 120 kV de la sous-station de Mantta (Finlande)

44 Gouvernement de Madras - Disjoncteur à faible volume d'huile type MF pour 80 kV de la sous-station de Melakallur (Indes)

45 Gouvernement de Andhra - Disjoncteurs à faible volume d'huile type MFA pour 150 kV de la sous-station de Bhimadolu (Indes)

46 Gouvernement de Andhra - Disjoncteurs à faible volume d'huile type MFR pour 35 kV dans la sous-station de Bhimadolu (Indes)

references abroad

les références à l'etranger | Referenzen im ausland

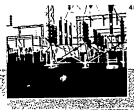
43 IMATRAN VOIMA - FINLAND: Ölarme Leichtungsschalter Reihe MFR für 120 kV im Unterwerk Mantta

44 REGIERUNG VON MADRAS, INDIEN: Ölarme Leistungsschalter Reihe MF für 80 kV im Unterwerk Melakallur

45 REGIERUNG VON ANDHRA, INDIEN: Ölarme Leistungsschalter Reihe MFA für 150 kV im Unterwerk Bhimadolu

46 REGIERUNG VON ANDHRA, INDIEN: Ölarmer Leistungsschalter Reihe MFR für 35 kV im Unterwerk Bhimadolu






In Europe: En Europe: In Europa:

Belgium - Belgique - Belgien

Société Nationale des Chemins de Fer - Bruxelles
A.C.E.C. - Ateliers de Constructions Electriques de Charleroi - Charleroi
Electro Navale & Industrielle - Anvers
Electro Entreprises Victor Begaux - Anvers
General Motors Continental - Anvers
Société Africaine d'Entreprises Electriques S.A. - Bruxelles
Société des Trasports Intercommunaux de Bruxelles - Bruxelles
SOFINA - Bruxelles
Syndibel - Bruxelles

Bulgaria - Bulgarie - Bulgarien

Metalimport - Sofia

Finland - Finlande - Finnland

Enso Gutzeit OY - Helsinki
Nokia OY - Nokia
Myllykosken Paperitehdas OY - Myllykosken
Imatran Voima OY - Helsinki

France - France - Frankreich

A.S.E.I. - Appareillages Spéciaux pour Equipements Industriels - Nogent sur Marne (Eine)

Greece

The references from Greece constitute a reason of pride for Magrini and deserve a more specific mention. In fact 22 complete transformer substations 150/15-22 kV and the electrical switchgear for three steam and water power stations have been supplied to the « Public Power Corporation » of Athens which is the national concern to whom the Greek government has entrusted the production and the distribution of electric power.
The organization of Magrini and the technical skill of its personnel have made it possible to accomplish this work in less than 24 months.

Grèce

Nos références en Grèce représentent un motif d'orgueil légitime pour la Société Magrini et méritent une mention plus détaillée. Pour la Public Power Corporation d'Athènes, c'est à dire l'entreprise à laquelle le gouvernement grec a confié la production et la distribution de l'énergie électrique dans tout le territoire du pays, nous avons fourni et monté 22 sous-stations complètes pour la transformation 150/15-22 kV et l'appareillage électrique pour 3 centrales thermiques et hydrauliques. Ce travail remarquable, accompli en 24 mois environ, a été possible grâce à la technicité et à l'organisation de la Société Magrini.

Griechenland

Auf die Referenzen in Griechenland ist die Firma Magrini besonders stolz. Für das « Offentliche Elektrizitätsunternehmen » (D.E.H.) Athen, welchem die Griechische Regierung die Erzeugung und Verteilung der elektrischen Energie im ganzen Lande anvertraute, hat Magrini die Ausrüstung für 22 komplette Umspannwerke 150/15-22 kV und für drei Dampf- und Wasserwerke geliefert und aufgestellt. Diese grosse Arbeit wurde in ungefähr 24 Monaten vollendet. Sie beweist die technische Qualität der Geräte der Firma Magrini und die Leistungsfähigkeit ihrer Organisation.

Ireland - Irlande - Irland

Board Solathair an Leictreachais - Dublin

Jugoslavia - Yougoslavie - Jugoslavien

Elektroopskrba - Zagreb
Elektrotehna - Zagreb
Elektrana - Zagreb
Rade Koncar - Zagreb
Brodoimpex - Beograd
Elektrosrbija - Beograd
Invest Import - Beograd
Rudarsko Nabavno Prodjno Preduzece - Beograd
Termoelektro - Beograd
Brodomaterijal - Rijeka
Elektrodalmatia - Split
Jugovinil - Split
Elektrotehna - Ljubljana
Elektronabava - Ljubljana
Hidromontaza - Maribor
Vanilar - Skopje
Rudnici i Topionicecolova i Cinka « Trepca » - Zvecan
Tvornica Elektroda i Ferolegura - Sibenik

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Empresa de Empreitadas de Electricidade - Porto
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Empresa Hidro Electrica da Serra da Estrela - Seia
Fabrica de Aparelhos e Acessorios Electricos Lda. - Porto
Joao Jacinto Tomé - Lisboa
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Constructora Nacional de Maquinaria Electrica S.A. - Madrid
Esteban Orbegozo - Zumarraga

Switzerland - Suisse - Schweiz

Elektro-Material A. G. - Basel

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In Africa: En Afrique: In Afrika

Belgian Congo - Congo Belge - Belgisch Kongo
Société General Industrielle et Chimique du Katanga «Sogechim»
Union Minière du Haut Katanga

Egypt - Egypte - Aegypten
Egyptian Government - Mechanical and Electrical Department - Cairo
Fratelli Gita - Cairo
Transport Engineering Co. - Cairo

Libia - Libye - Libyen
Istituto Nazionale della Previdenza Sociale - Tripoli
Casa della Luce - Tripoli
Seci - Tripoli

South Africa - Afrique du Sud - Süd Afrika
South African Railways - Johannesburg
Wilson & Herd, PTY. LDT. - Johannesburg
Electrical Supply Commission - Johannesburg

In Asia: En Asie: In Asien:

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National Power Corp. - Manila

Taiwan - Formose - Formosa
Taiwan Cement Corporation - Taipei

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Damodar Valley Corporation
Government of Madras
Government of Andhra
Government of Bihar
Eastern Railwalys Calcutta
Sindri Fertilizer (Bihar)
Government of Mysore

Indonesia - Indonesie - Indonesien
Bank Industry of Negara - Djakarta

Pakistan - Pakistan - Pakistan
SIRCE (Pakistan) Ltd. - Karachi
Government of Pakistan - Karachi

Turkey - Turquie - Türkei
Etibank - Ankara
Sumerbank - Ankara

In Australia: En Australie: In Australien:

Westinghouse Rosebery Pty.Ltd. - Sydney-N.S.W.
State Electricity Commission of Queensland - Brisbane
Cairns Regional Electricity Board - Cairns (Queensland)
State Hydroelectric Department - Wellington (New Zealand)
Snowy Mountains Hydro-electric Authority - Cooma N.S.W.

In Central America and South America: En Amerique Central et Amerique du Sud: In Mittel-und Süd-Amerika

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Uruguay - Uruguay - Uruguay
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Administracion General de Las Usinas Electricas y los Telefonos del Estado - Montevideo
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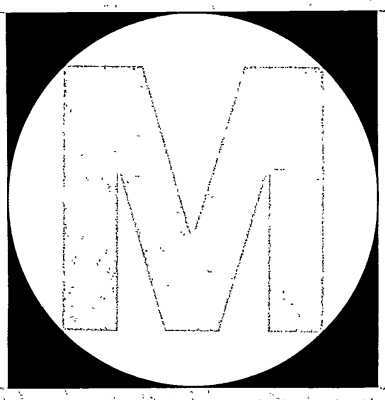

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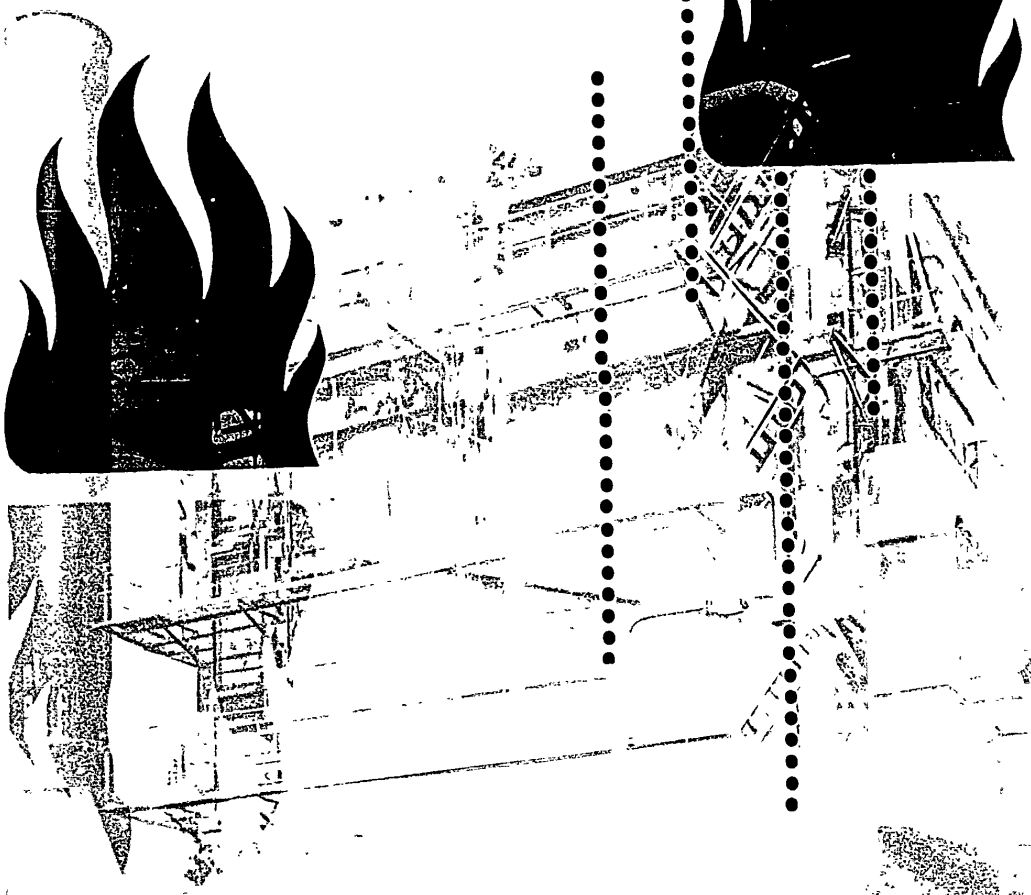


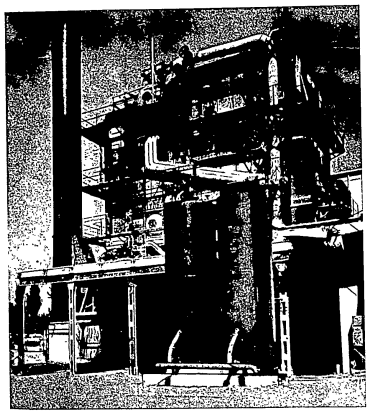
vertical water tube boilers

FRANCO TOSI LEGNANO

Circ. 108 - 1956

C-E

vertical water tube boilers



FRANCO TOSI LEGNANO

For « VP » type water tube boilers. please refer to publication 105-1956.

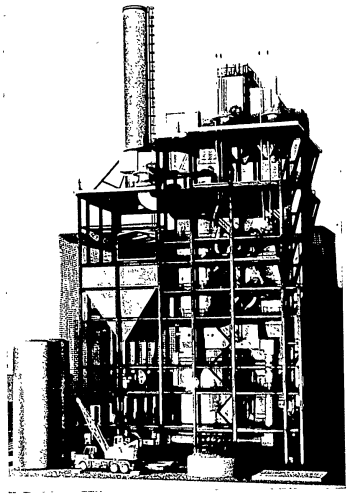
HOW TO JUDGE A BOILER

It is not possible to judge a boiler only on the basis of performance data given by suppliers and price quoted. A definite judgement can only be given after several years' operation, after which the following characteristics can be ascertained:

- Actual efficiency achieved through long periods of continued operation and not only through short tests carried out under the best of conditions.
- Boiler ability to operate under overload, as well as very low load conditions. Flexibility to rapid load changes and adaptability to automatic operation.
- Ability to fire various kinds of fuel as available on the market.
- Long life of all metal and refractory parts, whatever the fuel used.
- High purity characteristics of the steam produced.
- Utmost operational safety, particularly as regards the sturdiness of parts subjected to pressure, combustion and circulation regularity.
- Possibility to make a thorough clean-up of the boiler during operation, thus ensuring long periods of continued and troublefree service.
- Easy maintenance and guaranteed lay-up when the boiler stands idle are achieved by means of accurately designed devices.
- Manufacturer's ability to provide customers with a prompt and continuous assistance with regard to all problems connected with the designing, manufacturing, start up and operation of the steam plant.

Attainement of the above mentioned characteristics calls for a wide proportioning, a wide range of fittings, special care in the selection of materials, high standard engineering, manufacturing, erection and assistance organization, all these being factors which can largely justify any possible difference of price. As a matter of fact, FRANCO TOSI boilers are designed and manufactured after criteria of wide proportioning and sturdiness, with the object of ensuring the above mentioned advantages to all customers.

Both the company and the consultant engineer who want to purchase a boiler and wish to make it sure that same will operate smoothly for the years ahead,



U T E. - Montevideo (Uruguay) - TOSI-C.E Boiler. Capacity 292 T/h - Evaporating surface 3,000 sq mts - Design Pressure 75 Kg/sq.cm - Steam temperature 485 °C.

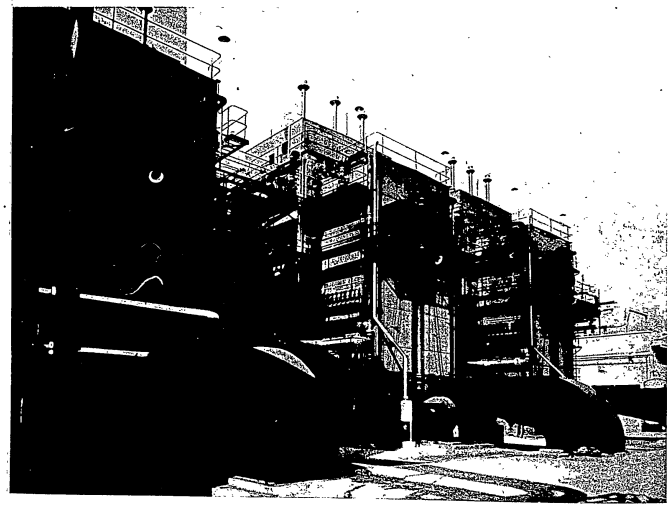
must make their choice fall upon a fully reliable manufacturer. In this connection, references should be regarded concerning units heretofore built; visits should be paid to operating plants, enquiring of station foremen who have been looking after boilers built by the same manufacturer for many years.

FRANCO TOSI has an experience of over 75 years acquired through manufacturing hundreds and hundreds of boilers of any type and size. The cooperation on the side of COMBUSTION ENGINEERING INC., NEW YORK, means a considerable increase of technical experience on a world wide scale.

Ultimately, it must be borne in mind that FRANCO TOSI is in a position to supply complete steam plants starting from softening and demineralizing equipment up to piping and turbogenerating sets, for which FRANCO TOSI assumes full responsibility as regards designing, manufacturing and start up of the plant. This also applies in the instance of FRANCO TOSI's sub-suppliers, thus assuring customers that the plant will give most perfect answers to their requirements.

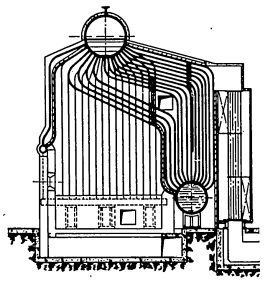
What above illustrated clearly shows how FRANCO TOSI can be regarded as a most reliable supplier. This is proven by the fact that many important companies have time after time afforded their preference to TOSI boiers and have always expressed highly satisfied with the services provided for by TOSI's organization.

CONDOR REFINERY, RHO (Italy) - Three vertical tube boilers - Capacity 45 T/h each - Evaporating surface 700 sq mts. - Design Pressure 54 ate - Steam temperature 420 °C.



VS type boilers

FOR INDUSTRIAL PURPOSES



Sectional view of a TOSI-C.E. « VS » Series boiler.

« VS » type boilers have been designed by C.E. to serve industrial requirements under the worst conditions. These boilers have been featured in such a way as to allow easy operation and maintenance, flexibility to sudden load changes, and sturdiness. Although this type of boiler is not a too expensive one, nothing has been spared to assure exceptional reliability and provision has been made for the most up-to-date devices.

field of application

Suitable for output requirements varying from 5 to 20 t/h, « VS » type boilers are equipped with oil or gas burners and, if required, with coal stokers too. They can produce saturated or superheated steam.

proportioning

A considerable amount of latitude has been allowed for in the proportioning of the size of « VS » type boiler furnace, so as to permit the utilization of low grade fuels without any difficulty and keep the thermic and mechanic stresses of the various boiler parts within safety limits. The broad size of the drum and the remarkable water capacity of this type of boiler make it particularly suitable to stand quick load variations, while special steam separators prevent water from flowing into the steam.

radiant heat boilers

In addition to furnace wall tubes, 65 % of the first bank of boiler tubes are flame radiated; therefore, brickwork maintenance is practically abolished, with the added advantage of a uniform and rational distribution of heat. Higher furnace temperatures can be tolerated and combustion is facilitated.

efficiency

« VS » type boilers are proportioned in such a way as to ensure a high efficiency which can be increased further by the adoption of economizers or air heaters when this is made advisable in view of continual operation requirements and high cost of fuels.

foundations

Supported construction instead of overhung construction enables to eliminate the costly and complicated supporting frame. This way, foundations are lightened and simplified. FRANCO TOSI supplies purchasers from time to time with all data required for building of the necessary foundation works.

circulation

Water circulation in « VS » type boilers has been rationally designed. In addition, circulation is favoured by a remarkable head between the two drums, as well as by the broad dimensions of tubes. Hence,

a rapid and safe circulation under any load conditions, no scaled slag, no deposits and utmost working reliability.

lining

Refractory bricks closely connected to tubes, insulating blocks and metal or plastic material casing, constitute a lining of high insulating power, perfect air tightness, extreme lightness, long life and free heat expansion.

automatic controls

FRANCO TOSI is in a position to supply or assist customers in the selection of an automatic control system which is studied from time to time according to operation requirements and economical convenience factors.

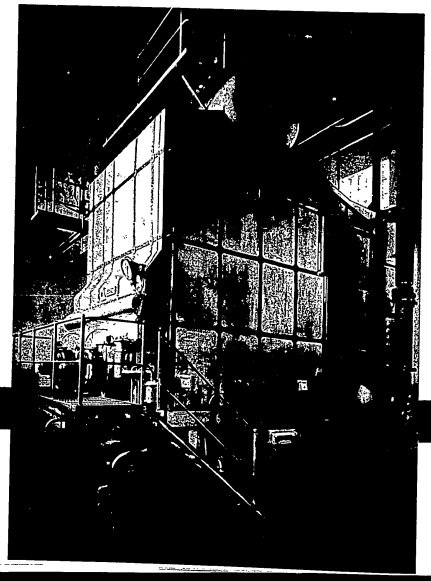
operation

« VS » type boilers are very simple to operate; the widest technical assistance connected with firing, lay-up of boiler and other relative problems, is provided for by FRANCO TOSI through skilled engineering staff and special instruction booklets.

maintenance

Bending of tubes has been designed in such a way as to allow cleaning of all the tubes from the upper drum by means of conventional type cleaning devices. A rationally performed soot blowing operation permits a thorough cleaning of tubes during operation, while all the parts are easily accessible when the boiler is out of service.

FIAT - SPA - Turin (Italy) - 432 sq mts TOSI-C.E. boiler - Capaciy 15 T/h of saturated steam at a pressure of 22 Kg/sq.cm. eff.



VU TYPE VERTICAL UNIT BOILERS

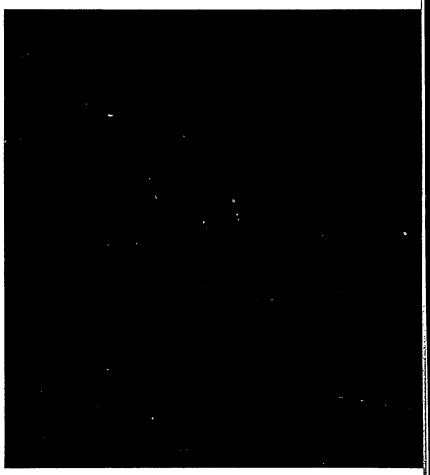
These boilers are designed to suit both steam production needs of big industries and of small power stations, where a steam output ranging from 20 to 150 T/h is needed, assuring at the same time the utmost operational reliability, flexibility to load variations, high efficiency and low operating cost Installation may be either indoor or outdoor.

adaptability

« VU » type boilers are, in a general way, integral furnace - two drum boilers with interposed tube bank. They are equipped with superheaters and heat recuperators. These boilers are, however, featured from time to time in such a way as to make them adaptable to the nature of their intended operation, space requirements and type of fuel used. This way, the general layout may be obtained in a number of different ways.

combustion equipment

« VU » boilers are suited to the use of oil or gas, pulverized coal and may also be adapted to grate stoker plants. The various fuels may be fired either alone or simultaneously and the boilers may be suited to fuel change-over.



Sectional view of a TOSI-C E. « VU » Series boiler.

efficiency

The ample size of the furnace which is completely covered by waterwall tubes, the efficiency of firing equipment, the rational design of gas flow in the tube bank and the use of air heaters and economizers, are all factors which help assure a highly efficient combustion and a maximum recovery of the combustion gas heat. In other words, all of this accounts for a higher efficiency.

operating costs

FRANCO TOSI's technical assistance to customers is extended to the study of operating costs according to the various possible solutions. In determining the operating costs, account is taken of the cost of fuel, operational and maintenance expenses, auxiliary equipment power consumption and any other expense involved with boiler operation. This permits to easily find out the most suitable solution from both a technical and economical point of view, with reference to the nature of required boiler operation and available fuel.

VU boiler construction

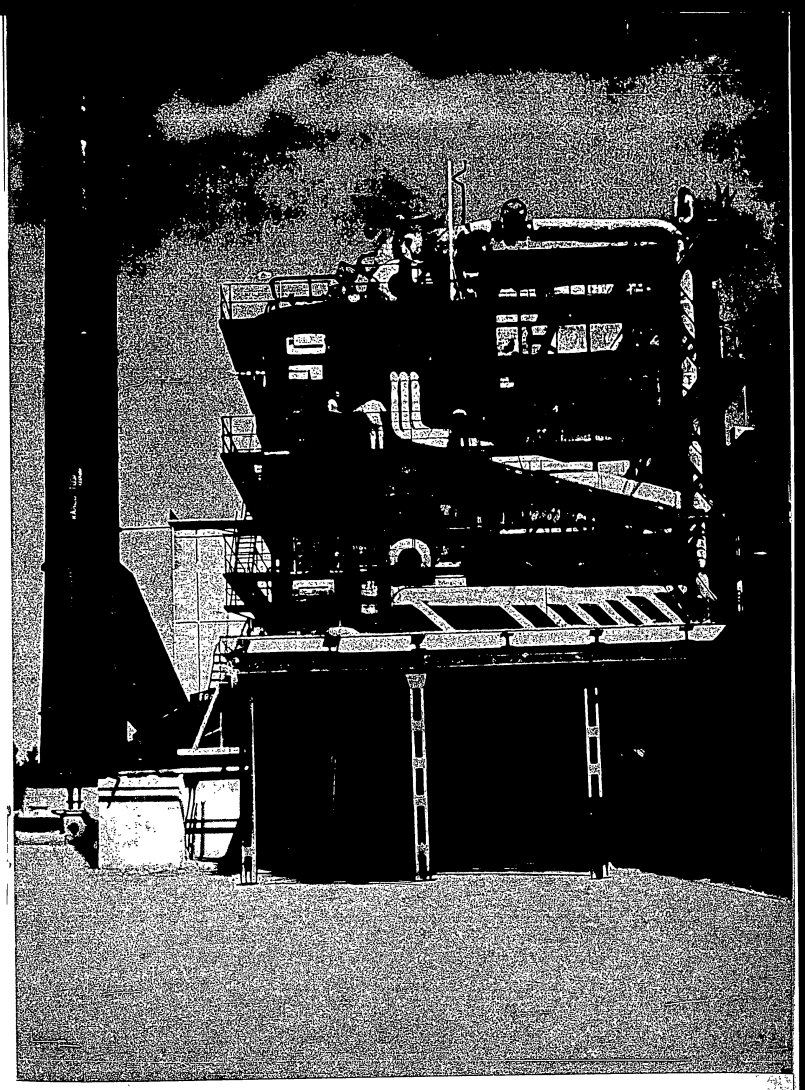
The « VU » boiler may be bottom supported or top suspended to a steel frame, according to dimensions and field arrangement factors. Whatever the supporting system adopted, FRANCO TOSI gives buyers all the necessary assistance for the study and construction of foundation works. As far as boiler casing is concerned, this consists of suitably arranged refractory and insulating material. with steel supporting frame and plastic or steel sheet outside lining.

operational safety

This is made possible thanks to a very conservative proportioning of all the boiler parts subjected to thermal and mechanical stresses. When the manufacturing process is on, accurate laboratory investigation and hydraulic tests are carried out on these parts. An active natural circulation, checked through precise calculations, ensures cooling and long life of screen tubes and tube banks, while the rational designing of firing equipment guarantees a reliable and efficient combustion, thereby preventing possible damages to masonry or metallic parts. Also the masonry works, which may freely expand and which is screened by waterwall tubes, is featured to ensure a long life and calls for a minimum of maintenance.

service

FRANCO TOSI places at customers' disposal its chemical staff specializing in water treatments, as well as skilled engineers to solve any problem connected with the firing and operation of boilers. Customers can also avail of the service provided for by FRANCO TOSI's technical departments and laboratories for the study of each individual problem related to operation, maintenance, lay-up of boilers, as well as operating instructions to personnel in charge of steam generating units.

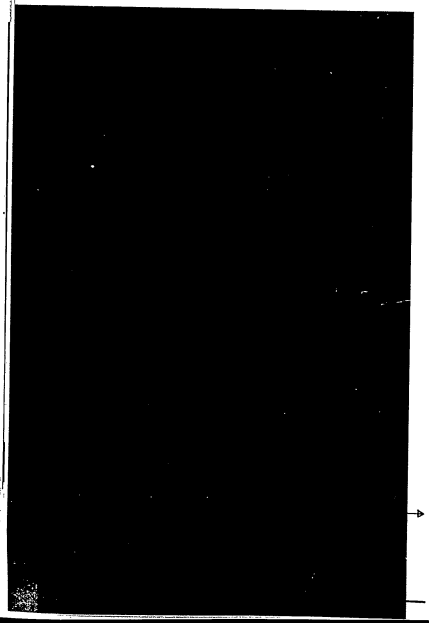


SACCARIFERA LOMBARDA - Jolanda di Savoia plant - TOSI-C.E Vertical Unit boiler - Capacity 60 T/h - Evaporating surface 1,250 sq.mts - Design pressure 38 ate - Steam temperature 420 °C.

BIG SIZE RADIANT BOILERS

Big Integral Furnace boilers for thermolectric power plants are studied from time to time according to the particular requirements each plant has to answer. These boilers may be either natural circulation or controlled circulation types, with or without steam reheating and are generally designed to provide the highest efficiencies.

TOSI-C.E. « RR » Type Radiant boiler - Maximum continuous output 725 T/h - Design Pressure 145 ate - Steam temperature 540 °C.



special boilers

The ample sizes of these boilers, the need to reach higher and higher pressure and temperature values within the maximum admitted materials stresses, the particular problems connected with space requirements, with fuels nature and type of operation, the opportunity of a thorough technical and economical comparison among the various possible solutions, are all factors which entail a very detailed study of each project, irrespective of standard constructions.

Never as in these instances does the cooperation and assistance provided for by COMBUSTION ENGINEERING INC. and FRANCO TOSI to purchasers develop to its utmost extent. As a matter of fact, every time FRANCO TOSI is committed with the supply of one of these particular plants, it uses to keep very closely in touch with both C.E. and customer's technical departments. Furthermore, FRANCO TOSI arranges for investigations being carried out on similar operating plants both in Italy and abroad, for accurate and detailed technical reports and offers being submitted to the parties concerned, and, ultimately, for engineering services being made available to customers as may be required to look after the designing and manufacture of each particular plant. In addition to this, FRANCO TOSI's technical staff looks after the field organization, erection and start-up of boilers.

In turn, besides supplying all the necessary technical data, COMBUSTION ENGINEERING INC. arranges, if so required, to send its own technical representatives out to the spot for talking problems connected with the plant design over with the manufacturer and customer, also to supervise erection and start-up of the steam generating units.

steam temperature control

Wherever the temperature of superheated steam is required to keep constant even with wide variations of load, provision is made for tilting tangential burners which are an exclusive feature of C.E. boilers. Provision can also be made, if necessary, for gas recirculating and bypass devices. This way, it is possible to operate normally without injecting spray water into the desuperheaters installed for emergency purposes only, and the injection of water into the steam, with possible inconveniences, is employed only exceptionally. A skilled Control Engineering Department takes care of the study and coordination of combustion, temperature and water-level controls, so as to assure a completely automatic and centralized boiler control system, providing at the same time utmost simplicity and minimum expense.

circulation

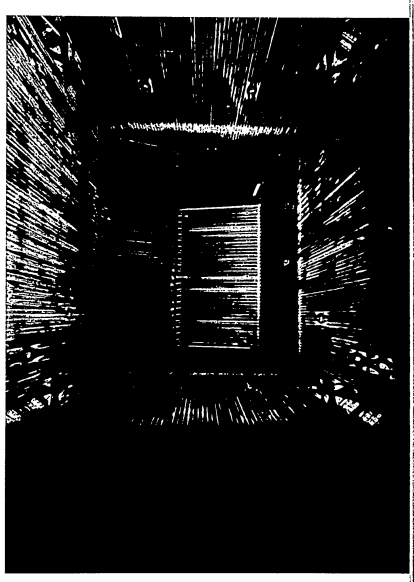
The remarkable height of these boilers and the rational design of the various water circuits assure a reliable and uniform circulation which is amply proportioned to the heat absorption of each evaporating surface. In the instance of very high pressure boilers, or whenever the height of the steam generator must be reduced, one may adopt the

« controlled circulation »

Boilers, where the water is circulated by means of special pumps. Besides being less nigh in comparison with other boiler types, controlled circulation boilers offer the advantage of a reduced thermal inertia and a positive circulation which make these boilers very adaptable to quick startings and sudden variations of load.

construction

The boiler is top supported by a sturdy steel frame to assure free thermal expansion. This feature is of great importance because of the ample dimensions and high temperatures in the furnace.



SADE - Porto Marghera (Italy) - TOSI-C.E. Radiant boiler - Inside view of furnace seen from the bottom. Coal, oil and gas burners can be seen at the four corners.

In the instance of outdoor installations, the supporting frame is designed in such a way as to stand the wind pressure and other working loads, provision being made, of course, for a suitably insulated and tight steel casing.

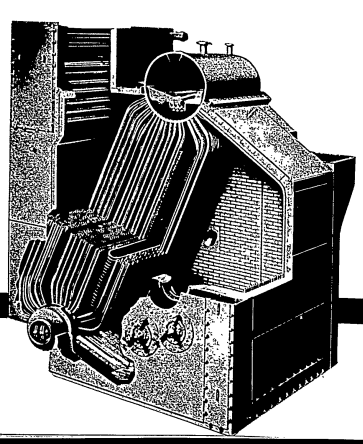
The rational installation of many powerful soot blowers allows long periods of uninterrupted and troublefree boiler operation, while the utmost care is given to full accessibility to all the boiler parts for cleaning and maintenance purposes.

MARINE BOILERS

Besides having to answer all those requirements which are usually expected from a boiler, marine boilers must suit to the particular board operating conditions, so as to meet with the following characteristics:

- *insensibility to the ship's rolling and pitching motions*
- *limited overall dimensions and adaptability to the hull shape and superstructures*
- *limited weight to the advantage of the carried useful load*
- *high efficiency to cut down steaming cost and reduce the weight of stored fuel*
- *utmost sturdiness and operational reliability in view of the importance of assuring continuous operation under any circumstances*
- *boiler ability to run unlimited time with no cleaning stop*
- *utmost flexibility to ensure easy and full manoeuverability*
- *extreme simplicity to assure easy operation, maintenance and repair work, without exceptionally skilled personnel*
- *ability to fire the lowest grade fuels as may be available in the ports the seamer calls at.*

It can be easily realized that, besides having to posses a really deep knowledge of this manufacturing field, the marine boiler manufacturer must also be long experienced with shipboard requirements. FRANCO TOSI has been supplying steam generating units to both Merchant and Military Navy for over fifty years.
Moreover, FRANCO TOSI has integrated this valuable experience with a close cooperation with COMBUSTION ENGINEERING INC., NEW YORK, this latter being particularly specializing in the manufacture of up-to-date design marine boilers.

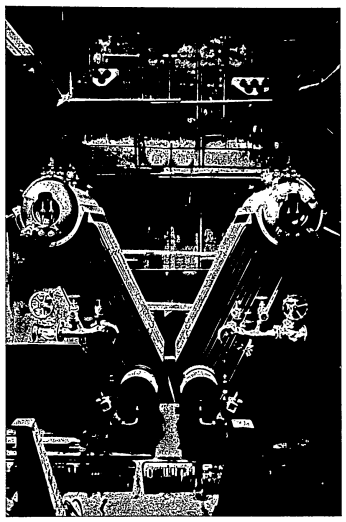


TOSI-C.E Two-Drum Bent Tube Marine boiler, complete with watercooled roof and side furnace wall, superheater, desuperheater and economizer

TOSI-C.E. sectional header marine boiler is a modern version, designed to meet with ship-board requirements, of the standard sectional header boiler. However, the most up-to-date marine boiler design which fully answers the foregoing requirements is the:

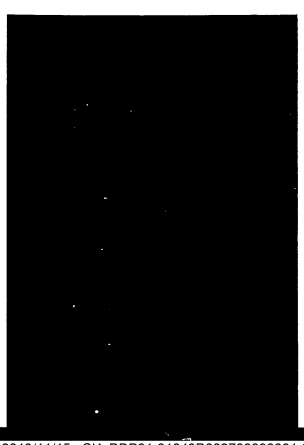
Tosi-C.E. vertical unit Marine boiler

This is a twin drum, water wall screened furnace-boiler as illustrated by the pictures at right. Welded steel casings are provided with adequate access doors, while brickwork is reduced to a minimum. These boilers have an amply sized upper drum provided with suitable internal separators to prevent any objectionable carryover. Superheaters, economizers, air heaters, firing equipment, soot blowers, fans and all other boiler accessories are manufactured by FRANCO TOSI in strict compliance with standards specially selected to meet with ship-board requirements.
Whenever weight and overall dimensions require being reduced to the utmost extent possible, a suitable answer is then given by the:



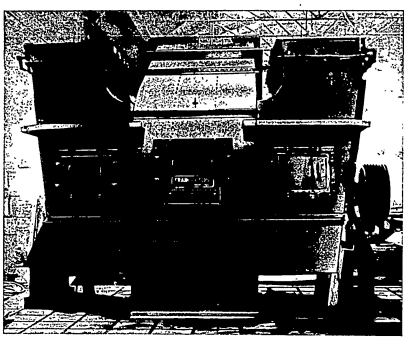
Two TOSI-C.E. Bent Tube boilers, as installed on board s/s « INTEGRITAS » - - Maximum steam output 22 T/h each, at a pressure of 32 ate - Steam temperature 400 °C.

TOSI-C.E. Marine type boiler - Capacity 10 T/h of steam at a pressure of 65 ate - Steam temperature 450 °C.



Tosi-C.E. controlled circulation Marine boiler

where a smooth circulation is ensured by specially designed pumps. The tubes diameter may therefore be reduced and, since the tubes may be placed in any position, the design and arrangement of heating surfaces can be freely adapted to any space conditions. TOSI-C.E. Controlled circulation boilers with their suitability for high pressures and high capacities, utmost flexibility of operation, are ideally suited for marine applications.

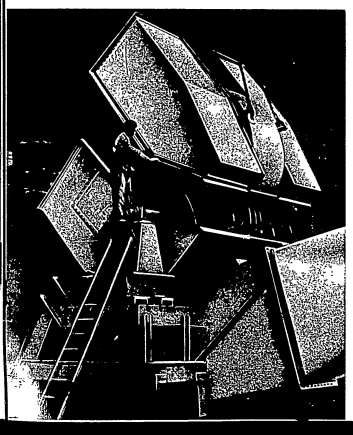


U.T.E. - Montevideo (Uruguay) - TOSI-WESTINGHOUSE Induced Draft Fan - Capacity 85 cu.mts/sec. - Pressure 372 mms. H_2O - Gas temperature 183 °C.

FANS

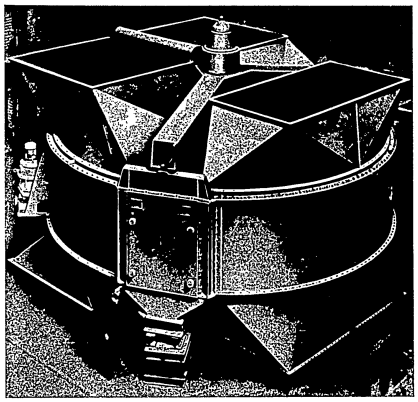
Forced draft fans and Induced draft fans are not simply boiler accessory parts. A proper selection, designing and manufacture of fans plays a leading part as far as boiler performance, operational reliability and flexibility are concerned.
A really deep knowledge of all problems connected with combustion and a long experience background are necessary to solve all the problems related to minimum power consumption, simultaneous use of different fuels and automatic control. In the instance of recirculating gas fans, one must bear in mind the difficulties caused by high temperature and solid particles carried by gases.
It is because of the above reasons that Franco Tosi prefers to design and manufacture by itself the fans to be applied to Tosi made boilers. In this connection, Franco Tosi avails of the cooperation established with WESTINGHOUSE STURTEVANT DIVISION, U. S. A., with whom Franco Tosi has signed a manufacturing licence agreement.
TOSI - WESTINGHOUSE, STURTEVANT fans are featured by:

- An appropriate design to meet with any requirements.
- High efficiency, also under reduced load conditions.
- Accurate balancing and utmost reliability of service.
- Ruggedness and long life.
- Rational application of automatic control equipment.
- Possibility of being driven by means of electric motors (with or without adjustable speed coupling), or by a steam turbine.



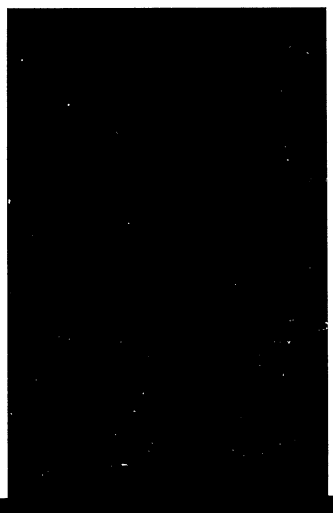
SACCARIFERA LOMBARDA - Molinella Plant - TOSI Centrifugal Fan for flue gas suction.

Regenerative type LJUNGSTROM Air Preheater.

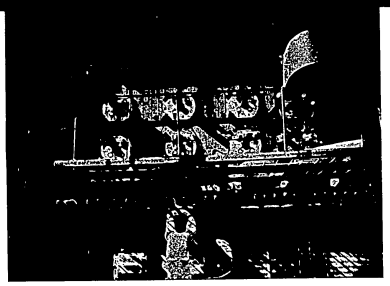


AIR PREHEATERS

The modern practice to increase the feedwater temperature by means of turbine-extracted steam, tends to reduce or eliminate the economizer and increase the importance of the role played by the air preheater accordingly.
The problem connected with the dimensioning of the economizer and air preheater, or the selection between the one and the other, concerns, therefore, the whole steam plant. FRANCO TOSI's technical organization which avails of a long experience background in the design of complete steam plants, is in a position to propose the most economical solution under a manifold aspect, that is to say, overall heat balance, and plant operation.
The selection between tubular type, plate type or regenerative type (Ljungstrom) Air Preheaters — the selection of the materials suitable for each zone of the air preheater in relation to temperatures and fuels used — the layout and proportioning of cleaning devices as may be required to the effect of assuring high efficiency even after a long time of operation — the adoption of particular devices (recirculation, by-pass, steam air preheaters), these being used to protect the air preheaters from corrosions even during small output operation — represent as many problems which Franco Tosi can solve in the most suitable way, from both a technical and economical point of view.
This is made possible thanks to Franco Tosi's own experience and to the cooperation with Combustion Engineering Inc., New York, and with Svenska Rotor Maskiner Aktiebolag, Stockholm (Sweden).



Tubular type Air Preheater.



SACCARIFERA LOMBARDA - Jolanda di Savoia Plant - Front view of burners installed on a TOSI - C.E.60 T/h, 1,250 sq.mts., 420 °C Vertical Unit boiler - outdoor installation.

FIRING EQUIPMENT

Franco Tosi manufactures and applies firing equipment to Tosi made boilers, for:

Fuel oil (light or heavy), tar, pitch, and other refinery by-products.

Natural gas, refinery gas and other industrial gases.

Coals and lignite, whether at the solid or pulverized state.

Wood waste fuel from the wood working industry and vegetable waste products such as olive husks, grape husks, etc.

The same boiler may be equipped for firing more than one type of fuel, so that the most economic operation is assured all the time, in relation to the fuel market conditions.

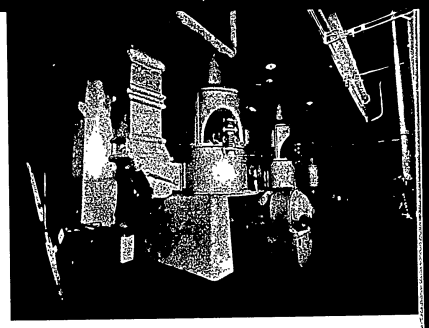
The maximum steam output of the boiler, flexibility, efficiency, cleanliness, preservation from corrosions, as well as operational reliability, are all dependent on the proper perfomance of the firing equipment.

Franco Tosi firing equipment is designed, manufactured and applied to the boiler as an integral part of the boiler itself and is supplied complete with all accessories. In this connection, Franco Tosi takes due account of the characteristics and size of the steam generating unit, nature of operational diagram and type of fuel to be fired.

May we say, in this regard, that experience is the best teacher that can suggest the best among many types of firing equipment, and what manufacturing details should be adopted. This also refers to the equipment layout, control systems, etc.

Franco Tosi has by this time built up a considerable experience which is backed by the cooperation with highly skilled Companies such as Combustion Engineering Inc., New York - Todd Oil Burners Ltd., London (England) and Todd Shipyards Corp., New York.

FIAT - SPA - Turin (Italy) - Boiler Room. - On the background is a new 432 sq.mts boiler capable of 15 T/h of saturated steam at a pressure of 22 Kg/sq.cm. eff.



SOC. TERMOELETTRICA VENETA - Porto Marghera (Italy) - Installation view of TOSI-RAYMOND Bowl Mills

fuel oil firing equipment

Franco Tosi manufactures Rotary Fuel Oil Burners, Mechanical Atomizing Burners and Steam Atomizing Burners. The plant is supplied complete with oil strainers, oil heaters, pumps, pipings, valves, governing devices and accessories. All of this is designed in a most rational way, so as to assure the utmost operational reliability.

gas firing equipment

When fuel availability calls for gas firing, Franco Tosi is also in a position to supply complete gas burning equipment and assist customers in the selection and adoption of all the necessary safety devices.

coal and other solid fuels firing equipment

For small and medium size boilers and where coal or industrial — agricultural residuals are to be utilized, Franco Tosi manufactures and installs: Traveling Grate Stokers - Spreader Stokers, dumping or continuous discharge type - Underfed Single Retort Stokers - Sloping Grates for poor grade fuel and Small Flat Grates.

In big size steam generating units, coals or lignites are fired in a pulverized state.

In this connection, Franco Tosi supplies complete coal pulverizing plants including feeders, automatic weighing equipment, bowl mills, pipings, burners and all control devices.

Worthy of note are the Rotary Bowl Mills complete with lined exhauster foir air circulation and dust classifier. These coal pulverizing mills are manufactured by Franco Tosi under Combustion Engineering - Raymond Div.'s manufacturing licence.

Pulverized coal burners are part of a completely coordinated system for pulverizing, carrying, distributing and firing the coal, in order to produce steam at the required pressure and temperature. These coal burners may be designed to burn both gaseous and liquid fuels separately, or in combination with pulverized coal.

In the most important cases, Tosi-C.E. Tilting Tangential Burners are installed at the four corners of the furnace so as to assure the turbulence and mixing of fuel and air necessary for a rapid and completely satisfactory combustion.

The vertical tilting of burners enables to keep the temperature of superheated steam constant within a wide range, both as regards variations of load and as regards cleanliness condition of the furnace.

SOC. TERMOELETTRICA VENETA - Porto Marghera (Italy) - Boiler No. 7 - Burners operating floor.

[redacted]

SOOT BLOWERS

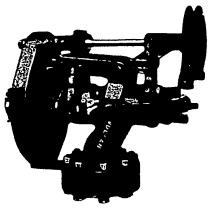
The always higher availability expected from a modern water tube boiler and the ever poorer qualities of fuels account for the importance of a rational design, accurate manufacture and proper application of soot blowers to the effect of assuring a long period of continuous operation with a high average efficiency rate of the steam generating units. This means cheaper steam plant operation too.

manufacture

The importance of a soot blower to assure a proper boiler operation, the complexity of performances expected from a boiler, the high temperatures and pressures of fluids, are all factors which demand that a modern design soot blower be not just an ordinary boiler accessory part; on the contrary, an up-to-date soot blower must play the role of a machine proper and should be therefore designed, manufactured and assembled accordingly.

« T 3 » type automatic Long Retractable Soot Blower.

[redacted]



« P 3 » type manually operated Rotary Soot Blower.

Franco Tosi has entered into a Licence Agreement for the manufacture of soot blowers with COPES VULCAN DIVISION, ERIE 4, PA. (U.S.A.), whereby Franco Tosi can benefit from the very wide experience gained by this American Company in soot blower manufacture.

application

The proper selection and application of soot blowers calls, among other factors, for a deep knowledge of boilers and boiler operation. It is, therefore, a most important thing that soot blowers be designed and manufactured by the same boiler maker. Franco Tosi is in a position to fit to its own boilers as many soot blowers as may be necessary to assure the utmost efficiency. In this connection, it must be borne in mind that a useless blower means an unjustified waste of steam.

operation and maintenance

The study of manufacturing details and the selection of materials used in the manufacture of VULCAN soot blowers are based upon a criterion to provide easy manoeuvrability and cut down maintenance costs and labour, assuring at the same time the utmost operational reliability.
In big size boilers, soot blowing may be easily achieved in accordance with prearranged schedules, by means of centralized automatic-sequential operation control panels.

[redacted]

Automatic - sequential operation centralized panel control.

rotary soot blowers

« P3 » Rotary soot blowers are manually operated, while « E.4 » soot blowers are motor driven either by compressed air or electric motor. The blowing medium may be either steam or compressed air. Cleaning starts instantly at full blowing pressure, continues at uniform speed and is positive in all directions. The valve has a very low pressure drop, with no internal spring and is sealed off from the corrosive furnace gases and condensate, which assures a long life to the valve. All the working parts of the blower are outside the boiler. Re-packing, re-grinding and replacement of valves, as well as any other important part of the blower can be done in a matter of minutes without special tools.

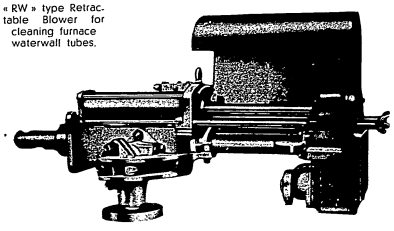
furnace retractable blowers

« RG » manually operated blowers and « RW » mechanically operated blowers (electric power or compressed air), are designed for cleaning the furnace waterwall tubes. Blowing medium may be steam or air, or both.
High striking power to remove soot and slag is assured by a proper sizing and arrangement of nozzles. All working parts, mainly valves and motors, are sealed off from corrosive furnace gases and condensate, and are designed in such a way as to make maintenance as easy as possible.

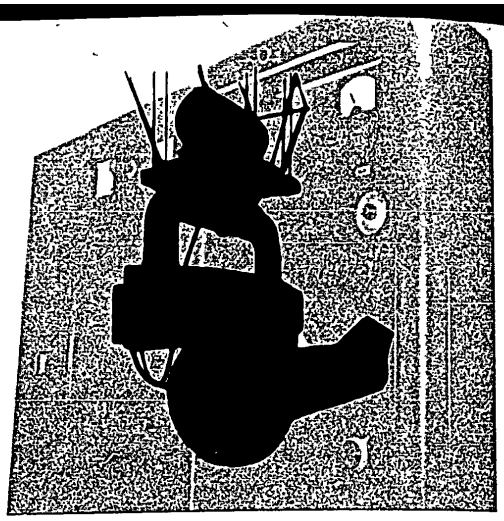
T 3 long retractable blowers

Where high gas temperature makes it impossible to use rotary blowers, long retractable units are used, with a travel up to about 25 ft. Except while blowing, all the working parts are outside the boiler for easy access and maintenance. Drive may be either by air or electric motor and is designed in such a way as to form an infinite number of helical patterns for more effective cleaning and minimizing tube cutting danger.

« RW » type Retractable Blower for cleaning furnace waterwall tubes.



RESEARCH AND TEST LABORATORIES



X-Ray Testing Unit

Research and Test Laboratories of Franco Tosi, which also include an Annealing Department, have been completely renewed and extended to include as many facilities as possible. Activity of these laboratories in connection with the boiler field is mainly conducted in three ways, viz.:

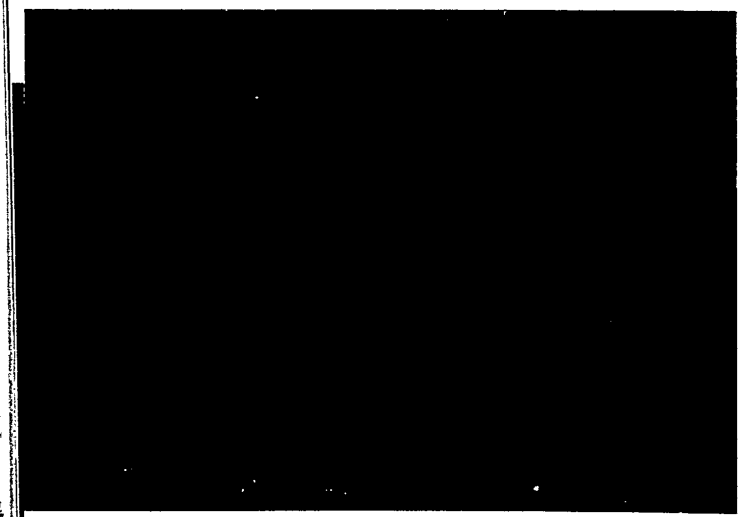
fuel analysis

This enables Franco Tosi to promptly collect all data necessary for the designing of firing equipment, coal pulverizing mills and other accessories. Moreover, any information connected with the firing of fuels such as provided for by this analysis, may be available to the customer.

water analysis

This includes:
examination of raw waters, prior to proceeding with the study of water conditioning plants.
examination of treated waters, so as to check the water treating equipment operation.
examination of boiler feed-waters to prevent steam contamination and boiler scaling or corrosions.
All of this falls within the frame of the technical assistance which FRANCO TOSI makes available to its customers with the purpose of facilitating a most suitable selection and operation of Tosi boilers and relative accessories.

View of the Heat Treatment Division and Analysis Laboratories building.



test of materials

A special department of these laboratories looks after the preparation of specimens which other departments will subject to mechanical and micrographic tests. This permits to determine the characteristics and structural features of the used materials, to conduct studies on the heat treatments previously made or yet to be made, as well as to ascertain of the full suitability of the various parts.
Non-destructive controls are carried out by means of X-Ray equipment, ultrasonics and magnetoscope, on cast, forged and welded pieces. Special mobile units allow to check also those weldings which must necessarily be made on the erection site.
All of these tests are conducted in a close cooperation with A.N.C.C. (Italian Boilers Inspection Association), RINa (Italian Naval Registration Board), as well as with other Foreign Associations. This is, therefore one more guarantee that FRANCO TOSI boilers are manufactured in strict compliance with all the regulations provided for by the law.

Franco Tosi

S. p. A. LEGNANO

Actual production:

Complete Thermoelectric power Stations
Gas turbines
Diesel engines
Steam naval propulsion units
Fans, pumps, centrifugal and axial compressors
Marine main machinery and auxiliaries
Complete cement plants
Hydraulic turbines, valves, sluice gates, pressure conduits
Cast iron, steel and various alloy castings

Legal seat: Milan, Via Brisa 3 - Cables: Francotosi

Head office: Legnano, Corso Italia 27, tel. 47.690 - Cables: Tosi - Legnano.

Rome office: Via Vittorio Veneto 89, tel. 462.884 & 480.227
Cables: **Francotosi** - Rome.

Hydroelectrical plants design office: Milan, Via G. B. Sammartini 5, tel. 600.021 & 600.022.

Commercial Offices adroard:

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Cables: Cirelectric - Paris

New York - A. Matteini, 114 Liberty Street - New York 6 N.Y., Tel. Worth 2-0391.

Affiliated Companies:

Franco Tosi Argentina - Buenos Aires - Calle Tucuman 358
Cables: Francotosi, Buenos Aires
Franco Tosi Oriente - Beirut - Avenue des Français 12 - tel. 61.37
Cables: Nijabre, Beirut

Franco Tosi de Venezuela
c/o DIMCO
Apartado 942
CARACAS (Venezuela)
Cables: Tosi - Caracas

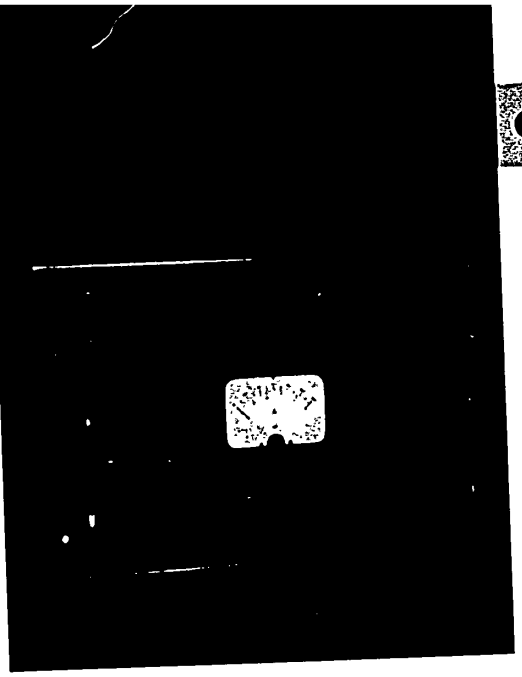
District offices in all Italy
Representatives in the main countries of the world

COPERTINA C. VERMIGLIO
STAB. POL. G. COLOMBI & P.A. - MILANO

ALIMENTATORI IN C. C. STABILIZZATI

STABILIZED D. C. POWER SUPPLIES

AS/TAM



C 6/2

microlambda

- COMPLETAMENTE STATICI
- SICUREZZA DI FUNZIONAMENTO
- ALTO RENDIMENTO
- NESSUNA MANUTENZIONE
- DURATA PRATICAMENTE ILLIMITATA

Gli apparecchi di questa serie sono di nuova ed originale concezione e dànno prestazioni veramente notevoli, sia sotto l'aspetto della funzionalità tecnica che da quello della sicurezza di esercizio.

L'impiego dei transistor e degli amplificatori magnetici, nonché l'uso di raddrizzatori al silicio, li pongono su un piano tecnico di alto livello.

Gli stabilizzatori di questa serie sono stati normalizzati in tipi aventi le seguenti caratteristiche:

— Tensioni corrente continua: da 20 a 100 V.
da 40 a 200 V.
da 60 a 300 V.
da 80 a 400 V.

— Correnti: 1 - 2,5 - 5 - 10 Amp.

Costruttivamente gli apparecchi sono previsti per montaggio su pannelli normalizzati da 19" con o senza telaio chiuso di custodia. L'unità di controllo è normalizzata per tutti i tipi sopra specificati su un pannello di due unità.

- NO MOVING PARTS
- RELIABILITY
- HIGH EFFICIENCY
- NO MAINTENANCE
- LONG LIFE

This series of apparatus has been made according to a new and original design, giving excellent performances in both the technical functioning and the security of operation

The use of transistors and magnetic amplifiers, together with silicon rectifiers, grants for the high technical standard of these equipments.

The stabilizers of the AS TAM series have been standardized in types having the following features:

— D. C. Voltages from 20 to 100 Volts
from 40 to 200 Volts
from 60 to 300 Volts
from 80 to 400 Volts

— Currents. 1 - 2.5 - 5 - 10 Amp.

These units are produced for mounting on 19" standard rack panels with or without a closed chassis cabinet. The control is normalized for all the above mentioned types, on a panel of two units.

BREVETTI
RAYTHEON
MFG. CO.

Per ottenere ulteriori informazioni rivolgersi alla MICROLAMBDA S.p.A. - Via F. di Savoia, 6 - Roma

Further information can be obtained from MICROLAMBDA S.p.A. - Via F. di Savoia, 6 - Roma

CARATTERISTICHE TECNICHE

Alimentazione: C. A. monofase, 50 Hz

Tensione uscita in C. C.:
Prefissabile su qualunque valore - stabilizzata al ± 1% per variazioni della tensione di alimentazione del + 15% e del carico da zero al 100%

Ondulazione residua: da 0,5% al 2%

Tempo di risposta: da 0,1 a 0,4 secondi

Rendimento: 70% circa alla massima tensione

Accessori: amperometro, voltmetro, interruttore generale, protezioni, reostato di regolazione, lampade, morsetti, ecc.

TECHNICAL CHARACTERISTICS

Input: A. C 50 c.p.s., single-phase

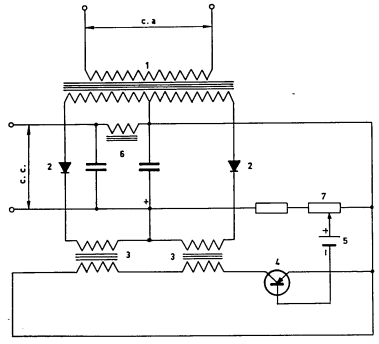
Output Voltage adjustable at any value - stabilized within 1 from no load to full load with line voltage changes of 15

Ripple. from 0.5 to 2

Response time from 0.1 to 0.4 seconds

Efficiency 70 at maximum voltage

Accessories Output Volt-Ammeter - control circuit and power circuit fuses - terminals - input switch - potentiometer for voltage control, etc

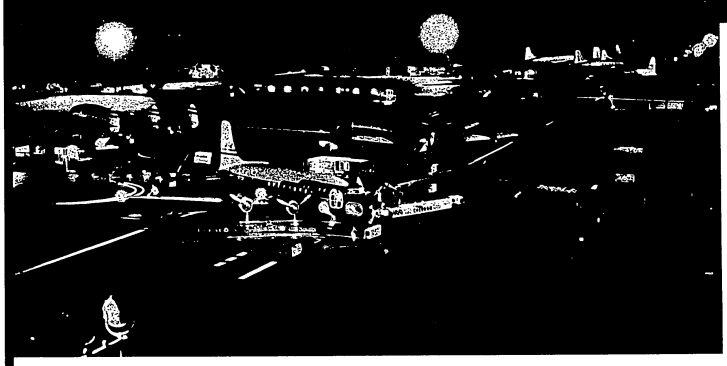


1 - Trasformatore di alimentazione
2 - Raddrizzatori
3 - Amplificatori magnetici
4 - Transistor
5 - Referenza
6 - Circuito di filtro
7 - Regolazione della tensione di uscita

1 - Power Transformer
2 - Rectifiers
3 - Magnetic Amplifiers
4 - Transistor
5 - Reference
6 - Filter Circuit
7 - Output Voltage Control

2000 - 5 - 58

microlambda - Via F. di Savoia 6 - Roma - Stab. in Pozzuoli (Napoli)
Stampato a cura della nuova produzione della Microlambda con la direzione artistica di C. Schneider - Grafici - Graf. Ipes - Roma



microlambda

ML/AS - E

RADAR PER LA SORVEGLIANZA AEROPORTUALE
AIRPORT SURVEILLANCE RADAR

- **INDIPENDENZA DALLA SITUAZIONE METEREOLOGICA**
- **TELECOMANDO DELL'APPARATO FINO A 2000 METRI**
- **PRESTAZIONI SECONDO LE NORME ICAO**

- **INDEPENDENCE FROM WEATHER SITUATION**
- **REMOTE CONTROL OF EQUIPMENT UP TO 2000 METERS**
- **PERFORMANCES MEETING ICAO SPECIFICATIONS**

Per il controllo del traffico nei pressi degli aeroporti è stato ormai universalmente accettato l'impiego di appositi apparati radar. Il radar ML/AS-E, basato sull'impiego delle unità dell'apparato AN/TPS-1E, le cui prestazioni e caratteristiche sono ben note, rappresenta un apparato nettamente superiore alle specifiche ICAO, specie per la portata massima e la copertura nel piano verticale. Ciò ne garantisce l'utilizzazione anche con l'avvento degli aerei di linea con propulsione a reazione.

Il sistema, composto da una sola antenna alimentata da uno o dall'altro dei due ricetrasmettitori, può essere telecomandato, via cavo, fino alla distanza di 2 km, dove è sistemato il ripetitore PPI. Normalmente viene fornito il tipo VJ-1, ma qualunque altro ripetitore di adeguate caratteristiche può essere impiegato.

L'apparecchiatura è dotata di tutta la strumentazione necessaria a mantenerla in perfetta efficienza.

For the control of air traffic around the airfields special radar equipments are now adopted anywhere. The ML/AS-E, using the basic units of the AN TPS-1E radar set, an equipment well known for its performances in air search duties, fea ures characteristics well over the ICAO specifications, mainly in range and high coverage. This ensures the useful use of the system also when jet airliners will become operational.

The ML/AS-E system includes one antenna connected to one or the other of the two Receiver-Transmitters, and can be remotely controlled by cable up to 2 km, where the PPI repeater is located. The standard type of indicator is the type VJ-1, but any other repeater with suitable characteristics can be used.

A complete set of measuring and checking instruments is supplied whith the equipment for maintenance and repair purposes.

BREVETTI RAYTHEON MFG. CO.

Per ottenere ulteriori informazioni rivolgersi alla MICROLAMBDA S.p.A. - Via F. di Savoia, 6 - Roma
Further information can be obtained from MICROLAMBDA S.p.A. - Via F. di Savoia, 6 - Roma

CARATTERISTICHE TECNICHE

Frequenza	1220 ÷ 1350 Mc/s
Potenza di picco	500 Kw (2 trasmettitori)
Durata dell'impulso	2,7 microsec. (1 microsec. a richiesta)
Frequenza di ripetizione	380 imp/sec (con MTI)
Diagramma antenna	Apertura orizz.: 3,5° Apertura vert.: cosec.² (45°)
Rotazione antenna	Regolabile da 1 a 15 g/m
Presentazione	Locale: A da 5" e PPI da 7" A distanza (VJ-1): PPI da 12" con asse ritardato
Portate	Locale: 20, 40, 80, 160 miglie nautiche A distanza (VJ-1): 2, 4, 10, 20, 80, 200 miglia nautiche

Caratteristiche particolari:

MTI parzializzato, spostamento del lobo dell'antenna sul piano verticale di 5°

Commutazione a distanza dei ricetrasmettitori

Alimentazione:

Qualunque tensione a 50, 60 o 400 c/s

KVA 12 (circa, dipendenti dalla sistemazione)

TECHNICAL CHARACTERISTICS

Frequency	1220 – 1350 Mc s
Peak Power	500 Kw (2 transmitters)
Pulse duration	2.7 microsec. (1 microsec. optional)
Pulse rate	380 pps (with MTI)
Antenna Pattern	Horizontal beamwidth: 3.5 Vert. beamwidth: cosec. sq. (45)
Antenna Rotation	Variable from 1 to 15 r.p.m.
Displays	Local: 5" type A and 7" type PPI Remote (VJ-1): 12 type PPI with delayed sweep
Ranges	Local: 20, 40, 80, 160 nautical miles Remote (VJ-1): 2, 4, 10, 20, 80, 200 nautical miles

Special features:

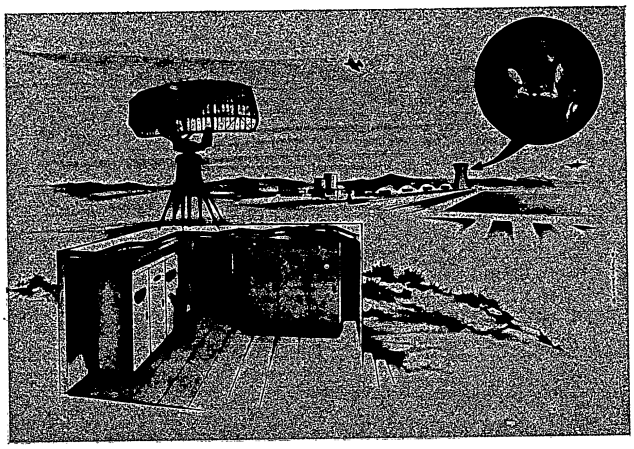
Gated MTI, Antenna beam tilting of 5 in the vertical plane

Remote switch over of the two transceivers

Power requirements:

Any voltage with 50, 60 or 400 c s

KVA 12 (ca. depending on installation)



VISTA PROSPETTICA DEL RADAR ML/AS - E

PICTORIAL VIEW OF RADAR ML AS - E

2000 - 3 - 58

carbon products

Elettrocarbonium Soc. per Az. has more than 50 years' experience in carbon and graphite products. Since 1897 Elettrocarbonium has carried on continuous research to meet and anticipate the more and more exacting demands of all industries for graphite and carbon products produced for purposes other than furnace electrodes and electrolytic anodes, the weight of the materials ranging from a few pounds, such as brushes to a few tons such as blast furnace hearth blocks.

These products can be broadly placed in two classifications: carbons being essentially amorphous in structure and graphite, crystalline as determined by X-ray diffraction patterns.

The features of carbon and graphite products are: resistance to most chemicals - no contamination - easily to be machined and fabricated - self lubricating - good electrical conductivity - strength maintained and no deformation at high temperatures - resistance to severe thermal shock - low thermal expansion - high heat transfer with graphite and low with carbon products.

carbon products

These unique properties have led to a great variety of commercial products for both carbon and graphite in chemical, metallurgical and electrical industries.

Behind Elettrocarbonium products and Elettrocarbonium progress lies Elettrocarbonium research. The Laboratory in addition to pure research and development, devotes its efforts to testing materials and controlling manufacturing processes. In daily work chemists and engineers have accumulated a very specialized type of knowledge and experience.

The Elettrocarbonium main offices are in Milan, Via Borghetto 5, and plants at Narni-Scalo and Ascoli Piceno.

Two factors have the maximum of importance in the growth of Elettrocarbonium: firstly a steadfast insistence on quality in every detail and secondly a sense of obligation to continue furnishing new and improved products.

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carbon products

A - IRON WORKING CARBONS
Amorphous carbon electrodes - Carbon furnace linings - Carbon linings for high blast furnaces - Casting holes - Carbon linings for ladles - Ingot moulds - Self-baking electrode paste - Carburite - Cements and joint-compounds - Graphite hearths and casting plugs.

B - CARBONS FOR ELECTROCHEMICAL PURPOSES
Carbon electrodes - Anodes and cathodes for igneous electrolysis - Electrodes for water electrolysis - Carbon linings for electric furnaces - Self-baking electrode paste.

C - CARBONS FOR CHEMICAL PURPOSES
Sulphite Digesters - Carbon linings - Carbonaceous cements - Pipe lines - Raschig rings - Heat recuperators - Coolers - Various appliances.

D - CARBONS FOR ELECTROTECHNICAL PURPOSES
Carbon brushes for electric equipment - Brushes for autos, motos cycles - Carbon inserts for trolleybus and locomotives - Sliding carbons for bridge lorries - Carbon contacts - Carbon for rheostats - Carbons for arc rectifies - Cabons for dry batteries.

E - CARBONS FOR TELEPHONES
Membranes - Electrodes - Microphonic powder - Dischargers - Carbons for laryngophones.

F - ARC LAMP CARBONS
Cinema carbons - Photo-engraving carbons - Plan reproduction carbons - Carbons for spectographic analysis - Carbons for submarine cutting - Welding rods.

G - HEATING ELEMENT IN ELECTRIC FURNACES
Ceramic electric resistances « Silicite » - Carbon rods for nitration in cyanamide furnaces - Resistance in carbon and graphite - Carbon granules « Narnitol ».

H - SPECIAL PRODUCTS
Carbons rings for hydraulic and steam turbines - Pistons for automatic weighing machines - Thrustbearings rings - Carbon tubes for Tammann furnaces - Bearings and journals in carbon and metal-carbon - Carbon moulds and tubes for hard metal industries and for the synterization of metals - Carbon powder for various appliances.

Mod. F 1

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Cinema Carbons

Mirio 3D

After the success obtained with high intensity carbons Mirio A and B, ELETTROCARBONIUM has recently developed the manufacture of MIRIO 3D carbons to face all the problems raised by modern systems of cinema projection, in order to give the cinema public the best possible screening result.

It is to-day required in cinema projection that the same cinema has means to exhibit all kinds of films, i.e. conventional black-white resp. coloured, panoramic cinemascope and vistavision, as well as other similar systems. These various systems create a demand for great variations of the screen area with higher claims than before on the light source.

To obtain a rational lighting of the screen area and at the same time a low burning rate of carbons, the operator should have different carbons at his disposal, according to whether he is operating at low or high amperage. This is however neither convenient nor practical.

The problem of manufacturing a carbon trim to cover the wide amperage ranges necessitated by the new projection methods described above, has arisen.

ELETTROCARBONIUM has solved this problem with MIRIO 3D provided with a special coating that limits oxidation to 2-3 cm from the crater, even at high overloads.

As to main advantages of MIRIO 3D (patented) see below:

a) It can take considerably higher overloads than conventional types of copper coated high intensity carbons.

b) Perfect arc stability also at low loads, with elasticity comparable to that of Mirio B.

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Cinema Carbons

Cinema Carbons

c) Possibility of use in existing lamp houses with its normal optical system even for projection on panoramic and cinemascope screens, without thes expenses of modifying existing projectors.

d) The luminous flux of MIRIO 3D is greater than the flux created by conventional types of carbon with the same diameter. This permits the use of MIRIO 3D carbons of smaller diameter and thus avoiding uncessary expense. To give an example, MIRIO 3D ∅ mm 8 operates instead of Mirio A ∅ mm. 9 with equal luminous flux but at considerably lower cost.

As regards the economic output (expressed in lumen per unit of power absorbed by the arc unit of hourly burning rate of the carbon) it can be asserted that MIRIO 3D carbons are the best high intensity carbons existing on the market to-day.

Apart from these important improvements, MIRIO 3D carbons retain all the advantages of Mirio A and Mirio B such as, the perfect relief of colours, especially in coloured films.

The table below clearly shows the wide amperage ranges compared with the famous Mirio A and B.

Comparative table for operation with Mirio B, A and 3D

Positive carbon diameter mm	Mirio B Amp	Mirio A Amp	Mirio 3D Amp
7	40 ÷ 50	48 ÷ 55	45 ÷ 60
8	50 ÷ 70	65 ÷ 75	60 ÷ 80
9	65 ÷ 80	75 ÷ 85	70 ÷ 95
10	—	—	90 ÷ 110

When operating the MIRIO 3D positive carbons at high loads ELETTROCARBONIUM recommends the use of the special MIRIO 3D negatives in the carbon set.

When operating MIRIO 3D positive carbons at low loads, a normal negative should be used.

The table below shows the simple rules of negative selection:

Mirio 3D pos. 7 mm	45 ÷ 50 Amp	neg. 6 mm	normal
	50 ÷ 60 »	» 6 mm	3D
Mirio 3D pos. 8 mm	60 ÷ 70 Amp	neg 7 mm	normal
	70 ÷ 80 »	» 7 mm	3D
Mirio 3D pos. 9 mm	70 ÷ 80 Amp	neg. 7,5 mm	normal
	80 ÷ 95 »	» 8 mm	3D
Mirio 3D pos 10 mm	90 ÷ 95 Amp	neg. 8 mm	normal
	95 ÷ 110 »	» 8 mm	3D

When MIRIO 3D carbons are used on high loads it is recommended to have the arc gap a little longer than normal and therefore the carbons must be supplied with higher voltage.

The diagrams on the last page describe the relations between the burning rates and voltages with respect to the different amperages on the positive MIRIO 3D carbons 7, 8, 9 and 10 mm diameter.

The figures indicated in the diagrams refer to an arc gap of 5-6 mm which is normal for these carbons.

The figures related to the burning rates are average values obtained by supplying the arc from rectifiers having external characteristics suitable for high intensity arcs.

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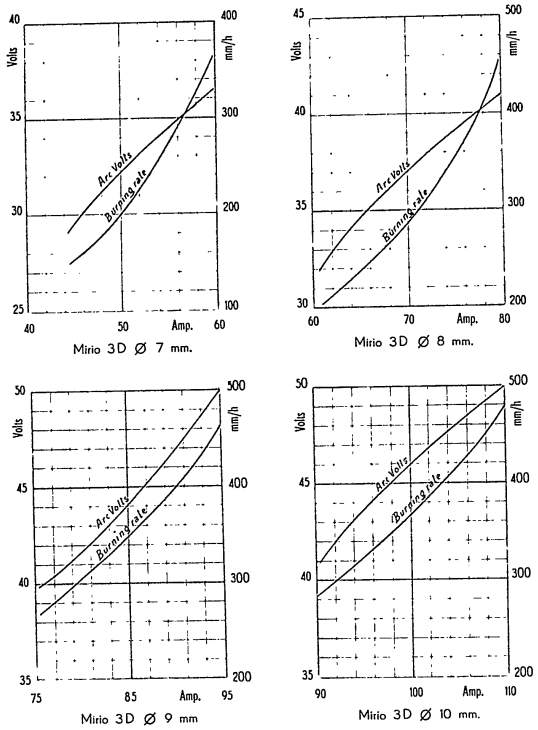
Cinema Carbons



Mod. 530/E

Charbons pour Photogravure

Remarques générales

Les systèmes modernes de reproduction et d'impression demandent l'emploi de lampes à arc spéciales. La lumière produite par les crayons employés pour ces lampes a la tâche d'impressionner les plaques ou papiers sensibilisés et couches sensibles sur les métaux, dans le but d'y reproduire un dessin quelquonque ou une figure quelquonque Cette impression atteindra le plus haut dégré de densité, réduisant donc au minimum la durée d'exposition, lorsque la lumière émise par les crayons, renfermera beaucoup de rayons violets et ultraviolets à l'action desquels les émultions photographiques sont particulièrement sensibles. Cette lumière fortement actinique (l'actinicité est une grandeur phisique similaire à la visibilité, qui mesure l'attitude de certaines radiations à provoquer des réactions chimiques) peut être obtenue de deux façons: ou en faisant fonctionner des crayons purs c'est-à-dire dépourvus de matières colorantes dans une lampe à arc en vase clos, dans laquelle l'arc ne brûle pas au contact de l'air, ou bien en faisant fonctionner des crayons à effet, c'est-à-dire des crayons contenant des sels métalliques dans une lampe à arc ouvert qui fonctionne à l'air libre. Pour ces deux systèmes on emploie deux groupes de lampes:

1) Lampes à arc en vase clos, employées pour le tirage des bleus.
2) Lampes à arc ouvert employées pour zincographie, phototypie, rotogravure etc.

LAMPES A ARC EN VASE CLOS

Les lampes à arc en vase clos sont employées pour le tirage des bleus. Dans ces lampes la rentrée d'air est bornée à la quantité suffisante à la combustion du charbon et il ne se produit donc pas sur la couronne extérieure de l'arc, l'auréole qui existe toujours dans l'arc brûlant en présence de l'air.

L'auréole se compose de petites particules de charbons qui, en brûlant émettent de la lumière jaune, tandis que la partie centrale de l'arc émet de la lumière violette. L'air à l'intérieur du globe, lorsque l'arc brûle, contient outre l'azote (75% env.) aussi CO et CO_2 dans la relation de 2-1 env. si le fonctionnement de l'arc est régulier. Les charbons émettent donc de la lumière violette qui a une action chimique considérable sur les papiers sensibles employés pour le tirage des bleus.

Lorsque la rentrée d'air dans l'arc est bien proportionnée, l'arc est beaucoup plus stable surtout du fait que la flamme n'est pas dérangée par des courants d'air extérieurs.

De cette façon il est possible de maintenir l'arc remarquablement plus long qu'on ne puisse le faire dans les lampes à arc ouvert. En outre, les bouts des charbons étant plus éloignés l'un de l'autre et par conséquent la tension plus élevée, la couleur bleu-violette de la lumière est beaucoup plus foncée, ce qui accroit l'actinicité. Le globe de verre dont toute lampe est pourvue, permet enfin de rapprocher au maximum le papier sensible avec une diminution du temps de pose.

Les lampes à arc en vase clos peuvent fonctionner soit sur courant continu soit sur courant alternatif. Sur courant continu on peut employer soit les charbons homogènes soit les charbons à mèche. Sur courant alternatif, au contraire, on doit employer exclusivement des charbons à mèche du fait que la mèche contient des matières qui, se vaporisant plus facilment, sont en mesure d'alimenter l'arc et de le maintenir stable pendant les battements du courant d'alimentation, qui ont tendence à l'éteindre.

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Charbons pour Photogravure

O[illegible]ement la stabilité de l'arc en interposant dans le circuit une résis[illegible]agit d'alimentation sur courant continu et un transformateur self s'il [illegible]'alimentation sur courant alternatif.
[illegible]st à cette résistance ou à ce self qui incombe la tâche de créer, premièrement une chute de tension de nature à alimenter justement l'arc et deuxièmement de réduire les variations de charge qui se produiraient inévitablement sans l'application de la résistance ou du transformateur self. Nous avons dit que sur courant alternatif on emploie les charbons à mèche car les matières qui composent la mèche sont plus facilement vaporisables, pour la même raison donc, la résistance de l'arc diminue lorsque le diamètre augmente et pourtant les charbons avec une mèche plus grande, à égalité de courant, demandent une tension d'arc légèrement inférieure.
Pour les lampes à arc en vase clos, on peut employer les charbons suivants, de notre marque RD:

1) Charbons homogènes, notre marque RDO pour les lampes alimentées sur courant continu. Ces charbons sont indiqués pour une vaste gamme de tension.
2) Charbons à mèche, notre marque RDA1 avec une mèche à petit diamètre, pour les lampes alimentées sur courant continu et alternatif. Ces charbons sont indiqués pour une tension d'arc entre 75 et 100 Volt.
3) Charbons à mèche, notre marque RDA2, avec une mèche à grand diamètre, pour les lampes alimentées sur courant continu et alternatif. Ces charbons sont indiqués pour une tension d'arc entre 75 et 100 Volt.

Nous indiquons dans le tableau n. 1 les conditions d'emploi des charbons RD les plus employés pour les lampes à arc en vase clos.

Tableau N. 1

Marque	Ø mm.	Amp.	Volt	Alimentation
RDO	13	12-15	120-160	Curant continu
RDA1	13	14-15	100-150	Courant continu et alternatif
RDA2	13	14-15	75-100	Courant continu et alternatif

Certains types de lampes alimentées sur courant alternatif maintiennent la stabilité de l'arc même si le charbon inférieur est homogène. Le charbon supérieur doit être en tout cas à mèche.
Dans le tableau n. 2, nous avons résumé les inconvénients les plus fréquents qui se produisent en cours de fonctionnement des arcs en vase clos:

Charbons pour Photogravure

Tableau N. 2
INCIDENTS DES LAMPES A ARC EN VASE CLOS

Incidents de fonctionnement	Causes	Moyens d'y remédier
Arc trop court (mauvais rendement)	Tension d'arc insuffisante	Augmenter la tension de l'arc
Lumière jaunâtre avec flamme volumineuse et pointe trop longue	Entrée d'air dans le globe	Vérifier l'intégrité du globe et l'étanchéité de la fermeture
Ruptures à l'allumage	Tension trop élevée Allumage trop rapide	Réduire la tension. Atteindre le régime normal de fonctionnement après 20-30 sec.
Bouts des charbons en biseau	Mauvais centrage des charbons ou bien influence magnétique	Rétablir le centrage des crayons et l'équilibre du courant dans les conducteurs. Eloigner les influences des pièces métalliques extérieures.
La flamme glisse sur le globe et sur la flasque supérieure de la lampe	Le charbon inférieur est trop haut	Placer le charbon plus bas

Remarques sur le fonctionnement des crayons RD

Pour obtenir un bon fonctionnement de nos charbons marque RD, on doit en outre tenir compte des conseils suivants:
a) Il est impossible d'éviter la formation de dépôts sur le globe, surtout avec les crayons à mèche. Il convient de nettoyer les globes (au moins une fois par jour) afin d'éviter un mauvais rendement, qui se traduirait par une augmentation du temps de pose.
b) Les crayons étant placés verticalement, le rendement sera d'autant meilleur que l'intensité de courant sera plus grande. Toutefois une tension de courant excessive activerait la vaporisation du carbone et échaufferait exagérément les crayons.
c) De l'avis de quelques constructeurs, on peut monter plusieurs lampes en série, soit en courant continu, soit en courant alternatif, en interposant dans le circuit une résistance dans le premier cas et un transformateur self dans le deuxième cas. Toutefois la chute de tension totale aux bornes des lampes, ne doit pas dépasser 65-75% de la tension d'alimentation, faute de quoi l'arc est peu stable.

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Charbons pour Photogravure

Charbons pour Photogravure

LAMPES A ARC OUVERT

Pour ce type de lampes, dans lesquelles l'arc brûle à l'air libre, nous conseillons l'emploi des crayons à mèche minéralisée, notre marque ARLIO. Au cours de la combustion, ces matières minérales sont vaporisées dans l'arc rendant celui-ci très conducteur et émettant, sous l'action de la haute température d'abondantes réactions lumineuses.

Le cratère de ces charbons atteint pourtant une température élevée, ce qui influence remarquablement l'émission de la lumière; pour cette raison les charbons brûlent d'habitude en position oblique de façon à laisser le cratère découvert le plus possible vers la surface à illuminer.

Les arcs ouverts diffèrent sensiblement des arcs clos, lesquels s'appellent aussi "à flamme", car leur puissance d'émission de la lumière, n'est due qu'à la colonne de gaz renfermée dans l'atmosphère sans oxygène, entre les deux charbons.

La lumière des charbons ARLIO est blanche et de composition analogue à la lumière solaire, qui présente en effet des radiations de tous teints, mais avec prédominance des couleurs violette et bleue, auxquelles toutes les émulsions actuelles sont particulièrement sensibles.

De nombreux types de lampes peuvent fonctionner sur courant continu, ou alternatif, monophasé ou triphasé. Pour chaque type de lampe il faut employer le couple de crayons indiqué. Il n'est donc pas possible de donner des instructions générales sur l'usage des crayons pour photogravure, étant donné que toute lampe est construite et tarée pour un courant et tension déterminés ainsi que pour un couple de crayons donné.

Nous examinons ci-dessous les types le lampes pour photogravure les plus employés.

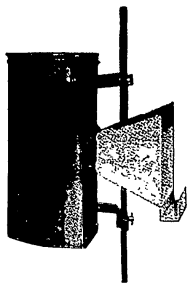

Fig. 1

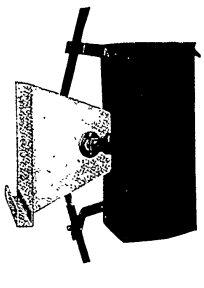

Fig. 2

Lampes monophasées à charbons verticaux

Lampes pour courant alternatif monophasé

Dans ces lampes on peut avoir une disposition verticale ou renversée des crayons. Dans le premier cas, le crayon supérieur brûle plus rapidement que le crayon inférieur, du fait que les crayons ne sont pas placés symétriquement par rapport à la verticale. Il est pourtant nécessaire que le crayon supérieur ait un diamètre plus grand que le crayon inférieur, afin d'éviter que l'arc ne se déplace pas pendant le fonctionnement. Le rapprochement automatique des charbons est causé par des bobines voltmétriques placées en parallèle sur l'arc.

La longueur de l'arc et le déplacement des crayons, sont réglés automatiquement par des bobines ampérométriques placées en série sur l'arc et parcourues par le courant qui alimente l'arc. L'action combinée du poids des crayons et de l'électro-aimant, règle le déplacement des crayons et la stabilité de l'arc. C'est pour cette raison que toute lampe doit travailler dans les conditions d'alimentation prévues par le constructeur et avec le couple de charbons approprié.

A titre d'information nous indiquons les diamètres des crayons ARLIO recommandés pour les types les plus courants de lampes monophasées. Les lampes à crayons verticaux (voir fig. 1 et fig. 2) sont très employées dans la photogravure, pour une plus grande intensité d'éclairage de l'objet. On emploie d'habitude des groupes de deux ou quatre lampes raccordées en série ou en parallèle.

On conseille pour les lampes monophasées à charbons verticaux les accouplements repris au tableau N. 3 ci-dessous:

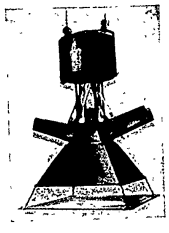

Fig. 3

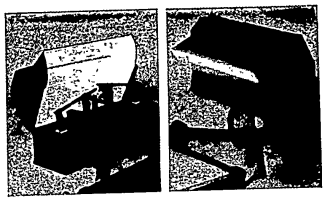

Fig. 4

Lampes monophasées à charbons horizontaux

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Charbons pour Photogravure

Tableau N. 3

Amp.	Volt	Crayons sup. Ø mm.	Crayons inf. Ø mm.
20	42	14	11
20	65	15	13
30	42	15	13

Les lampes à crayons renversés (voir fig. 3-4) sont équipées avec les crayons ARLIO noirs de même diamètre et sont construites en différents types, suivant les exigences de travail.
Le tableau suivant n. 4 indique les acccouplements les plus recommandés dans les lampes monophasées à charbons renversés.

Tableau N. 4

Amp.	Volt	Ø des Charbons, mm.
20	42	11
20	70	12
30	42	12
30	70	13
45	55	18
60	55	22

Lampes à courant continu

Les mêmes types de lampes pour courant alternatif monophasé, sont construites pour courant continu. L'usage du courant continu est néanmoins peu répendu dans lo photogravure.
Nous conseillons l'emploi des crayons ARLIO en ayant soin d'employer un crayon positif de diamètre supérieur au crayon négatif.

Lampes à courant alternatif triphasé

Ces derniers temps les lampes triphasées, qui peuvent fournir une très grande quantité de lumière, ont pris un grand essor. Il y a deux types de lampes triphasées:

1) Lampes (voir fig. 5) qui fonctionnent avec trois crayons ARLIO noirs. Le diamètre des charbons employés avec ces lampes et leurs conditions d'emploi sont repris sur le tableau n. 5 ci-dessous:

Charbons pour Photogravure

Tableau N. 5

Amp.	Volt	Ø des Charbons, mm.
40	35	13
60	45	22

2) Lampes fonctionnant avec charbons partiellement ou complètement cuivrés (voir fig. 6).
Pour ces lampes, réglables en tous sens, il faut employer les charbons Arlio cuivrés aux extrémités, lorsque les lampes sont placées verticalement et le flux lumineux est répendu vers le bas, afin d'éviter toute projection de cuivre sur le matériel photographique.

En tout autre cas, on emploie les crayons ARLIO complèment cuivrés.

Le diamètre des charbons employés avec ces lampes et leurs conditions d'emploi, sont indiqués sur le tableau N. 6 repris à la page suivante.

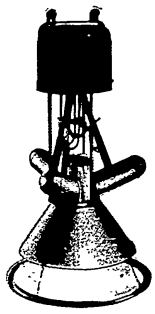

Fig. 5

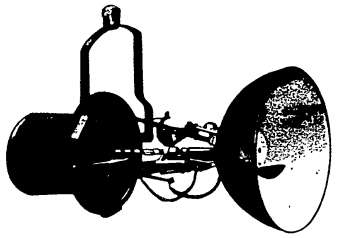

Fig. 6

Lampes triphasées

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Charbons pour Photogravure

Tableau N. 6

Amp.	Volt	Crayons ARLIO cuivrés ou cuivrés aux extrémités Ø mm.
20	45	9
30	45	12

Dans ces lampes on peut également employer de spéciaux charbons en électrographite Ø mm. 9 cuivrés aux extrémités.
Nous avons résumé dans le tableau n. 7 ci-dessous les incidents qui risquent de se produire en cours de fonctionnement des lampes à arc ouvert:

Tableau n. 7
INCIDENTS DES LAMPES À ARC OUVERT

Incidents de fonctionnement	Causes	Moyens d'y remédier
Allumage difficile et crayons en contact après fermeture du circuit	Système de régulation de l'arc défectueux	Vérifier la lampe et tarer l'equipement électrique
Bouts des charbons en biseau	Mauvais centrage des charbons	Rétablir le centrage des charbons
Arc trop long et effilement des charbons	Régime trop poussé	Rétablir l'intensité de courant
Arc trop court et variations de lumière	Tension d'arc insuffisante	Augmenter la tension
Flamme trop longue et vacillante	Il y a des courants d'air sur la lampe	Protéger la lampe
Les charbons rougisssent près des pinces	Mauvais contact	Vérifier le serrage des pinces et l'oxydation des contacts.
Chute de mèche	Charbons humides	Conserver les charbons au sec et n'employer que des charbons parfaitement secs

Mod. 524/E

INCET

TORINO

ELECTRICAL WIRES AND CABLES

INDUSTRIA NAZIONALE CAVI ELETTRICI - TORINO
VIA ANTONIO BANFO 5 - PHONE 21-292 - CABLES: **INCET** TORINO (ITALY)

The purpose of the new edition of our catalogue is to facilitate the task of the Technician in selecting the type of cable most suitable for the installation to be planned as well as for additional works in already existing installations.

In addition to the types of cables corresponding to the Italian CEI-UNEL-UNI Standard specifications, INCET manufactures cables according to the specifications now required in many foreign countries:

BSS	British Standard Specifications
ASTM	American Society for Testing Materials
NEMA	National Electrical Manufacturers
IPCEA	Insulated Power Cable Engineers Association
AIEE	American Institute of Electrical Engineers
VDE	Verband Deutscher Elektrotechniker
ASE	Association Suisse des Electriciens
USE	Union Technique des Syndicats de l'Electricité
HCNN	Hoof Commissie Voor der Normalisie in Nederland
SABS	South African Bureau of Standard
ISI	Indian Standard Institution

INCET can give full references on materials supplied both in Italy and abroad to a large number of Electric Power and Industrial Companies, Telephone Companies, Shipyards, Italian and Foreign State Organizations.

INCET is therefore in a position to supply cables of any kind up to the most modern types of insulation and protective coverings: from polyvinyl chloride or polyethylene resins to butyl rubber or silicon rubber or polychloroprene (neoprene).

Important → *For the various appliances of electric cables select among the complete INCET line.* *See page 2, 3, 4, 5, 6.*

JANUARY 1958 EDITION

INCET TORINO

contents

Our Firm has been established in 1888.
In those times electrotechnics had just come into existence nor could then anyone foresee how it would make gradual and constant steps up to nowadays extraordinary achievements.
The technique of producing insulated electric cables had to keep up with the progress of electrical appliances in order to put into practice what had been attained both by theory and by experience.

The importance of our Firm gradually increased by introducing new manufacturing systems, up to date machinery, skilful workmen and by winning the constant confidence of all customers thanks to the high quality of its products and the honesty of its purpose.

INDUSTRIA NAZIONALE CAVI ELETTRICI - TORINO
VIA ANTONIO BANFO 5 - PHONE 21-292 - CABLES: INCET TORINO (ITALY)

A) Power and Control Cables

Select the cable you need for your installation among **INCET** *products*

Application and installation		Cable reference (1)	Group	Catalogue paragraph	Maximum voltage	Characteristics
Power transmission lines and distribution nets	Underground	325 N	2	25	60.000*	Impregnated paper insulation, lead sheath, steel tapes.
		G1PN-G1OPN	1	1	11.500	Vulcanized India rubber insulation, lead sheath, steel tapes.
		G1K	1	2	10.000	VIR insulation, neoprene jacket. (Parkway).
	Submarine	325 F	2	25	60.000*	Impregnated paper insulation, lead sheath, galvanized steel wire.
		G1PF-G1OPF	1	1	11.500	VIR insulation, lead sheath, galvanized steel wire.
	Aerial	325	2	25	60.000*	Impregnated paper insulation, lead sheath.
		G1P-G1OP	1	1	11.500	VIR insulation, lead sheath.
		G1K	1	2	10.000	VIR insulation, neoprene jacket.
		G1K with messenger cable	1	2/a	10.000	VIR insulation, neoprene jacket, stranded conductors tied to messenger cable.
		G1T-G1TM	1	4	1.000	VIR insulation, black or minium painted fibrous braid.
	On insulators	UK-RK	1	5		Neoprene jacket.
Building wirings	On insulators	FG1TX/1,5	1	3	250	VIR insulation, fibrous braid.
		FR1X/1,5	4	36/a	250	Thermoplastic insulation.
	On insulators or in conduits or pipes	UG1T/2-RG1T/2	1	4	450	VIR insulation painted fibrous braid.
		UG1T/3-RG1T/3		4	600	
	On walls	UR1/2-RR1/2	4	36/b	450	Thermoplastic insulation.
		UR1/3-RR1/3		36/b	600	
		MR1L/2	4	36/c	380	Plastic insulation (with separator)
		MR1H/3	4	36/d	450	Plastic insulation (grooved cable)
	On walls and for general use	G1P/2-G1DP/2 G1OP/2	1	1	450	VIR insulation, lead sheath.
		G1P/3-G1DP/3 G1OP/3	1	1	600	

(1) Initials are generally used, according to CEI-UNEL indications (see table page 7).
(*) 60.000 volts in single-phase - 35.000 volts in three-phase.

A) Power and Control Cables

Application and installation		Cable reference	Group	Catalogue paragraph	Maximum voltage	Characteristics
Factories	On walls or on poles	G1P/3-G1DP/3 G1OP/3	1	1	600	VIR insulation, lead sheath.
		GIK/3	1	2	600	VIR insulation, neoprene jacket.
	On metallic beams or structures	G1PA/3 G1OPA/3	1	1/b	600	VIR insulation, lead sheath, galvanized steel wire braid.
		G1KA/3	1	2/b	600	VIR insulation, neoprene jacket, galvanized steel wire braid.
Acid locations	Indoor and open air installations	G1PR/3 G1OPR/3	1	1/a	600	VIR insulation, lead sheath, plastic sheath.
		G1K/3	1	2	600	VIR insulation, neoprene jacket.
Portable fixtures	For domestic appliances	FG1OT/1,5	1	3/a	250	VIR insulation, braided conductors, glossy
		FG1TOT/1,5	1	3/a	250	cotton outer jacket.
		FG1H/1,5	1	3/c	250	Rubber insulation, zip cord.
		FG1G/1,5	1	7	250	Rubber insulation, rubber jacket.
		FG1G/3	1	7/a	600	ditto
		FR1OR/1,5	4	36/f	250	Plastic insulation, plastic sheath.
		FR1H/1,5	4	36/a	250	Plastic insulation, zip cord.
	Fluorescent lamp connections	FK/1,5	1	5/a	250	Special neoprene insulation.
	For industry and agriculture	FG1G	1	7/a	3.500	Rubber insulation, rubber jacket.
		FG1K	1	7/b	3.500	Rubber insulation, neoprene jacket.
Shipboard	According to: RINA-UNAV Lloyd's Register American Specifications	G1P-G1PA-G1PR	1	9	660	Rubber insulation, lead sheath, metallic or plastic or braided covering with or without interposed armour.
		G1PRAR	1	10	660	
		G1PRNR	1	10	660	Varnished cambric insulation, lead sheath, neoprene jacket, braided or steel tape armour, plastic jacket.
		TPKAR-TPKNR	3	34	1.100	
		FG1K	1	35	250	Rubber insulation, neoprene jacket.
Automobile	Lighting or starting	GM-UNI	1	11	B. T.	VIR, varnished cambric or ethylcellulose varnished fibrous braid.
		IFA	4	41	B. T.	Plastic insulation.
	Ignition	A/7 UNI	1	12	A. T.	Special ozone-resisting rubber insulation with or without varnished cambric or ethylcellulose varnished fibrous braid.
		F.R.A.	4	44	A. T.	Special plastic insulation.

A) Power and Control Cables

Application and installation		Cable reference	Group	Catalogue paragraph	Maximum voltage	Characteristics
Aircraft	Lighting Control Signal	UNEL-UNAVIA and U.S.A. specifications	4	45	B. T.	Plastic insulation, fiberglass braid and nylon or resin covering, screen when required.
	Ignition	Italian and U.S.A. specifications	1	46	A. T.	Special ozone resisting rubber insulation, neoprene jacket.
Lifts and elevators	Indoor	IASCE T	1	19	600	Rubber insulation, double fibrous braid.
	Outdoor	IASCE K	1	20	600	Rubber insulation, fibrous braid, neoprene jacket.
Neon sign	H.T. luminescent gas sign lamp feeders	INEO/5	4	47	5.000	Plastic insulation.
		INEO/12	4	48	11.500	Polyethylene and plastic insulation.
Railways	Lighting and power circuits	UG1T-RG1T	1	4	1.000	VIR insulation, varnished fibrous braid (CEI-UNEL specifications).
		G1P-G1OP	1	1	11.500	VIR insulation, lead sheath, special binding or covering, if necessary (CEI-UNEL specifications).
	Signal equipment	P.I.	1	14	B. T.	VIR, lead sheath, plastic armour or covering, if necessary, or special protection against electrolytic corrosions.
	Locomotive	FG1T/3 FG1T/4 FG1T/12	1	15	110 1.000 3.700	VIR insulation, varnished fibrous braid.
Mines	Shaft fixed installations	325 F	2	25	10.000	Specially impregnated paper insulation, lead sheath, steel wire armour.
		G1PF-G1OPF	1	1/c	10.000	VIR insulation, lead sheath, steel wire armour.
		TPF	3	34/a	10.000	Varnished cambric insulation, lead sheath steel wire armour.
	Movable installation	FG1K	1	7/b 7/c	10.000	VIR insulation, neoprene jacket, interposed armour if required.
High temperatures	Temperatures up to 120° C	SIL-VE	4	49	1.000	Special silicon rubber insulation; fiberglass braid impregnated with silicon varnish.

INCET has largely supplied trunk telephone cables for the national telephone network, pader and air-space insulated type as well as polythene and air-space insulated «coaxial» type.

B) Telecommunications

Application and installation		Cable reference	Group	Catalogue paragraph	Maximum voltage	Characteristics
Toll trunk local and railway connections	Toll lines	TD/MQ TSQ.	2	26	—	Paper and dry air insulation, D.M. or star quads, lead covered with special covering or armouring.
	Local lines	180 T-Q 180 TU-QU	2	27	—	Paper and dry air insulation, pairs or star quads, concentrically or sectorally stranded, lead covered; armouring, jute serving or special protection, if necessary.
		TPR	4	40	—	Polyethylene insulation, pairs or star quads, polyethylene and resin covered.
		TPPR		40/a		
		TPRAR		40/b		
Various appliances	Short distance connections	192 P	1	21	—	Rubber insulation lead covered.
		DW	1	22	—	Bronze or copperweld conductors, rubber insulation; twin parallel insulated conductors, neoprene jacket.
	Temporary telephone connections	FG1AK	1	23	—	Rubber insulation, neoprene jacket with interposed galvanized steel wire braid.
	Overhead telephone crossings	383/M	1	24	—	Bronze conductor, VIR insulation, minium varnished fibrous braid.
	Interior and open air lines	195 ÷ 197 PR-PE-PS	3	30	—	Paper and waxed fibrous insulation, lead covered.
		194 ÷ 198 PR-PE-PS	3	31	—	Waxed fibrous insulation, lead covered.
		TRR	4	37	—	Polyvinyl resin insulation, screen if required, plastic sheath.
		TRSR		37/a		
	Interior telephone	TPR	4	38	—	Polyethylene insulation plastic sheath.
	Telephone exchange	5569	3	32	—	Enamelled and waxed fibrous insulation, aluminium screen; flameproof fibrous braid.
		TRR	4	37	—	Polyvinyl resin insulation, screen when required, plastic sheath.
		TRSR		37/a		
	Switchboard	5425	3	33	—	Enamelled and flameproof varnished fibrous insulation.
		TR1X	4	36/g	—	Polyvinyl resin insulation.
Radio and television	Receivers	FR/1	4	36/i	—	Plastic insulation.
	Antenna drop lines	BPCN	4	51	—	Polyethylene parallel antenna cable.
		BPAcN	4	52	—	Two-conductor cellular polythene cable.
		CRCS	4	53	—	Solid polythene coaxial cable, plastic sheath.
		CRAcS	4	54/a	—	Cellular polythene insulated coaxial cable, covered with plastic sheath.
		BPAcS	4	56/a	—	Cellular polythene insulated double-core cable, screened, plastic sheath.

PROTECTIVE COVERINGS

The enemy	Action on cable	The defence	The effect
Moisture	Deterioration of insulation (particularly quick on paper and fibre).	Lead sheath. I	Waterproofs insulation totally.
		Rubber jacket. II	Waterproofs insulation totally.
		Neoprene jacket. II	Waterproofs insulation totally.
		Plastic jacket. II	Waterproofs insulation totally.
	Oxidizing of metallic protection.	Weatherproof varnished fibrous braid. III	Avoid condensation on installation and direct damage by exposure.
		Galvanization or anti-rust coating. IV	Protects from oxidizing and rust.
		Asphalt and jute protection. V	Delays oxidizing and rust formation.
Vibrations	Crystallisation phenomena on lead sheath.	Special lead alloys.	Avoid crystallisation.
Acidity	Gradual corrosion of lead or iron armour, damaging insulation.	Jute serving (paper and asphalt impregnated fibre protection). V	Prevents contact of lead or metallic armour with corrosive substances.
		Plastic or neoprene jacket.	ditto
Mechanical injuries	Damages to both lead and insulation.	Steel tape or steel wire armour. VI-VII	Protects cable against direct hits.
Mechanical stress	Jerking or shearing stress.	Round or flat steel wire armour. VII	It takes up any stress.
Stray currents	Corrosion of lead.	Special rubber, neoprene or thermoplastic jacket. VIII	Insulates lead sheath from the ground.
Insects or rodents	Perforation of lead sheath.	Iron or brass tapes between two lead or thermoplastic jackets.	Iron and brass tapes are not injured by insects.
		Poisonous substances added to protective coverings. IX	Poison prevents action of insects and rodents.
Gun-shot	Cable core injured by gun-shots.	Double lead or thermoplastic jacket with interposed steel tape. IX	Shot-proof tape interposed between double lead sheath protects cable core.
Heat and flame	Quick deterioration of organic insulating substances.	Flameproof varnished asbestos braids.	Avoids direct contact with flame, sparks or hot air, protecting insulation (for temperatures above 80° C special insulation is recommended).
		Specially lacquered fibre-glass braids. X	
Oils	Deterioration of rubber insulation.	Oil resisting impregnated braids. XI	Avoids direct contact with solvents.
		Oil resisting neoprene or thermoplastic material. XII	Makes cable oil and solvent resistant.

Application	
Permanent installation.	I
Movable or buried installation.	
ditto.	
ditto.	
Fixed outdoor installation.	II
For exposed armours.	III
For steel tape or wire armours.	
For overhead installations.	IV
Buried or in acid locations.	V-VI
For acid locations.	
Exposed to the risk of any injury whatever.	VII
Overhead, submarine, tilted stretches, vertical risers.	
Proximity of d.c. electrified railroad.	VIII
Overhead, submarine, underground passages.	
Overhead rural lines.	IX
Hot located cables.	X
	XI
Automobile, aircraft, special industrial installations.	XII

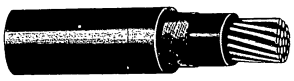
INCET TORINO

STANDARD PRODUCTION 1 RUBBER INSULATED CABLES

A POWER LINES

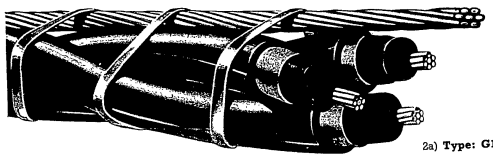
1) **Type: G1P-G1OP** lead covered: single or multicore from grade 2 to 18 (CEI-UNEL Italian specifications)

Conductor: tinned copper; solid up to 6.3 sq. mm.; stranded above 6.3 sq. mm.
Insulation: vulcanized India rubber.
Working voltage limit: 420 volts up to 11.500 volts a. c. according to grade of insulation.
Operating temperature limit: 65° C.
Protective covering: lead sheath for overhead or underground passage installation (jute serving if required); additional protective covering (neoprene armour or jacket) for underground or submarine installation.
Characteristics: high insulation resistance, high dielectric strength, long aging, long durability.



2) **Type: G1K** with neoprene jacket: single or multicore

Conductor: tinned copper; solid up to 6.3 sq. mm.; stranded above 6.3 sq. mm.
Insulation: vulcanized India rubber.
Working voltage limit: 420 volts up to 10.000 volts according to grade of insulation.
Operating temperature limit: 65° C.
Characteristics. as above with regard to insulation; neoprene jacket, water tigh, resistant to sunlight, oil, solvents, vibrations; lighter than lead-covered cables.
Recommended for: some kinds of installations (thermoelectric power plants, chemical industries, tunnels) instead of lead-covered cables.



2a) **Type: G1K** messenger wire

Just as the one at no 2 except for cables previously fastened to a steel or copperweld messenger wire working as neutral conductor for voltage distribution up to 10.000 V. Overhead installations.

For special purposes butyl rubber insulation is recommended

5) **Type: UK-RK**

Conductor: plain copper wire or strand.
Covering: neoprene.
Use: on insulators only.

B RESIDENTIAL BUILDING, INDUSTRIAL AND RURAL CABLES

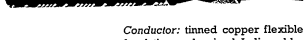
1) **Type: G1P-G1DP-G1OP** lead covered cables (according to CEI-UNEL Italian specifications)

Insulation, voltage, characteristics: see par. A.
For installations on metallic frame poles use type G1OPA (with steel wire braid finish and anti-rust coating - 1b); in acid locations a plastic jacket over lead - 1a).

2) **Type: G1K** (see par. A).
2b) **Type: G1KA**
See cable above except for an outer anti-rust coated metallic braid.

3) **Type: FG1TX** (grade 1.5 CEI-UNEL Italian specifications)
Two or multi-conductor flexible cord, cotton or rayon individual braid.

Conductor: tinned copper flexible strand.
Insulation: vulcanized India rubber.
Working voltage limit: 250 volts.
Characteristics: inexpensive and easy installation.
Recommended for: indoor plants.



3a) **Type: FG1OT-FG1TOT** (grade 1.5 CEI-UNEL)
Round flexible cord covered with 1 or 2 fibrous braids.

Conductor: tinned copper flexible strand.
Insulation: vulcanized India rubber. - Fibrous fillers. Fibrous braid on each core if necessary (FG1TOT).
Working voltage limit: 250 volts.
Recommended for: flexible cord for pendant lighting fittings, smoothing-irons, small electric domestic appliances.

3c) **Type: FGH/1.5** (according to UNEL specifications)
Double-core flexible zip cord.

Conductor: tinned copper flexible strand.
Insulation: vulcanized India rubber.
Working voltage limit: 250 volts.
Recommended for: table-lamps, portable radios, dry located portable apparatus, in door installation.

INCET TORINO

STANDARD PRODUCTION 1 RUBBER INSULATED CABLES

B RESIDENTIAL BUILDING, INDUSTRIAL AND RURAL CABLES

4) **Type: UG1T-RG1T** (grade 2-3-4 CEI-UNEL Italian specifications)

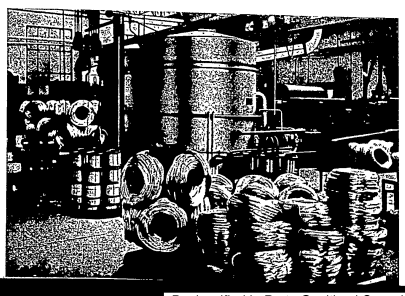
Conductor: tinned copper wire or strand.
Insulation: vulcanized India rubber.
Working voltage limit: 450 to 600 and 1000 volts according to grade of insulation.
Operating temperature limit: 65° C.
Protective covering: fibrous braid impregnated with bituminous compound (T) or minium paint (TM).
Characteristics: excellent mechanical properties, high dielectric strength and insulation resistance.
Recommended for: fixed installations on walls, enclosed electric installations, in conduit pipes, outdoor connections (minium painted braid).

5a) **Type: FK/1.5**

Conductor: tinned copper flexible cord.
Insulation: special coloured neoprene jacket.
Working voltage limit: 250 volts.
Characteristics: flexible and resistant to special impregnating compounds used in reacting coils.
Recommended for: reacting coils for fluorescent lamps.

7) **Type: FG1G** (grade 1.5 CEI-UNEL) one or more conductors

Conductor: tinned copper strand.
Insulation: vulcanized India rubber. Insulated stranded conductors, over-all compact vulcanized grooved rubber jacket.
Working voltage limit: 250 volts.
Recommended for: portable appliances, tools, electric domestic appliances, temporary connections in dry locations.



Copper wire electric annealing

7a) **Type: FG1G** (grade 3 to 7 CEI-UNEL)

Description: just as no. 7 but with smooth rubber jacket (or neoprene 7b, par. H).
Working voltage limit: 600 to 3500 volts according to grade of insulation.
Recommended for: cranes, submersed pumps, core boring, mining industries, general connections.

C SHIPBOARD

9) **Type: G1P-G1PA-G1PR** according to the Italian Naval Register, Lloyd's Register and American specifications - one or more conductors

Conductor: tinned copper wire or strand.
Insulation: vulcanized India rubber with high percentage of pure rubber.
Working voltage limit: 660 volts.
Operating temperature limit: 65° C.
Protective covering: lead sheath (G1P) — lead covered, anti-rust coated metallic braid (G1PA) — lead covered, plastic jacket (G1PR).
Characteristics: high dielectric strength, excellent long-lasting mechanical properties.
Recommended for: electric installations on board ships.

10) **Type: G1PRAR-G1PRNR** according to above specifications - one or more conductors

Conductor: tinned copper wire or strand.
Insulation: vulcanized India rubber with high percentage of pure rubber.
Working voltage limit: 660 volts.
Operating temperature limit: 65° C.
Protective covering: plastic jacket over lead sheath — galvanized steel braid or tape — additional plastic jacket.
Characteristics: high dielectric strength and insulation resistance.
Recommended for: electric installations on board ships.

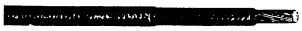
35) **Type: FG1K** according to above specifications Flexible, neoprene protection as per item 7b, par. H.

Copper wire tinning

INCET TORINO

STANDARD PRODUCTION 1 RUBBER INSULATED CABLES

D AUTOMOBILE



11) **Type: GM** (according to UNI specifications)

Conductor: tinned copper flexible strand.
Insulation: vulcanized India rubber.
Operating temperature limit: 65° C.
Protective covering: sterling or cellulose varnished fibrous braid.
Characteristics: good mechanical properties, oil-resistant, long aging.
Recommended for: lighting installations, automobile starting and control.

12) **Type: A/7**

Conductor: tinned copper flexible strand.
Insulation: vulcanized India rubber.
Working voltage limit: up to 13 KV.
Operating temperature limit: 65° C.
Protective covering: sterling or cellulose varnished fibrous braid or neoprene jacket. Metallic braided screen if required.
Characteristics: high dielectric strength, ozone-resistant, good flexibility, long aging.
Recommended for: ignition, connection of battery-coil ignition or magnet to sparking plug.

E AIRCRAFT

46) **Type:** ignition for aircraft engines according to Italian and U.S.A. specifications

Conductor: tinned copper strand.
Insulation: special vulcanized India rubber, fibreglass braid, special neoprene jacket.
Working voltage limit: 20 KV.
Characteristics: high dielectric strength, resistant to ozone, oil and solvents and to both high and low temperatures.
Recommended for: aircraft engines ignition.

F LIFTS AND ELEVATORS

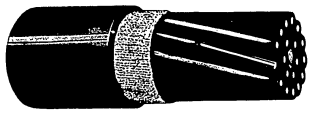
19) **Type: IASCE/T** (according to CEI-UNEL specifications - grade 2 and 3 G1FT) Indoor wiring flexible cable; numbered conductors under double fibrous braid with or without interposed supporting core.

Conductor: tinned copper flexible strand.
Insulation: vulcanized India rubber.
Working voltage limit: 600 volts.
Operating temperature limit: 65° C.
Characteristics: high dielectric strength, flexibility, mechanical resistance, flameproof.
Recommended for: lifts and elevators.

20) **Type: IASCE/K** (according to UNEL specifications - grade 2 and 3 G1TK) Flexible cable for outdoor installation as well with or without supporting core, neoprene jacket.

Characteristics: like the previous one, weatherproof as well.

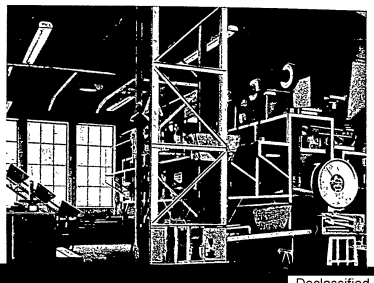
G SIGNAL



14) **Type: PI**
Multiple signal cable.
Conductor: tinned copper wire 1 - 1.5 - 2 mm. ∅.
Insulation: vulcanized India rubber.
Operating temperature limit: 65° C.
Protective covering: lead sheath with additional covering if required according to plant requirements.
Characteristics: excellent mechanical and insulating resistance.
Recommended for: signal and control circuits.

15) **Type: FG1T/3 - FG1T/4 - FG1T/12** (CEI-UNIFER)

Conductor: tinned copper concentric strand for all sizes.
Insulation: vulcanized India rubber. — *Protection:* braid.
Working voltage limit: 110 volts - 1000 volts - 3700 volts respectively.
Operating temperature limit: 65° C.
Characteristics: high electric properties.
Recommended for: locomotive electric equipment.

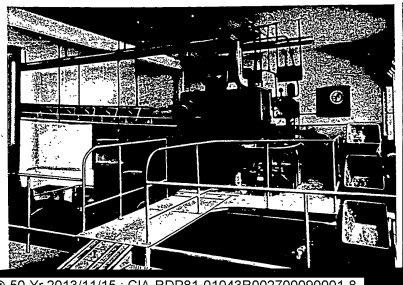


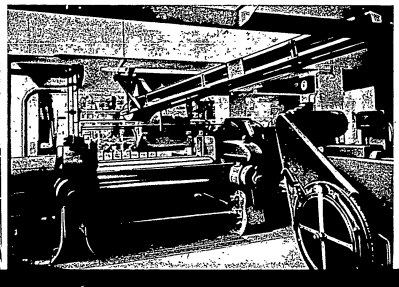
Automatic installation for making rubber compounds

◄— Weighting

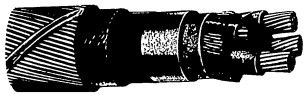
Bambury —►

Mixer and filter —►

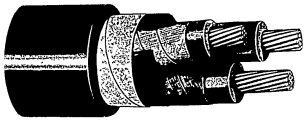




H MINING



1c) **Type: G1PF-G1OPF**
Lead covered and armoured cable.
Insulation, voltage, temperature and characteristics: see par. A.
Protective covering: helix wound round or flat galvanized steel wire.

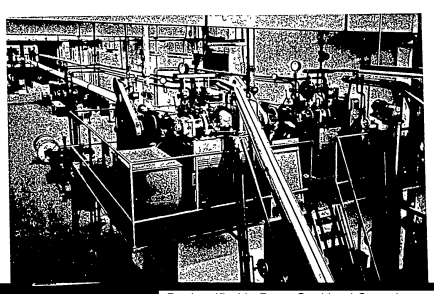


7b) **Type: FG1K**
Neoprene jacket cable.

7c) **Type: FG1KFK**
Insulation, voltage, temperature and characteristics: see item 7a, par. B.
Protective covering: additional neoprene jacket; if required with interposed steel wire armour.

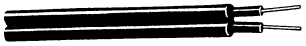
L TELECOMMUNICATIONS

21) **Type: 192 P**
Pairs lead covered telephone cable.
Conductor: tinned copper wire 1 to 2 mm. ∅.
Insulation: vulcanized India rubber.
Protective covering: jute serving or plastic jacket or rubber sheath or armour.
Characteristics: good insulating resistance, high dielectric strength, good mechanical properties.
Recommended for: short length telephone connections, terminal connections.



Continuous vulcanizing rubber extruder

L TELECOMMUNICATIONS

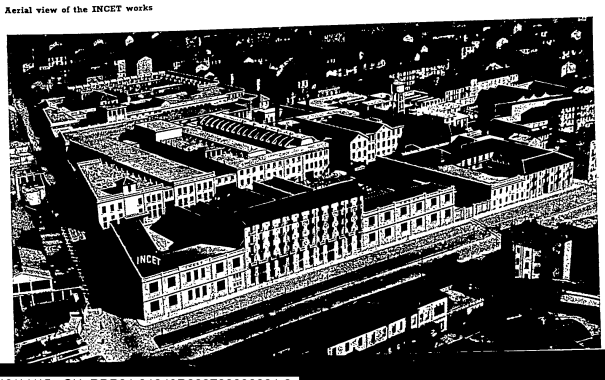


22) **Type: DW** (drop wire)
Two parallel conductor cable for aerial connections.
Conductor: tinned bronze wire 0.6 to 0.9 mm. ∅.
Insulation: vulcanized India rubber.
Protective covering: neoprene jacket.
Characteristics: high mechanical resistance, high dielectric properties.

23) **Type: FG1AK**
One star quad flexible cable for emergency telephone lines and temporary installations.
Conductor: tinned copper strand.
Insulation: vulcanized India rubber.
Protective covering: steel wire braid between insulated conductors and neoprene jacket.
Characteristics: excellent mechanical resistance together with good telephone transmission.

24) **Type: 383 M**
Conductor: telephone bronze wire.
Insulation: vulcanized India rubber and insulating tapes.
Protective covering: cotton separator and minium impregnated fibrous braid.
Characteristics: high mechanical resistance, good electric properties, weatherproof.
Recommended for: road or railway crossings, terminal connections.

Aerial view of the INCET works

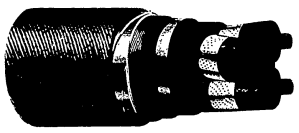


INCET TORINO

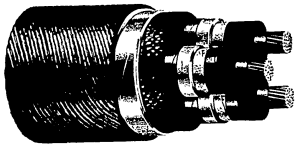
STANDARD PRODUCTION 2 PAPER INSULATED CABLES

A POWER LINES

25) **Type: 325**
Conductor: plain copper wire solid up to 10 sq. mm., concentric strand for bigger sizes. In multicore cables oval shaped strand for sizes from 10 to 25 sq. mm.; sector shaped for bigger sizes and voltage up to 15 KV. (325 S); round above 15 KV.
Insulation: solid paper impregnated with mineral oils with highest electric properties.
Protective covering: bare lead (325) or with jute serving (J) or iron tape armouring (N - 25a) or steel wire armouring (F - 25b) or some other armouring according to requirements.
Working voltage limit: 60 KV. for single-core cables; 35 KV. for multicore cables.
Operating temperature limit: 70° C for L.T. cables; 55° C for H.T. cables.
Recommended for: power transmission lines.
NB. Such cables can be single-core or multicore, "belted" or "screened" (H type or 3-leads cable).

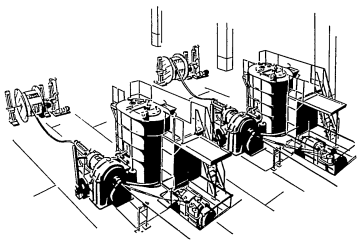


25c) **Type: 325 TH** - *H type* cable
Round conductors.
A metallized paper screen over each insulated core increasing the cable safety.



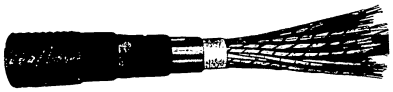
25d) **Type: 325 TPBN** - 3 single core, lead covered under common armour.
It is like a sistem of 3 single-core cables, with no greater size it has a higher rating current.

NB. In the types TH and TPBN the insulation of each phase to ground is lower than the insulation of the corresponding "belted" cable. It is therefore recommended for grounded installations.



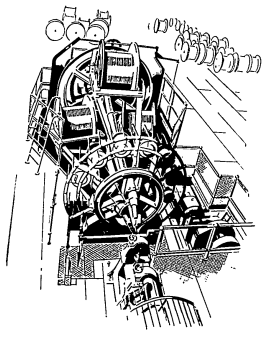
Continuous extrusion lead press

B TELECOMMUNICATIONS



26) **Type: TDMQ-TSQ**
Conductor: plain copper wire from 0.9 to 1.5 mm. ∅.
Insulation: paper and air-space, obtained with a cellulose paper string and a helicoidal superposed paper tape.
Circuit: D.M. (Dieselhorst Martin) or star quads, concentrically stranded.
Protective covering: bare lead sheath, jute serving or armour if required or special protection.
Characteristics: low capacity unbalances, excellent telephone transmission performance.
Recommended for: toll and trunk lines.

27) **Type: 180 T - Q - U**
Conductor: bare copper wire 0.4 to 1.5 mm. ∅.
Insulation: paper and air-space.
Circuit: concentrically stranded pairs (T) or concentrically stranded star quads (Q) up to 2400 conductors; concentrically stranded pairs or star quads up to 200 conductors to build a unit (U); concentrically stranded units up to 4800 conductors.
Protective covering: bare lead sheath; protective covering if required.
Characteristics: low capacity, high telephone transmission.
Recommended for: local telephone lines.



Closing

INCET TORINO

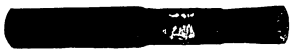
3 STANDARD PRODUCTION FIBRE INSULATED CABLES

A TELECOMMUNICATIONS

30) **Type: 195 - 196 - 197: PR - PS - PE**

Conductor: plain (R), enamelled (S), tinned (E) copper wire - 0.5 to 0.9 mm. ∅.
Insulation: waxed paper and fibre.
Circuit: twisted pairs concentrically stranded up to 100 pairs.
Protective covering: lead sheath.
Characteristics: good insulation up to requirements.
Recommended for: interior telephones.

31) **Type: 194 - 198: PR - PS - PE**
See cables at no. 30 except for impregnated fibre insulation.



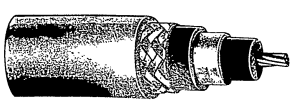
32) **Type: 5569**

Conductor: enamelled copper wire, 0.6 or 0.7 mm. ∅.
Insulation: fibre or paper and waxed fibre.
Circuits: pairs, triple or star quad concentrically stranded.
Protective covering: aluminium tape and flameproof fibrous braiding. Cables can be round or oval.
Characteristics: good insulation.
Recommended for: interior connections of telephone exchanges.

33) **Type: 5425**

Conductor: enamelled copper wire, 0.6 to 1 mm. ∅.
Insulation: flameproof waxed fibre.
Circuit: two or three twisted or stranded conductors.
Protective covering: flameproof individual fibrous braid.
Recommended for: switchboard wire and jumper wire.

B SHIPBOARD



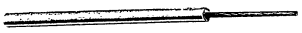
34) **Type: TPKAR-TPKNR** (according to RIN, Lloyd's Register, American Bureau specifications)
Conductor: plain copper wire or strand.
Insulation: varnished cambric.
Protective covering: pure or alloyed lead sheath. neoprene jacket, steel braid or tape or plastic jacket.
Characteristics: high insulation and heat resistance.
Recommended for: hot-located shipboard installations (above 65° C).

C TUNNELS, SHAFTS AND MINES

34a) **Type: TPF** single-core or multicore
Conductor and insulation: see type no. 34.
Protective covering: round or flat steel wir armoured.
Recommended for: mining installations, tunne hydraulic power conduit, mines.

4 SPECIALLY INSULATED CABLES

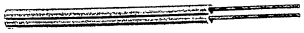
A POWER LINES



36) **Types: IVINIL** for low voltage

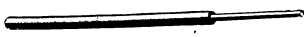
Conductor: wire (U) - rigid (R) - semi-flexible (M) - flexible (F) - ultra flexible (FF) plain copper strand.
Insulation: PVC resin.
Working voltage limit: 600 volts.
Operating temperature limit: 70° C.
Characteristics: high dielectric strength; abrasion, oil, acid, weather resistance; wide range of colours.

36a) **Type: FR1X/1.5** (CEI-UNEL) twisted conductors



FR1H/1.5 (CEI-UNEL) parallel conductors

Insulation and characteristics: as above.
Working voltage limit: 250 volts.
Recommended for: lamps, radio-sets, TV and domestic appliances.



36b) **Type: UR1/2 - RR1/2** - grade 2 (CEI-UNEL)
UR1/3 - RR1/3 - grade 3 (CEI-UNEL)

Conductor: rigid wire or strand.
Insulation and characteristics: as above.
Working voltage limit: 450 and 600 volts respectively.
Recommended for: permanent installations on insulators (or in pipes) in lighting or power installations.

36c) **Type: MR1L/2 - MR1L/3**
2 or 3 parallel conductors with separator

Insulation and characteristics: as above.
Working voltage limit: 450 and 600 volts respectively.
Recommended for: lighting and power installations instead of MG1DT/3 cables.

INCET TORINO

4 STANDARD PRODUCTION

36d) **Type: MR1H/3** (CEI-UNEL)
2 or 3 parallel conductor zip cord

Insulation: PVC resin.
Characteristics: as above.
Working voltage limit: 450 volts.
Recommended for: lighting or low-powered installations.

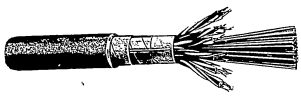
36f) **Type: FR1OR/1.5** - grade 1.5 (UNEL specifications)
Plastic insulated flexible cable, over-all plastic jacket.

Working voltage limit: 250 volts.
Characteristics: flexibility and good mechanical resistance.
Recommended: instead of FG1G/1.5 rubber embedded cables.

B TELECOMMUNICATIONS

36g) **Type: TR1X**

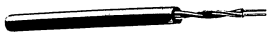
Conductor: 0.6 mm. copper wire.
Insulation: synthetic resin.
Circuit: 2 or 3 stranded conductors.
Characteristics: flameproof.
Recommended for: switchboard.



37) **Type: TRR**
37a) **Type: TRSR**
Conductor: plain copper wire.
Insulation: PVC resin.
Circuit: insulated stranded pairs or triples or star quads. A paper or plastic tape wrap is applied over them.
Protective covering: polythene jacket (37) with screen if required (37a).
Characteristics: low capacity, good transmission properties, lightness.
Recommended for: interior telephones and station connections.

Extruder for thermoplast insulation

SPECIALLY INSULATED CABLES



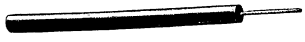
38) **Type: TPR-2×6/10** for interior telephones
Conductor: plain or tinned copper wire.
Insulation: polythene.
Circuit: two stranded conductors.
Protective covering: polythene jacket.
Characteristics: low capacity, good insulating resistance, lightness, weatherproof.
Recommended for: interior telephones.

40) **Type: TPPR**
Polythene local telephone cable, plastic jacket.
Conductor: plain copper wire.
Insulation: coloured polythene.
Circuit: polythene insulated conductors, concentrically stranded pairs as to form a solid round cable. Two polythene tapes, an aluminium screen, a separator is applied over them plus an over-all plastic sheath. When buried an additional polythene jacket is applied under the screen over the stranded taped pairs (no. 40a: TPPR).
Protective covering: against gun-shots, double lead or double thermoplastic jacket with interposed steel tape.

C AUTOMOBILE AND AIRCRAFT

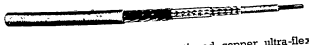
41) **Type: IFA**
Single-core cable according to UNI specifications

Conductor: plain or tinned copper flexible strand.
Insulation: special PVC resin (a wide range of colours).
Characteristics: flexibility, good mechanica and electric properties, oil and gasoline resistance.
Recommended for: automobile and railway lighting circuits etc.



44) **Type: FRA**
Cable for ignition of internal combustion engines.

Conductor: plain copper flexible strand.
Insulation: special PVC resin.
Characteristics: highest dielectric strength, good resistance to corona discharge, oil and solvents resistance, excellent electric and mechanical properties.



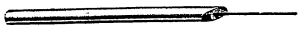
45) **Type: AVIO**
Aircraft cables

Conductor: tinned copper ultra-flexible strand.
Insulation: special synthetic resin.
Protective covering: fiberglass braid, nylon or plastic jacket; screen if necessary.
Characteristics: high dielectric strength, good flexibility and mechanical properties; cold and heat resistance.

INCET TORINO

STANDARD PRODUCTION 4 SPECIALLY INSULATED CABLES

D SPECIAL APPLIANCES



47) **Type: INEO/5**

Conductor: plain copper flexible strand, sectional area 0.22 sq. mm.
Insulation: resin.
Maximum voltage: 5 KV.
Characteristics: remarkable ozone resistance, weatherproof, long aging; excellent dielectric strength, flameproof.
Recommended for: luminescent gas-lamp feeders.

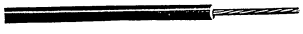
48) **Type: INEO/12**

Conductor: plain copper flexible strand, sectional area 0.67 sq. mm.
Insulation: polythene and resin.
Maximum voltage: 12 KV.
Characteristics: special ozone resistance, weatherproof, long aging; excellent dielectric properties, flameproof.

49) **Type: SIL-VE**

Conductor: tinned copper flexible strand.
Insulation: special silicon rubber.
Protective covering: varnished fiberglass braid.
Working voltage limit: 1000 volts.
Temperature: up to 120° C.
Recommended for: hot and wet-located connections.

E RADIO AND TELEVISION-SETS AND CARRIER FREQUENCY INSTALLATIONS



36i) **Type: UR1-FR1**

Conductor: plain or tinned copper wire or strand.
Insulation: PVC resin.
Working voltage limit: 250 volts.
Recommended for: radio and television connections.

51) **Type: BPCN** flat-twin lead

Conductor: plain copper strand.
Insulation: white, black, brown or silver polythene.
Recommended for: connection between the antenna and the receiving TV set.

52) **Type: BPAcN** oval

Conductor: plain copper wire.
Insulation: brown cellular polythene.
Recommended for: antenna drop lines or connection to remote antenna.

53) **Type: CRCS** coaxial

Internal conductor: plain copper wire or strand.
Insulation: solid polythene.
External conductor: tinned or plain copper wire thick braid.
Protective covering: PVC jacket.
Recommended for: TV antenna drop lines provided a suitable unbalancing antenna circuit is used.

54a) **Type: CRAcS** coaxial

Internal conductor: plain copper wire or strand.
External conductor: plain or tinned copper wires, thick braid.
Insulation: cellular polythene.
Protective covering: PVC jacket.
Recommended for: as above.

56a) **Type: BPAcS** screened twin cable

Conductor: plain copper wire or strand.
Insulation: cellular polythene.
The two parallel conductors embedded into cellular polythene; the shielding is performed with a closed braid with plain or tinned copper wires.
Protective covering: PVC jacket.
Recommended for: balanced TV antenna drop line.

INCET
TORINO

INDUSTRIA NAZIONALE CAVI ELETTRICI - TORINO
VIA ANTONIO BANFO 5 - PHONE 21-292 - CABLES: INCET TORINO (ITALY)

SCUOLA GRAFICA SALESIANA - TORINO

OFFICINE TRASFORMATORI ELETTRICI BERGAMO

SOCIETÀ PER AZIONI

OFFICINE TRASFORMATORI ELETTRICI

CAPITALE SOCIALE L. 105.000.000 VERSATO

BERGAMO

SOMMARIO

SUMMARY

STABILIMENTO • DIREZIONE • AMMINISTRAZIONE

BERGAMO, VIA BIANZANA 56 • TELEFONI: 23.451 - 24.709

INDIRIZZO TELEGRAFICO: "TRIFASE„ • CASELLA POSTALE N. 207

trasformatori di potenza

power transformers

SOC. ADRIATICA DI ELETTRICITÀ - VENEZIA

N 1 Trasformatore trifase in olio, a raffreddamento forzato per mezzo di aerotermi
Three-phase transformer, oil immersed, forced circulation with air-blast cooling
KVA 30.000 — KVolt 135 / 56,16 ± 2 × 2,16

N. 1 Trasformatore trifase in olio, a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformer, oil immersed, forced oil circulation with water cooling
KVA 22.000 — KVolt 10 / 135

Trasformatori trifasi in olio, a tre avvolgimenti, a raffreddamento naturale
Three-windings three-phase transformers, oil immersed, natural cooling

N. 1 KVA 10.000 / 5.000 / 7.000 — KVolt 51,5 ± 1,5 / 31,5 ± 1,5 / 11 ± 0,5
N. 1 KVA 8.330 / 6.670 / 5.000 — KVolt 51,5 ± 1,5 / 31,5 ± 1,5 / 11 ± 0,5

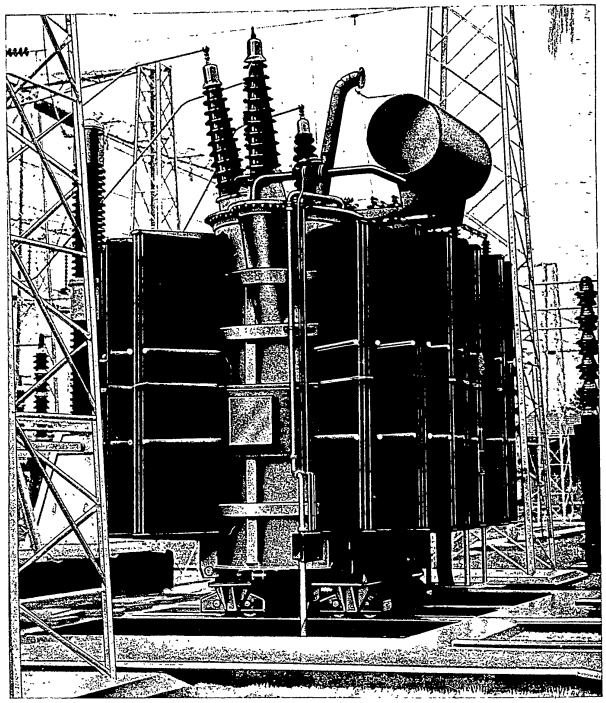
Trasformatori trifasi in olio, a raffreddamento naturale
Three-phase transformers, oil immersed, natural cooling

N. 3 KVA 12 000 — KVolt 124 ± 2 × 6 / 52
N. 1 » 12 700 — » 50,75 ± 3 × 1,25 / 22 - 11
N. 3 » 10 000 — » 51,157 - 49 - 47,016 / 28,241
N 2 » 8.000 — » 48 ± 2 × 2 / 5,2
N. 2 » 6.000 — » 52 - 50,1 - 48,2 / 11,15 - 10,7
N. 1 » 6.000 — » 45,5 / 16,4 - 15,4
N. 1 » 6.000 — » $\frac{48,4 \pm 3 \times 1,2}{1,73}$ / 16,83 - 8,415
N. 1 » 6 000 — » 48 - 44,82 / 12,15 - 10,57 - 7 - 6,66
N. 14 » 6 000 — » 50,75 ± 3 × 1,25 / 22 - 11
N. 2 » 6 000 — » 48,25 ± 3 × 1,25 / 16,2 - 8,1 - 5,4
N. 1 » 6.000 — » 48,25 ± 2 × 1,25 / 12,16 - 11 - 10,50
N. 1 » 6.000 — » 52 ± 3 × 1,25 / 20,78 - 10,39

N. 80 Trasformatori di potenza compresa fra 1.000 e 4.000 KVA
Power transformers, from 1 000 to 4.000 KVA

N. 1 Trasformatore trifase a raffreddamento a circolazione forzata dell'olio e a ventilazione forzata
Three-phase transformer oil immersed, forced oil circulation with air-blast cooling
KVA 6.000 — KVolt 54 - 52 - 50 - 48 / 3,6

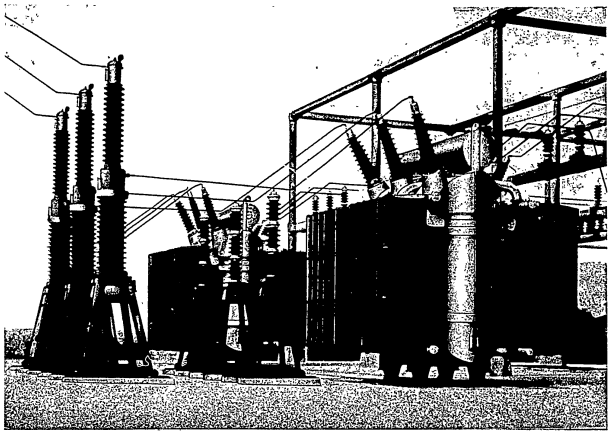
N. 2 Trasformatori trifasi in olio con radiatori, a ventilazione forzata
Three-phase transformers, oil immersed, natural oil circulation in radiators, with air-blast cooling
KVA 4.240 — KVolt 50,75 ± 3 × 1,25 / 22 - 11



TRASFORMATORE TRIFASE IN OLIO A RAFFREDDAMENTO
A VENTILAZIONE FORZATA

THREE-PHASE TRANSFORMER, OIL IMMERSED, WITH AIR-BLAST COOLING

KVA 15.000 - Hz 50 ± 5% - KVolt 120-126-132 / 6.3-10 91



TRASFORMATORE TRIFASE IN OLIO A RAFFREDDAMENTO NATURALE
THREE-PHASE TRANSFORMER, OIL IMMERSED, NATURAL COOLING

KVA 15 000 - Hz 50 - KVolt 60 / 127 ± 5% ± 10%

SOC. EDISON - MILANO

N 1 Trasformatore trifase a raffreddamento a circolazione d'olio in radiatori a ventilazione forzata
Three-phase transformer oil immersed, natural oil circulation in radiators, with air-blast cooling

KVA 30.000 — KVolt 127,5 / 22,9 ± 0,4

N 1 Trasformatore trifase in olio, a raffreddamento naturale
Three-phase transformer, oil immersed, natural cooling

KVA 11 000 — KVolt 8,4 / 148,5 - 142 - 135

N. 2 Trasformatori trifasi a raffreddamento a circolazione forzata dell'olio e a ventilazione forzata
Three-phase transformers oil immersed forced oil circulation with air-blast cooling

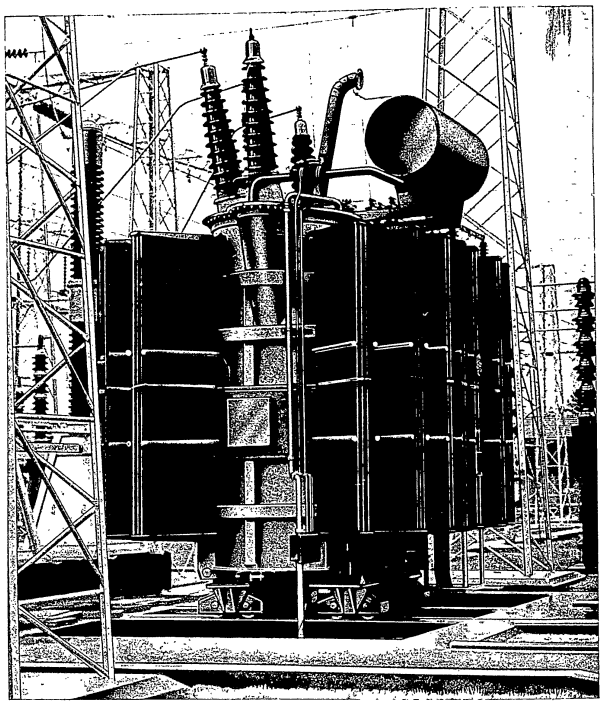
KVA 10.000 — KVolt 13,2 ± 2 × 0,66 / 3,2

Trasformatori trifasi a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformers, oil immersed, forced oil circulation with water cooling

N. 2 KVA 8 500 — KVolt 10 / 142, 5 ± 7,5
N. 1 » 7.000 — » 8,4 / 142 ± 6

N. 1 Trasformatore trifase a circolazione d'olio in refrigerante raffreddato ad acqua, a tre avvolgimenti
Three-windings three-phase transformer, oil immersed forced oil circulation with water cooling

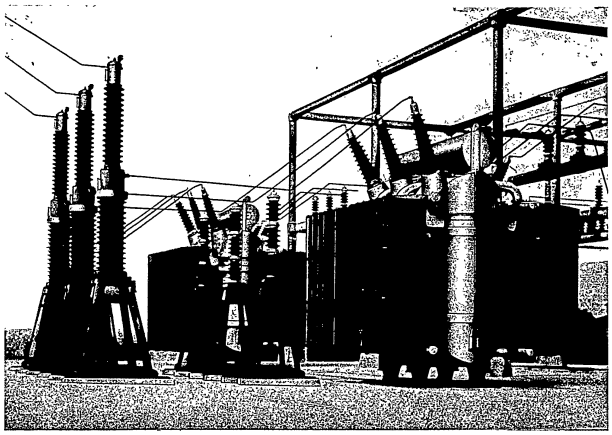
KVA 10.000 / 6.000 / 6.000 — KVolt 46 / 7,7 - 3,85 / 7,7



TRASFORMATORE TRIFASE IN OLIO A RAFFREDDAMENTO
A VENTILAZIONE FORZATA

THREE-PHASE TRANSFORMER, OIL IMMERSED, WITH AIR-BLAST COOLING

KVA 15.000 - Hz 50 ± 5% - KVolt 120-126-132 / 6 3-10 91



TRASFORMATORE TRIFASE IN OLIO A RAFFREDDAMENTO NATURALE
THREE-PHASE TRANSFORMER, OIL IMMERSED, NATURAL COOLING

KVA 15.000 - Hz 50 - KVolt 60 / 127 ± 5% ± 10%

SOC. EDISON - MILANO

N. 1 Trasformatore trifase a raffreddamento a circolazione d'olio in radiatori a ventilazione forzata
Three-phase transformer, oil immersed, natural oil circulation in radiators, with air-blast cooling

KVA 30 000 — KVolt 127,5 / 22,9 ± 0,4

N. 1 Trasformatore trifase in olio, a raffreddamento naturale
Three-phase transformer, oil immersed, natural cooling

KVA 11.000 — KVolt 8,4 / 148,5 - 142 - 135

N 2 Trasformatori trifasi a raffreddamento a circolazione forzata dell'olio e a ventilazione forzata
Three-phase transformers oil immersed forced oil circulation with air-blast cooling

KVA 10.000 — KVolt 13,2 ± 2 × 0,66 / 3,2

Trasformatori trifasi a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformers, oil immersed, forced oil circulation with water cooling

N. 2 KVA 8.500 — KVolt 10 / 142, 5 ± 7,5
N. 1 » 7 000 — » 8,4 / 142 ± 6

N. 1 Trasformatore trifase a circolazione d'olio in refrigerante raffreddato ad acqua, a tre avvolgimenti
Three-windings three-phase transformer oil immersed, forced oil circulation with water cooling

KVA 10.000 / 6.000 / 6.000 — KVolt 46 / 7,7 - 3,85 / 7,7

SOC. IDROELETTRICA MEDIO ADIGE - VERONA

N. 4 Trasformatori trifasi in olio a raffreddamento a ventilazione forzata
Three-phase transformers, oil immersed, with air-blast cooling

KVA 20.000 — KVolt 10 ± 10% / 125 - 130 - 135 - 140

SOC. ELETTRICA OROBIA - MILANO

N. 2 Trasformatori trifasi in olio a raffreddamento a ventilazione forzata
Three-phase transformers, oil immersed with air-blast cooling

KVA 17.000 — KVolt 64 ± 3 / 29,4 - 14,7 - 6,8

N. 2 Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed, natural cooling

KVA 5.000 — KVolt 60 ± 2 / 45 - 13

ITALCEMENTI - BERGAMO

N. 1 Trasformatore trifase in olio a tre avvolgimenti a raffreddamento naturale
Three-windings three-phase transformer oil immersed, natural cooling

KVA 8.000 / 8.000 / 4.000 — KVolt 45 ± 2,25 / 5,25 / 14,5

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 2 KVA 15.000 — KVolt 60 / 127 ± 6,35
N. 2 » 15.000 — » 3,6 - 7,2 / 143,1 - 136,5 - 129,45 - 122,4
N. 1 » 15.000 — » 5 / 64 ± 2 × 5%
N. 3 » 10.800 — » 125 - 62,5 ± 2 × 5% / 5,15
N 2 » 8.000 — » 5 ± 2 × 0,25 / 60 - 45
N. 1 » 8.000 — » 5 / 64 ± 2 × 5%
N. 1 » 6.000 — » 50,75 ± 3 × 1,25 / 5,525
N. 4 » 4.000 — » 5 ± 2 × 0,25 / 60 - 45
N. 2 » 4.000 — » 70 ± 2 × 3,5 / 5

N. 125 Trasformatori di potenza compresa fra 1.000 e 4.000 KVA
Transformers from 1 000 to 4 000 KVA

N. 450 Trasformatori di potenze varie inferiori a 1.000 KVA
Power transformers up to 1 000 KVA

ENTE SICILIANO DI ELETTRICITÀ "E.S.E." - CATANIA

Trasformatori trifasi in olio a tre avvolgimenti a raffreddamento naturale
Three-windings three-phase transformers oil immersed natural cooling

N. 3 KVA 10.000 / 6.000 / 5.000 — KVolt 150 / 70 ± 2× 3,5 / 10,5 + 0,525
N. 6 » 6.000 / 4.000 / 4.000 — KVolt 70 / 21 + 2 × 5% / 10,5 ± 2 × 5%

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 3 KVA 14.000 — KVolt 10,5 + 1,05 / 150
N. 2 » 6 400 — » 150 / 75,2 + 2 × 5%
N. 2 » 3.500 — » 150 / 20 + 1

GRUPPO DI TRASFORMATORI CON ENTRATA E USCITA IN CAVO

GROUP OF TRANSFORMERS WITH CABLE BOX ON THE H. V. AND L V. SIDE

KVA 1.200 - Hz 50 - KVolt 5.5-5.25-5-4.75 / 0.395

AZIENDA GENERALE SERVIZI MUNICIPALIZZATI DEL COMUNE DI VERONA

Trasformatori trifasi in olio a tre avvolgimenti a raffreddamento naturale
Three-windings three-phase transformers oil immersed natural cooling

N. 2 KVA 13.350 / 13 350 / 4.000 — KVolt 133,5 / 54,3 [illegible] / 10,33
N. 2 » 13.350 / 7.050 / 13 350 — KVolt 10 / 54,3 / 133 5

METALLURGICA LUCIANO RUMI - SERIATE - (Bergamo)

N. 1 Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer oil immersed natural cooling

KVA 12.000 — KVolt 130 / 15 ± 2 × 3%

"STEI" - SOCIETÀ TERMO ELETTRICA ITALIANA - MILANO

N. 1 Trasformatore trifase in olio con raffreddamento a ventilazione forzata
Three-phase transformer, oil immersed with air-blast cooling

KVA 15.000 — KVolt 126 ± 6 / 6,3 - 10,91

COMPAGNIA IMPRESE ELETTRICHE LIGURI - GENOVA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 2 KVA 15.000 — KVolt 60 ± 2,5 / 30 - 15
N. 3 » 4.000 — » 64 ± 3 / 14,5 ± 0,6 - 12 ± 0,6

SOC. DELL'ALLUMINIO ITALIANO - BORGOFRANCO D'IVREA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 1 KVA 14 000 — KVolt 66 ± 3 / 11,5
N. 1 » 11 0[illegible] — » 11,5 / 66,5 ± 3

AZIENDA ELETTRICA CONSORZIALE DELLE CITTÀ DI BOLZANO E MERANO

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers, oil immersed, natural cooling

N. 2 KVA 10.000 — KVolt 3,3 - 10 - 17,3 / 66 ± 3,3
N. 2 » 8.000 — » 3,3 - 10 - 17,3 / 66 ± 3,3
N. 2 » 6.000 — » 3,3 - 10 - 17,3 / 66 ± 3,3
N. 4 » 6.000 — » 66 ± 5% / 15,5 ± 5%

SOCIETÀ ROMANA DI ELETTRICITÀ - ROMA

N 1 Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer oil immersed, natural cooling

KVA 12.700 — KVolt 62,65 ± 2,88 / 20,4 ± 5,06%

SOC. MONTECATINI - MILANO

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 1 KVA 3.500 — KVolt 133,4 ± 6,67 / 17,32 - 10
N. 2 » 7 300 — » 30 ± 1,5 / 10
N. 1 » 5 000 — » 61,5 ± 3,075 / 5,2
N. 3 » 5.000 — » 64 ± 3,2 / 10,47 - 6,05

Autotrasformatore trifase in olio a raffreddamento naturale
Three-phase auto-transformer, oil immersed, natural cooling

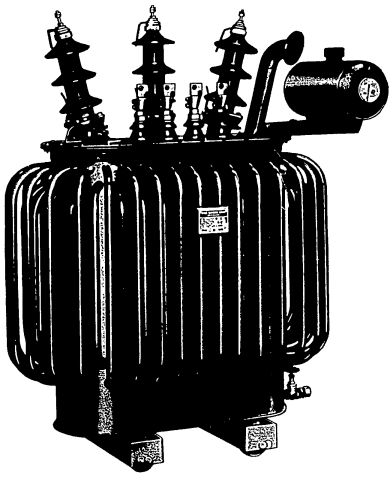
N. 1 KVA 12.500 — KVolt 16,5 / 18,9 ± 0,4

N. 50 Trasformatori di potenza compresa fra 1.000 e 4.000 KVA
Power transformers, from 1 000 to 4 000 KVA

SOC. AN. FRATELLI GALTAROSSA - MILANO

Trasformatori trifasi a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformers, oil immersed, forced oil circulation with water cooling

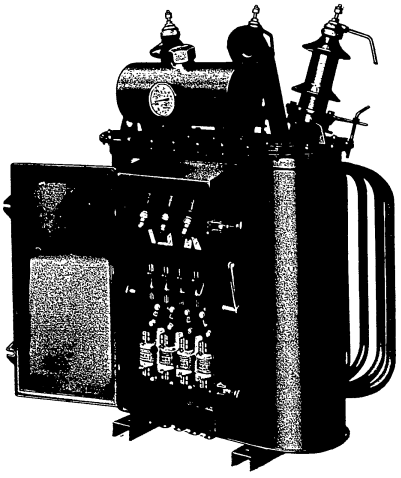
N. 2 KVA 11.000 — KVolt 63 ± 2 × 1,5 / 7 - 3,5
N. 1 » 10.000 — » 47,5 ± 2,325 / 3,5
N. 1 » 10.000 — » 55 ± 2,5 / 3,5
N. 1 » 8.000 — » 47,5 / 3,5
N. 2 » 7.000 — » 55 / 3,5
N. 1 » 5.000 — » 63 ± 1,5 / 3,5
N 1 » 5.000 — » 55 / 3,5



TRASFORMATORE
TIPO UNIFICATO

S T A N D A R D
T R A N S F O R M E R

KVA 100 - Classe KVolt 20.



TRASFORMATORE DA PALO CORREDATO DI SEZIONATORE E VALVOLE SULLA BASSA TENSIONE

POLE MOUNTING TRANSFORMER WITH DISCONNENTING SWITCH AND FUSES ON THE L V SIDE

"DINAMO" SOC. ITALIANA PER IMPRESE ELETTRICHE - MILANO

Trasformatori trifasi a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase trasformers oil immersed forced oil circulation with water cooling

N. 2 KVA 10.000 — KVolt 49,5 ± 2,5 / 5,4 - 7,2
N. 1 » 7.000 — » 49,5 / 7,2 ± 0,36

Trasformatori trifasi in olio a raffreddamento naturale
Three phase transformers oil immersed natural cooling

N. 2 KVA 5.000 — KVolt 60 ± 2,5 - 49,5 ± 2,5 / 13 - 12,5
N. 1 » 5.000 — » 40 ± 1 / 24,5 - 24 - 22,8 - 14,15 - 13,85 - 13,16

SOC. AN. CARLO TASSARA - GENOVA

Trasformatori trifasi a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformers oil immersed forced oil circulation with water cooling

N. 2 KVA 10.000 — KVolt 65 ± 2 / 3,9
N. 1 » 5.400 — » 12 / 65 ± 2

N. 2 Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

KVA 4.150 — KVolt 6,5 / 65 ± 2

UNIONE ESERCIZI ELETTRICI - ROMA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed, natural cooling

N. 2 KVA 10.000 — KVolt 63 ± 3 / 10,5 ± 0,5
N. 6 » 5 000 — » 63 ± 3 / 31,5 ± 1,5
N. 4 » 5.000 — » 63 ± 3 / 10,5 ± 0,5

SOC. ACCIAIERIE FERRIERE CRAVETTO - SETTIMO TORINESE

N. 1 Trasformatore trifase a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformer oil immersed forced oil circulation with water cooling

KVA 10.000 — KVolt 70 - 65 - 63 - 61 / 6

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed, natural cooling

N 1 KVA 6.000 — KVolt 70 - 65 - 63 - 61 / 40
N. 2 » 5.100 — » 6 / 76,21 - 72,745 - 69,25 - 65,815
N. 1 » 5.000 — » 70 - 65 - 63 - 61 / 40

SOC. IDROELETTRICA PIEMONTESE "S.I.P." - TORINO

N. 1 Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer oil immersed natural cooling

KVA 4.000 - KVolt 30 ± 1,5 / 9,5

CENTRALA ZAOPATRZENIA MATERIALOWEGO PRZEMYSLU WEGLOWEGO - POLONIA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 1 KVA 12.000 — KVolt 20,2 ± 1 / 6,3
N. 1 » 5.000 — » 6,3 ± 0,25 / 3,15
N. 2 » 2.500 — » 6 ± 0,3 / 2,2
N. 4 » 2.000 — » 20 ± 1 / 6 - 3

GRUPPO DI TRASFORMATORI DI PICCOLA POTENZA CON NUCLEO A CRISTALLI ORIENTATI

GROUP OF SMALL SIZE TRANSFORMERS WITH ORIENTED STEELS CORE

ORMAS - SOC. PER AZ. - ARGENTINA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 1 KVA 6.000 — KVolt 13,2 / 66 ± 2 × 1,65
N. 2 » 5.000 — » 13,2 ± 0,33 / 69,3 ± 3,465
N. 2 » 3.000 — » 13,2 / 66 ± 2 × 1,65
N. 2 » 2.500 — » 13,2 - 6,6 / 34,65 ± 2 × 0,866
N. 4 » 1.500 — » 66 ± 2 × 1,65 / 13,2

"JUGOVINIL,, TVORNICA PLASTICNIH I KEMIJSKIH PROIZVODA - SPALATO (Jugoslavia)

N. 2 Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers, oil immersed natural cooling
KVA 6.000 — KVolt 60 ± 2 × 3 - 34,6 ± 2 × 1,73 / 6,3

KAUKOMARKKINAT OY - FINLANDIA

N. 1 Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer, oil immersed natural cooling
KVA 6.000 — KVolt 20 ± 1 / 6,3 - 3,15

SOCIETÈ D'APPLICATIONS MECANIQUES ET INDUSTRIELLES "SAMI" - MAROCCO

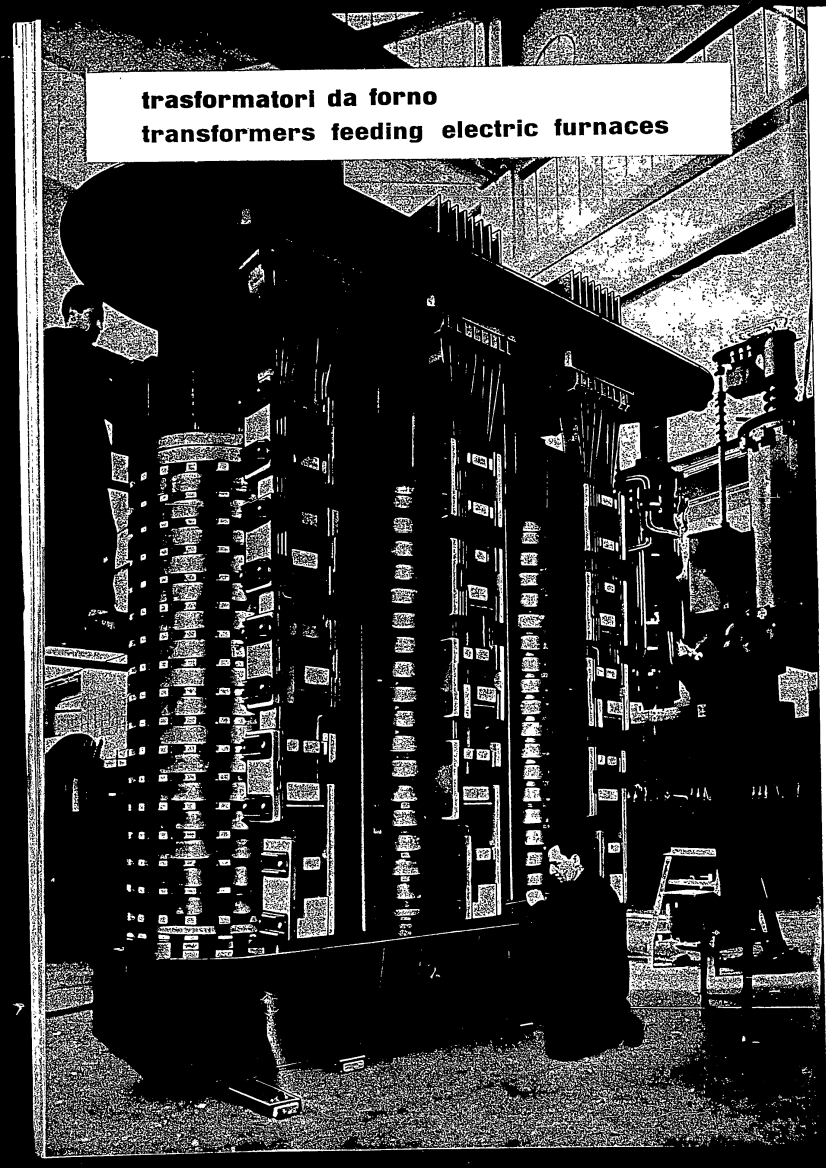
N. 2 Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers, oil immersed, natural cooling
KVA 5.000 — KVolt 5,5 / 60 ± 2 × 3

ÉLÉCTRICITÉ DE FRANCE - FRANCIA

N. 2 Trasformatori trifasi a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformers, oil immersed, forced oil circulation with water cooling
KVA 3.400 — KVolt 10 / 64 ± 3,2

ALTRE REFERENZE
OTHER REFERENCES

SOC. DE ANGELI FRUA - MILANO
SOC. " APE ,, - APPLICAZIONE PROCESSI ELETTROCHIMICI - GENOVA
SOC. " ANIC ,, - MILANO
CARTIERA CIMA - SAN GIOVANNI BIANCO - BERGAMO
SOC. FONDERIE OFFICINE DI GORIZIA - GORIZIA



trasformatori da forno
transformers feeding electric furnaces

SOC. DALMINE - MILANO

Trasformatori trifasi a colonna per forni elettrici a circolazione d'olio in refrigerante raffreddato ad acqua

Three-phase transformers core type for electric furnaces, oil immersed forced oil circulation with water cooling

N. 2 KVA 14.600 — Volt 11 200 / 140 ÷ 340 in 14 salti di tensione
with 14 voltage steps

SOCIETÀ MONTECATINI - MILANO

Trasformatore trifase corazzato a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Three-phase transformer shell type for electric furnaces, oil immersed, forced oil circulation with water cooling

N. 1 KVA 8.000 — Volt 55 000 - 47.000 / 90 - 100 - 110 - 120

SOC. AN. FRATELLI GALTAROSSA - MILANO

Trasformatori monofasi corazzati a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Single-phase transformers shell type for electric furnaces oil immersed, forced oil circulation with water cooling

N	1	KVA	3.000 —	Volt	3.500 / 60 - 141	in 32 salti di tensione with 32 voltage steps
N.	2	»	3.000 —	»	3.500 / 30 - 60	in 12 salti di tensione with 12 voltage steps
N.	1	»	3 000 —	»	3.500 / 30 — 120	in 26 salti di tensione with 26 voltage steps
N.	1	»	2.500 —	»	3.500 / 30 - 60	in 12 salti di tensione with 12 voltage steps
N.	1	»	2.500 —	»	3.500 / 30 - 60	in 10 salti di tensione with 10 voltage steps
N.	1	»	2.500 —	»	3.500 / 50 - 120	in 28 salti di tensione with 28 voltage steps
N.	1	»	2 000 —	»	3.500 / 35 - 60	in 10 salti di tensione with 10 voltage steps
N.	1	»	2.000 —	»	3.500 / 40 - 70	in 10 salti di tensione with 10 voltage steps
N.	9	»	1.700 —	»	7.000 - 3 500 / 65 - 130	in 14 salti di tensione with 14 voltage steps
N.	2	»	1.300 —	»	3.500 / 80 - 185	in 32 salti di tensione with 32 voltage steps

ACCIAIERIE FERRIERE LOMBARDE FALCK - MILANO

Trasformatori monofasi in olio corazzati a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Single-phase transformers shell type for electric furnaces oil immersed forced oil circulation with water cooling

N. 1	KVA 2.600 —	Volt 13.000 / 85 ÷ 160	in 6 salti di tensione with 6 voltage steps
N. 2	» 2.000 —	» 13.000 / 70 — 160	in 6 salti di tensione with 6 voltage steps
N. 2	» 1.500 —	» 13.000 / 40 - 50 - 60 - 70	
N. 1	» 1.350 —	» 13.000 / 70 — 180	in 6 salti di tensione with 6 voltage steps

SOC. ACCIAIERIE FERRIERE CRAVETTO - SETTIMO TORINESE

Trasformatori trifasi corazzati a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Three-phase transformers shell type for electric furnaces oil immersed forced oil circulation with water cooling

N. 2 KVA 3.320 — Volt 70.000 - 63.000 / 75 ÷ 200 in 7 salti di tensione
with 7 voltage steps

SOC. ACCIAIERIE E FERRIERE DEL CALEOTTO - LECCO

Trasformatore trifase corazzato a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Three-phase transformer shell type for electric furnaces oil immersed forced oil circulation with water cooling

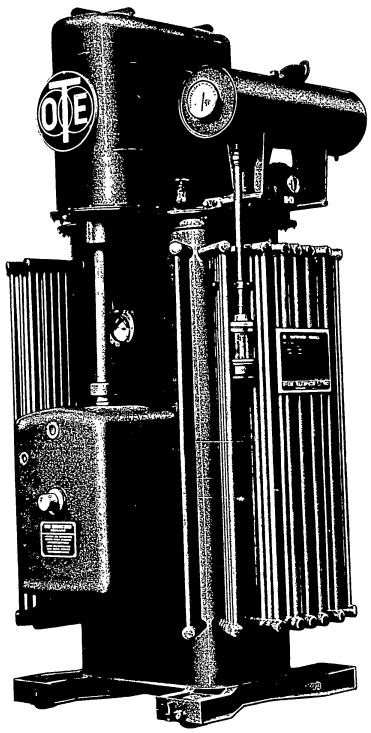
N. 1 KVA 3.000 — Volt 30.000 / 77 — 200 in 5 salti di tensione
with 5 voltage steps

SOC. AN. CARLO TASSARA - BRENO

Trasformatori monofasi corazzati a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Single-phase transformers shell type for electric furnaces oil immersed forced oil circulation with water cooling

N. 3 KVA 1.900 — Volt 3.800 / 70 ÷ 100 in 6 salti di tensione
with 6 voltage steps



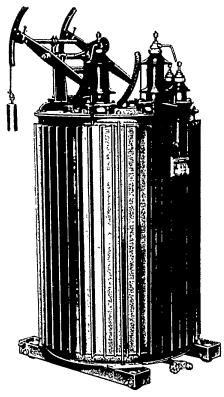
TRASFORMATORE MONOFASE IN OLIO A RAFFREDDAMENTO NATURALE CON VARIAZIONE DELLA TENSIONE SOTTO CARICO

SINGLE-PHASE TRANSFORMER, OIL IMMERSED, NATURAL COOLING, WITH ON-LOAD TAP-CHANGER

KVA 330 — Volt 2.300 / 150 ÷ 50 in 13 gradini
with 13 voltage steps

trasformatori a corrente costante

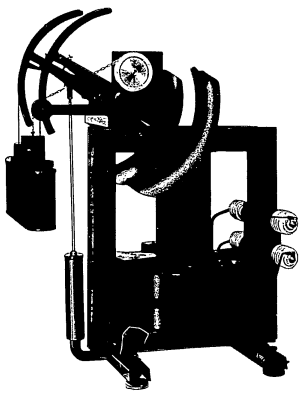
constant current type transformers



TRASFORMATORE MONOFASE IN OLIO A CORRENTE COSTANTE PER IMPIANTI ILLUMINAZIONE, A RAFFREDDAMENTO NATURALE

SINGLE-PHASE TRANSFORMER, OIL IMMERSED, NATURAL COOLING, CONSTANT CURRENT TYPE FOR LIGHTING PLANTS

KVA 40 - Hz. 50 - Amp. 9,6



TRASFORMATORE MONOFASE IN ARIA A CORRENTE COSTANTE, CON DISPOSITIVO AUTOMATICO PER L'ATTENUAZIONE DELLA LUCE

SINGLE-PHASE, DRY TYPE, CONSTANT CURRENT TRANSFORMER, WITH AUTOMATIC EQUIPMENT FOR LIGHT ATTENUATION

KVA 12 - Hz. 50 - Amp. 9,6

commutatori sotto carico

on-load tap-changer

I trasformatori con variazione di rapporto sotto carico sono equipaggiati con commutatori a gradini, di ns. costruzione.

Di questi illustriamo brevemente il modello "CIO" trifase che è quello più frequentemente usato. Esso viene costruito per portate di 400 Amp. e 600 Amp.

La ns. costruzione di serie comprende i tipi elencati nella tabella a pag. 20 che permettono di realizzare gli schemi di principio ivi segnati.

Detti schemi possono essere impiegati con diverse combinazioni e alcune di esse sono schematizzate a pag. 21.

Gli organi essenziali del commutatore sono (vedere pag. 20).

a) un doppio selettore di prese tripolare posto nell'interno del cassone;
b) un prelesettore tripolare per i tipi T2SI, T2SP e un doppio preselettore tripolare per il tipo T2S2P;
c) un doppio interruttore tripolare posto esternamente al cassone e con i contatti immersi in olio;
d) un'impedenza trifase doppia posta nell'interno del cassone;
e) un cofano di comando a mano e a motore; (vedere pag. 21);
f) un pannello con le apparecchiature di manovra e segnalazione (vedere pag. 21).

The transformers with voltage variation on load are equipped with tap-changers built by us

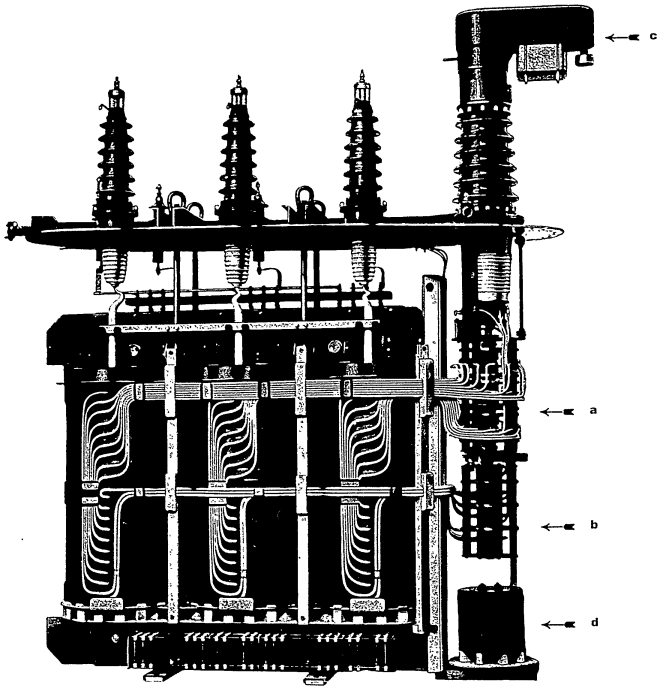
We will briefly illustrate the three-phase "CIO" type which is the most used and which is suitable for current up to 400 or 600 Amp

Our production includes the types enumerated in the list at pag 20 and which allow to obtain the principle schemes indicated there.

The above mentioned schemes can be used in several combinations, some of which are illustrated at pag 21

The main mechanisms of the tap-changer are (see pag 20)

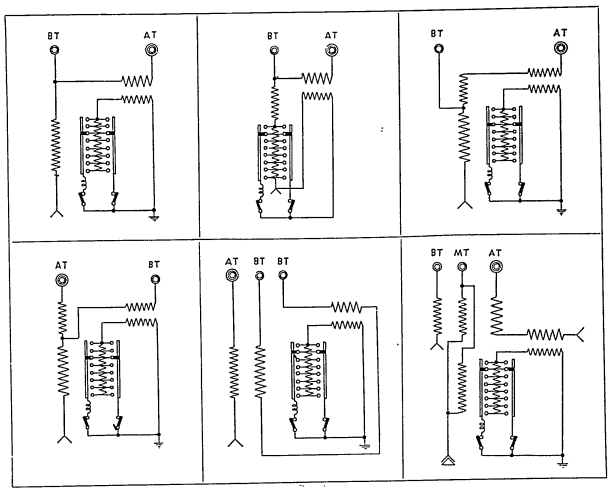
a) a double three-pole taps selector, placed inside the tank,
b) a three-pole preselector for the T2S1 and T2SP types and a double three-pole preselector for the T2S2P type,
c) a double three-pole breaker placed outside the tank and with the contacts immersed in oil,
d) a double three-phase impendance placed inside the tank,
e) an hand and motor drive and control cabinet (see pag 21),
f) a control panel with the operation and signalling apparatus (see pag 21)

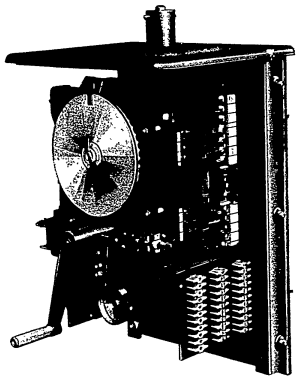


TRASFORMATORE TRIFASE IN OLIO A RAFFREDDAMENTO NATURALE
THREE-PHASE TRANSFORMER, OIL IMMERSED, NATURAL COOLING

KVA 6.000 - Hz 50 - KVolt 49.5 ± 8 × 0,625 / 16 2 - 8.1

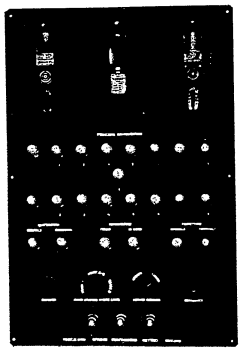
TIPO	T2S	T2SI	T2SP	T2S2P
Schema	1	2	3	4
Linea				
Avvolgimento principale				
Preselettore				
Selettore				
Reattanza				
Interruttore				





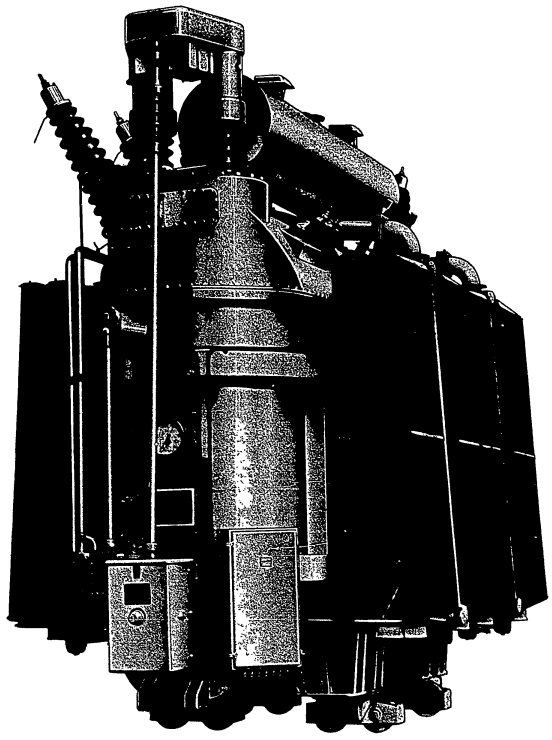
COFANO DI COMANDO
DRIVE AND CONTROL CABINET

PANNELLO COMANDO E SEGNALAZIONE
DRIVE AND SIGNALLING CONTROL PANEL



trasformatori di potenza con commutatore sotto carico

power transformers with on-load tap-changer



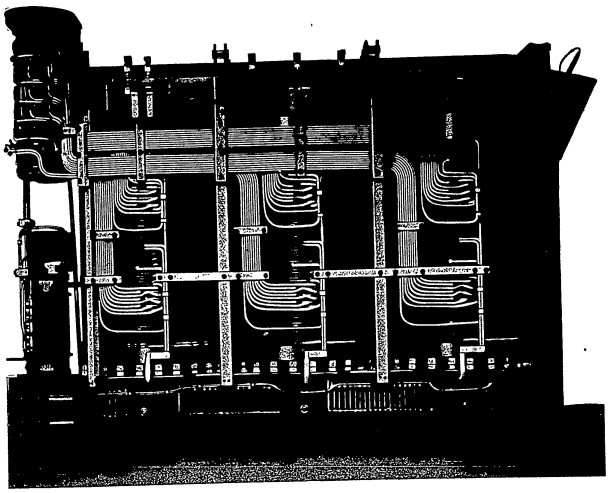
SOC. ADRIATICA DI ELETTRICITÀ - VENEZIA

Trasformatore trifase in olio a raffreddamento con ventilazione forzata
Three-phase transformer oil immersed with air-blast cooling

N. 1 KVA 12.700 — KVolt 49,5 ± 8 × 0,625 / 17 - 8,5

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed, natural cooling

N	1	KVA	12.700 —	KVolt	52 ± 8 × 0,625 / 22 - 21 - 11 - 10,5
N.	3	»	12.700 —	»	52 ± 8 × 0,625 / 22 - 11
N.	1	»	12.700 —	»	49,5 ± 8 × 0,625 / 22 - 11
N.	2	»	12.700 —	»	49,5 ± 8 × 0,625 / 17 - 8,5
N.	1	»	12.000 —	»	49,5 ± 8 × 0,625 / 20,78 - 10,39 - 12 - 6
N.	6	»	12.000 —	»	49,5 ± 8 × 0,625 / 20,78 - 10,39
N	2	»	6.350 —	»	49,5 ± 8 × 0,625 / 22 - 11
N.	3	»	6.000 —	»	49,5 ± 8 × 0,625 / 16,2 - 8,1
N.	1	»	5.500 —	»	9,3 - 9,6 - 9,9 - 10,2 - 10,5 - 10,8 - 11,1 / 3,2
N.	1	»	5.500 —	»	12,2 - 12,6 - 13 - 13,4 - 13,8 - 14,2 - 14,6 / 3,2
N	2	»	1.000 —	»	4,19 ± 3 × 0,07 / 10,75 - 10



TRASFORMATORE TRIFASE IN OLIO A RAFFREDDAMENTO A VENTILAZIONE FORZATA

THREE-PHASE TRANSFORMER, OIL IMMERSED, WITH AIR-BLAST COOLING

KVA 20.000 - Hz 50 - KVolt 128 / 16.2 ± 6 × 0.28.

SOC. AN. OROBIA - MILANO

Trasformatori trifasi in olio a raffreddamento a ventilazione forzata
Three-phase transformers, oil immersed, with air-blast cooling

N. 2 KVA 20.000 — KVolt 128 / 16,2 ± 6 × 0,28
N. 8 » 10.000 — » 63 / 14 ± 8 × 0,26

Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer oil immersed, natural cooling

N. 1 KVA 5.000 — KVolt 62,5 / 14 + 8 × 0,26

AZIENDA ELETTRICA CONSORZIALE DELLE CITTÀ DI BOLZANO E MERANO

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers, oil immersed, natural cooling

N. 1 KVA 24.000 — KVolt 66 ± 8 × 1,5% / 16,5
N. 1 » 13.500 — » 66 ± 8 × 1,5% / 16,5

DIRECTION GÉNÉRALE DES EXPLOITATIONS DE L'ÉLÉCTRICITÉ DES TRAMWAYS ET DU MÉTROPOLITAIN - INSTANBUL (TURCHIA)

Trasformatori trifasi a raffreddamento con ventilazione forzata
Three-phase transformers, oil immersed, with air-blast cooling

N. 2 KVA 18.000 — KVolt 10 / 36,75 - 7 × 0,5385

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers, oil immersed, natural cooling

N. 3 KVA 5.000 — KVolt 34,72 ± 4 × 0,5 / 9,72

ÉLÉCTRICITÉ DE FRANCE - FRANCIA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers, oil immersed, natural cooling

N. 1 KVA 10.000 — KVolt 63 ± 19% / 16,5 - 14,5
N. 1 » 10.000 — » 63 ± 2 × 3,5% ± 6 × 2% / 11

KRAFTWERKE MAINZ - WIESBADEN - (GERMANIA)

Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer, oil immersed, natural cooling

N. 1 KVA 12.000 — KVolt 20 ± 2,25 / 10,6 - 5,3

"TIFEO" - SOC. PER AZ. PER LA PRODUZIONE DI ENERGIA - PALERMO

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 2 KVA 10.660 — KVolt 72 + 7 × 1,03 / 11,19 - 22,38

SOC. EDISON - MILANO

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N 1 KVA 10.000 — KVolt 22,556 ± 4 × 0,364 / 6,65
N. 2 » 6 300 — » 67,2 ÷ 50,4 / 14 — 8,1

"S. I. T." - SOC. INDUSTRIALE TRENTINA - TRENTO

Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer oil immersed, natural cooling

N. 1 KVA 10.660 — KVolt 61 + 2 × 1 / 21

SOC. ELEKTRONABAVA - LJUBLJANA (JUGOSLAVIA)

Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer oil immersed natural cooling

N. 1 KVA 8 000 — KVolt 36,75 ± 8 × 1,5% / 10

"E. V. S." - ENERGIE VERSORGUGNG SCHWABEN - STUTTGART (GERMANIA)

Trasformatori trifasi in olio a raffreddamento con ventilazione forzata
Three-phase transformers, oil immersed, with air-blast cooling

N. 2 KVA 8.000 ÷ 10.000 — KVolt 60 ± 12 × 1 / 15,75

NORDWESTDEUTSCHE KRAFTWERKE AKHENGESLLSCHAFT - HAMBURG (GERMANIA)

Trasformatore trifase in olio a raffreddamento naturale
Three-phase transformer oil immersed natural cooling

N 1 KVA 10.000 — KVolt 60 ± 8 × 2% / 22

"S. I. P." - SOC. IDROELETTRICA PIEMONTE - TORINO

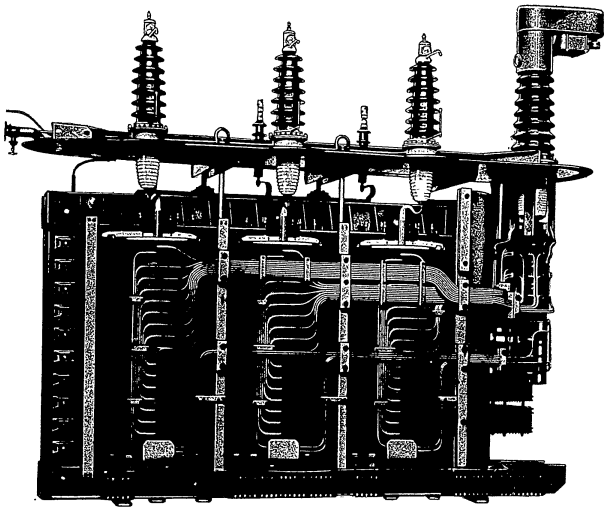
Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed, natural cooling

N. 1 KVA 5.000 — KVolt 21 ± 2 × 0,5 / 3,33 - 5,767
N. 1 » 4.000 — » 29,5 ± 3 × 0,5 / 10,2 - 9,2
N. 2 » 2.000 — » 29,5 ± 3 × 0,5 / 9,2

SOC. DINAMO - NOVARA

Trasformatori trifasi in olio a raffreddamento con ventilazione forzata
Three-phase transformers, oil immersed with air-blast cooling

N. 2 KVA 6.000 — KVolt 23 ± 4 × 2,5% / 11,5 - 6,65



TRASFORMATORE TRIFASE IN OLIO, CON NUCLEO A CINQUE COLONNE, A RAFFREDDAMENTO NATURALE

THSEE-PHASE TRANSFORMER WITH FIVE COLUMNES CORE, OIL IMMERSED, NATURAL COOLING

KVA 24.000 - Hz 50 - KVolt 66 ± 8 × 1.5% / 16.5.

SOC. IDROELETTRICA SUBALPINA - COMO

Trasformatore trifase in olio a raffreddamento con ventilazione forzata
Three-phase transformer oil immersed with air-blast cooling

N. 1 KVA 6.000 — KVolt 23 + 4 × 2,5% / 11,5 — 6,65

STANIC - INDUSTRIA PETROLIFERA SOC. P. AZ. - ROMA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 3 KVA 4.000 — KVolt 9 + 6 × 0,27 / 0,515
N. 2 » 3.000 — » 9 + 6 × 0,27 / 0,515

AZIENDA COMUNALE ELETTRICITÀ ED ACQUE - ROMA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 4 KVA 4.000 — KVolt 60 ± 7 × 1,33% / 8.4

ING. C. OLIVETTI & C. S.P.A. - IVREA

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers oil immersed natural cooling

N. 3 KVA 4.000 — KVolt 30 ± 7 × 2,15 / 9,2
N. 1 » 1.000 — » 30 ± 7 × 2,15 / 9,2

CELLULOSA D'ITALIA S. p. A. "CELDIT„ - ROMA

Trasformatori trifasi in olio a raffreddamento ad aria soffiata
Three-phase transformers, oil immersed, with air-blast cooling

N. 2 KVA 3.000 - KVolt 23-22-21-11,5-11-10,5 / 10 ± 10 × 1,6%

"P. C. E." SOC. PIEMONTE CENTRALE DI ELETTRICITÀ - TORINO

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers, oil immersed, natural cooling

N 2 KVA 1.000 — KVolt 29,5 + 3 × 0,5 / 15,66

SERVICIOS PUBLICOS DE ELECTRICIDAD DE ANCON S.A. - ANCON (Perù)

Trasformatori trifasi in olio a raffreddamento naturale
Three-phase transformers, oil immersed, natural cooling

N. 1 KVA 1.000 - KVolt 30,2 $^{+6}_{-10}$ × 1,6% / 10
N. 1 KVA 1.500 - KVolt 30,2 $^{+6}_{-10}$ × 1,6% / 10

trasformatori da forno con commutatore sotto carico

transformers feeding electric furnaces with on-load tap-changer

SOC. MONTECATINI - MILANO

Trasformatori trifasi corazzati a mantello per forni elettrici, a circolazione d'olio in refrigerante a raffreddamento ad acqua
Three-phase transformers shell type for electric furnaces, oil immersed, forced oil circulation with water cooling

N. 2 KVA 9.000 — Volt $\frac{10{,}392 \pm 8\%}{6.000 \pm 8\%}$ / 107,5 $\div$ 7 × 2,5

Trasformatore trifase a colonna per forni elettrici, a circolazione d'olio in refrigerante a raffreddamento ad acqua
Three-phase transformer core type for electric furnaces, oil immersed, forced oil circulation with water cooling

N. 1 KVA 6.600 — Volt 6 300 - 6.000 - 5.700 / 99,5 $\pm$ 8 × 2,6

SOC. AN. FRATELLI GALTAROSSA - MILANO

Trasformatori trifasi corazzati a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformers shell type for electric furnaces, oil immersed, forced oil circulation with water cooling

N. 2 KVA 5.125 — Volt 7.050 / 74,7 $\div$ 129,2 in 25 salti di tensione
with 25 voltage steps

Trasformatore monofase corazzato a mantello per forni elettrici, a circolazione d'olio in refrigerante ad acqua
Single-phase transformer shell type for electric furnaces, oil immersed, forced oil circulation with water cooling

N. 1 KVA 2.500 — Volt 3.500 / 30 - 60 in 12 salti di tensione
with 12 voltage steps

Trasformatore monofase a colonna per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua
Single-phase transformer core type for electric furnaces, oil immersed forced oil circulation with water cooling

N. 1 KVA 2 200 — Volt 3.500 / 400 $\div$ 100 in 84 salti di tensione
with 84 voltage steps

SOC. METALLURGICA COBIANCHI - GMEGNA

Trasformatore trifase a colonna per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformer core type for electric furnaces oil immersed forced oil circulation with water cooling

N. 1 KVA 5.500 — Volt 50.000 / 80 $\div$ 120 in 8 salti di tensione
with 8 voltage steps

SOC. ACCIAIERIE E FERRIERE DEL CALEOTTO - LECCO

Trasformatore trifase a colonna per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformer core type for electric furnaces oil immersed forced oil circulation with water cooling

N. 1 KVA 5.300 — Volt 12.050 / 280 $\div$ 118 in 15 salti di tensione
with 15 voltage steps

VALFONTE S. A. PRODOTTI ELETTROMETALLURGICI - MARTIGNY (SVIZZERA)

Trasformatore trifase corazzato a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformer shell type for electric furnaces oil immersed forced oil circulation with water cooling

N. 1 KVA 5.000 — Volt 10.000 / 80 $\div$ 120 in 8 salti di tensione
with 8 voltage steps

MONTEFORNO - ACCIAIERIE E LAMINATOI S. A. - EODIO (SVIZZERA)

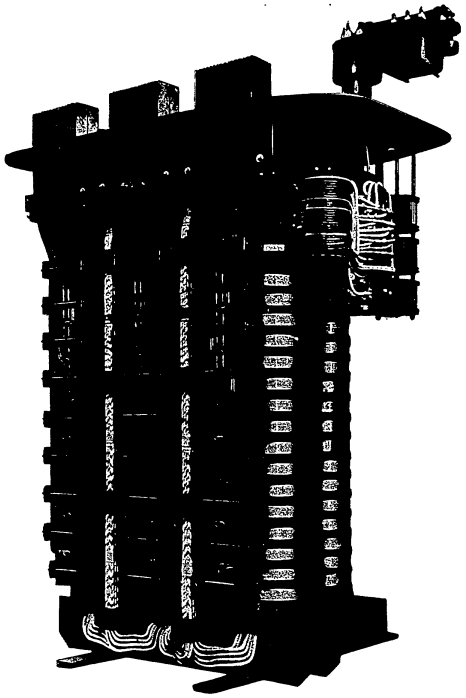
Trasformatore trifase a colonna per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformer core type for electric furnaces oil immersed, forced oil circulation with water cooling

N. 1 KVA 4 000 — Volt 8.000 / 156 $\pm$ 5 × 16,5

SOC. AN. MERONI & C. - SETTIMO TORINESE

Trasformatore trifase a colonna per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua
Three-phase transformer core type for electric furnaces oil immersed, forced oil circulation with water cooling

N. 1 KVA 2.800 — Volt 30.000 / 220 $\div$ 90 in 15 salti di tensione
with 15 voltage steps



TRASFORMATORE TRIFASE A COLONNA PER FORNI ELETTRICI, A CIRCOLAZIONE D'OLIO IN REFRIGERANTE RAFFREDDATO AD ACQUA

THREE-PHASE TRANSFORMER CORE TYPE FOR ELECTRIC FURNACES, OIL IMMERSED, FORCED OIL CIRCULATION WITH WATER COOLING

KVA 5500 - VOLT 50000 / 80 ÷ 120 in 8 salti di tensione
with 8 voltage steps

SOC. ACCIAIERIE FERRIERE CRAVETTO - SETTIMO TORINESE

Trasformatori monofasi corazzati a mantello per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Single-phase transformers shell type for electric furnaces oil immersed forced oil circulation with water cooling

N. 4 KVA 2.500 — Volt 6.000 / 90 - 150 in 11 salti di tensione
with 11 voltage steps

SOC. AN. VETRERIA ITALIANA BALZARETTI MODIGLIANI - LIVORNO

Trasformatore trifase a colonna per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Three-phase transformer core type for electric furnaces oil immersed forced oil circulation with water cooling

N. 1 KVA 2.400 — Volt 30.000 / 100 ÷ 150 in 10 salti di tensione
with 10 voltage steps

FERRIERA DELL'OSSOLA DI PIETRO MARIA CERETTI - VILLADOSSOLA

Trasformatore trifase a colonna per forni elettrici, a circolazione d'olio in refrigerante raffreddato ad acqua

Three-phase transformer core type for electric furnaces, oil immersed, forced oil circulation with water cooling

N. 1 KVA 1.800 — Volt 55.000 / 80 ÷ 180 in 14 salti di tensione
with 14 voltage steps

FABBRICA PISANA DI SPECCHI E LASTRE COLATE DI VETRO - PISA

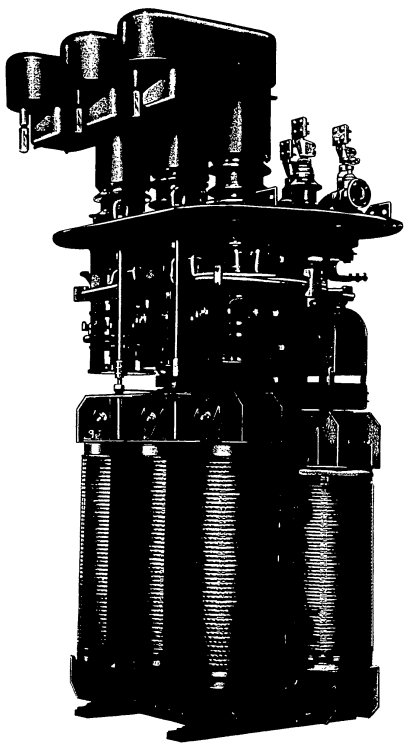
Trasformatori trifasi a colonna per forni elettrici a raffreddamento naturale

Three-phase transformers core type for electric furnaces oil immersed natural cooling

N. 2 KVA 1.150 — Volt 30.000 / 47 - 150 in 31 salti di tensione
with 31 voltage steps

regolatori di tensione con commutatore sotto carico

voltage regulators with on-load tap-changer



SOC. ADRIATICA DI ELETTRICITÀ - VENEZIA

Regolatori di tensione trifasi in olio a raffreddamento naturale
Three-phase voltage regulators oil immersed natural cooling

N. 1 KVA 20.000 — KVolt $10{,}6 + 8 \times 1{,}7\% / 10{,}6$
N. 1 » 20.000 — » $\frac{21{,}2}{10{,}6} + 8 \times 1{,}7\% / \frac{21{,}2}{10{,}6}$
N. 2 » 12.000 — » $16{,}6 + 8 \times 1{,}7 / 16{,}6$
N. 1 » 12.000 — » $16{,}6 + 12\% / 16{,}6$
N. 10 » 12.000 — » $10{,}6 + 12\% / 10{,}6$
N. 1 » 10.000 — » $5{,}2 + 5 \times 78 / 5{,}2$
N. 18 » 6.000 — » $10{,}6 + 13{,}6\% / 10{,}6$
N. 1 » 6.000 — » $\frac{21{,}2}{10{,}6} + 8 \times 1{,}7\% / \frac{21{,}2}{10{,}6}$
N. 1 » 6.000 — » $16{,}6 + 8 \times 1{,}7\% / 16{,}6$

AZIENDA COMUNALE ELETTRICITÀ ED ACQUE - ROMA

Regolatori di tensione trifasi in olio a raffreddamento naturale
Three-phase voltage regulators oil immersed natural cooling

N. 2 KVA 33.000 — KVolt $8 \pm 12\% / 8$

SOC. EDISON - MILANO

Regolatore automatico di tensione trifase in olio a raffreddamento naturale
Three-phase automatic voltage regulator oil immersed natural cooling

N. 1 KVA 15.000 — KVolt $46 / 46 \pm 5 \times 2\%$

AZIENDA ELETTRICA CONSORZIALE DELLE CITTÀ DI BOLZANO E MERANO

Regolatore di tensione trifase in olio a raffreddamento naturale
Three-phase voltage regulator oil immersed natural cooling

N. 1 KVA 12.000 — KVolt $66 \pm 5\% / 60 \pm 15 \times 0{,}48$

AZIENDA COMUNALE DEI SERVIZI ELETTRICITÀ GAS ACQUA E TRAMVIE - TRIESTE

Regolatore di tensione trifase in olio a raffreddamento naturale
Three-phase voltage regulator oil immersed natural cooling

N. 1 KVA 10.000 — KVolt $27 / 27 \pm 5 \times 0{,}44$

AZIENDA GENERALE DEI SERVIZI MUNICIPALIZZATI - VERONA

Regolatore di tensione trifase in olio a raffreddamento naturale
Three-phase voltage regulator, oil immersed natural cooling

N. 1 KVA 9.000 — KVolt 3,44 ± 9 × 0,065 / 3,15

SOC. P. AZ. FABBRICHE FIAMMIFERI ED AFFINI "SAFFA" - MAGENTA

Regolatore di tensione trifase in olio a raffreddamento naturale
Three-phase voltage regulator, oil immersed, natural cooling

N. 1 KVA 6.000 — KVolt 12,8 ± 7 × 2,14% / 12,8

ELEKTRIZITAETSWERK WESERTAL - G.M.B.H. - HAMELN (GERMANIA)

Autotrasformatore trifase in olio a raffreddamento naturale
Three-phase auto-transformer, oil immersed, natural cooling

N. 1 KVA 6.000 — KVolt 7,175 ± 5,1 / 6,3

"S.I.P." - SOC. IDROELETTRICA PIEMONTE - TORINO

Regolatori di tensione trifasi in olio a raffreddamento naturale
Three-phase voltage regulators, oil immersed, natural cooling

N. 2 KVA 5.000 — KVolt 8,6 ± 5 × 0,24 / 9,08

SOC. ELETTRICA SELT-VALDARNO - FIRENZE

Regolatori di tensione trifasi in olio a raffreddamento naturale
Three-phase voltage regulators, oil immersed, natural cooling

N. 2 KVA 4.000 — KVolt 10 ± 6 × 1,66% / 10

SOC. DINAMO - NOVARA

Regolatore di tensione trifase in olio a raffreddamento naturale
Three-phase voltage regulator oil immersed natural cooling

N. 1 KVA 3.000 — KVolt 13,3 - 12,9 - 12,6 - 12,1 - 11,7 - 11,3 / 12,5

"S.I.T." - SOC. INDUSTRIALE TRENTINA - TRENTO

Regolatore di tensione trifase in olio a raffreddamento naturale
Three-phase voltage regulator oil immersed natural cooling

N. 1 KVA 3.000 — KVolt 18,75 ± 5 × 0,25 / 21 - 20 - 19

ORMAS S.P.A. - ARGENTINA

Regolatori di tensione trifasi in olio a raffreddamento naturale
Three-phase voltage regulators, oil immersed natural cooling

N. 3 KVA 3.310 — KVolt 13,2 ± 7 × 1,43% / 13,2

OFFICINE TRASFORMATORI ELETTRICI
BERGAMO - OTTOBRE 1957

Clichés dello Studio PREVITALI - Bergamo
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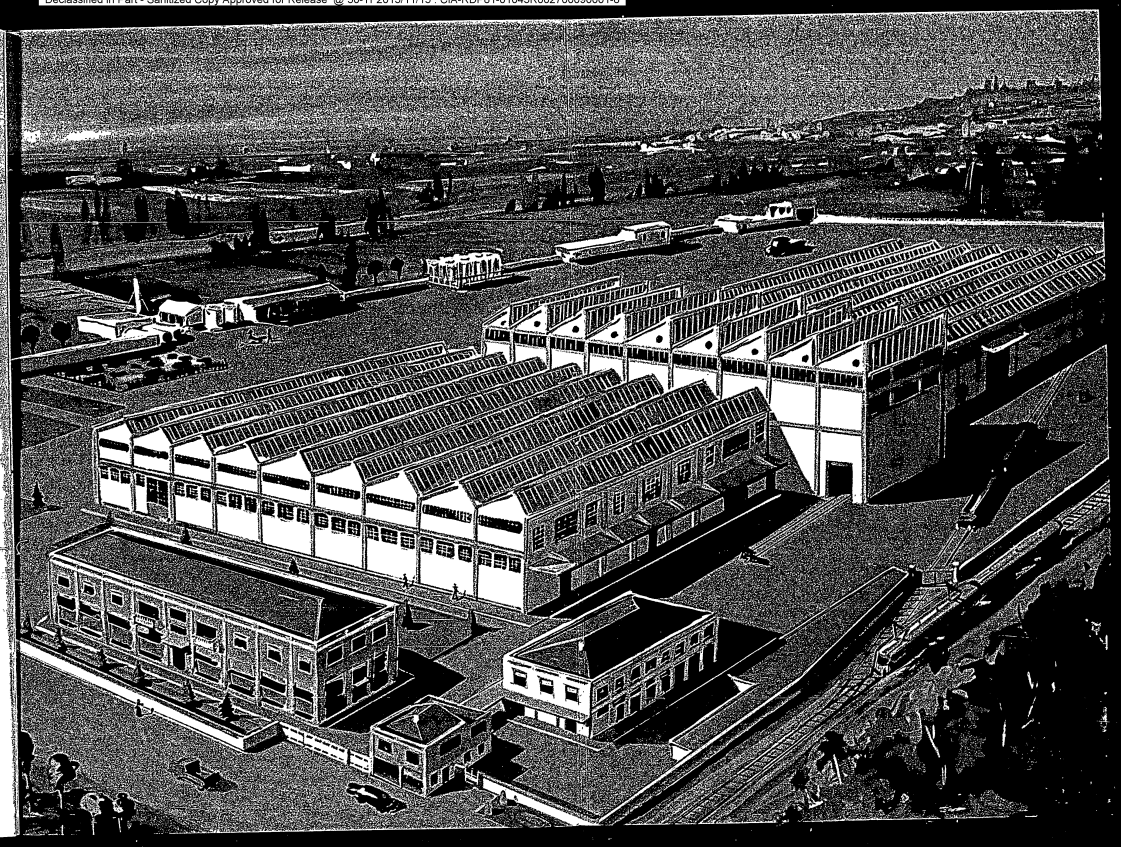
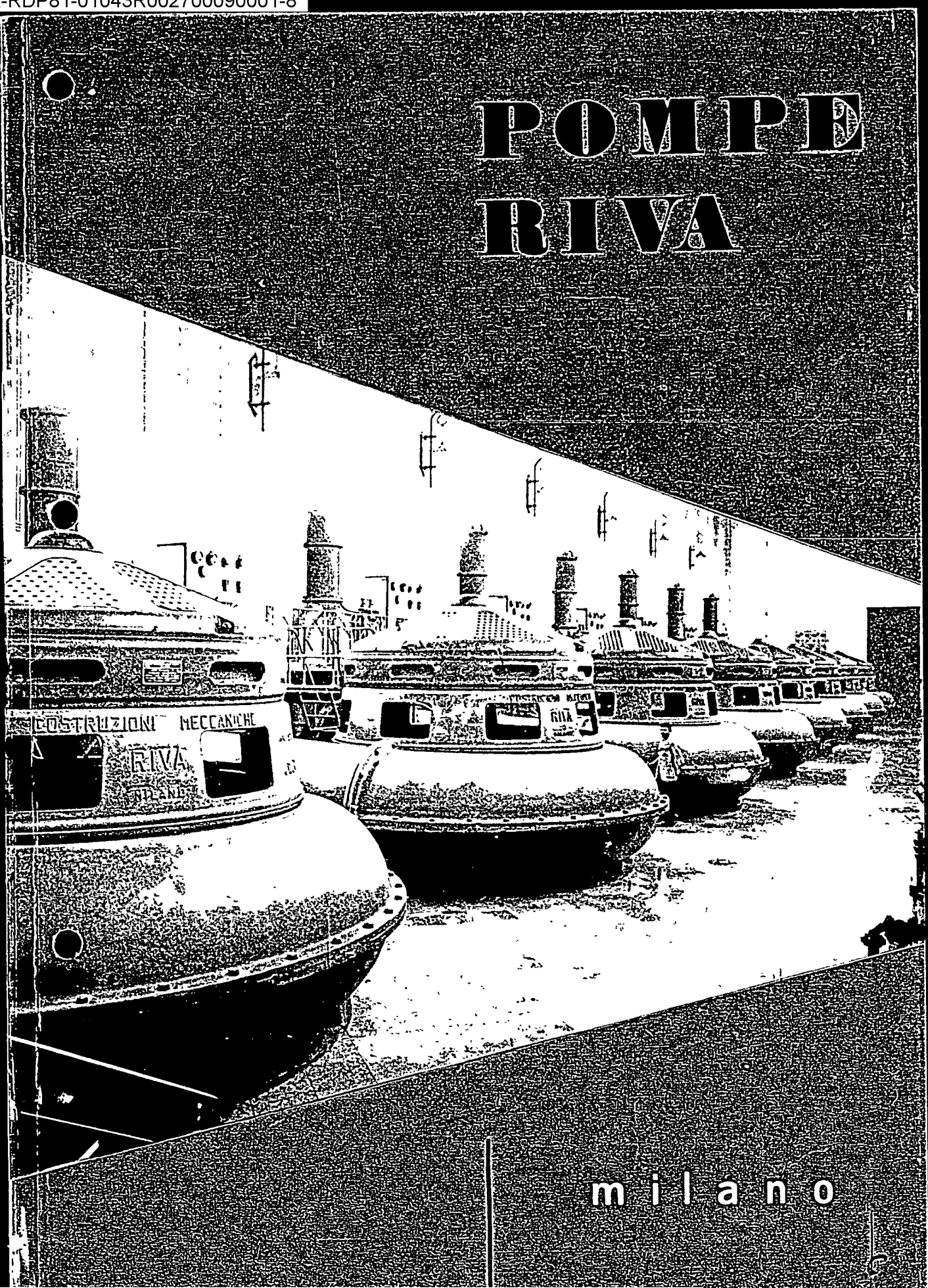


POMPE RIVA



milano

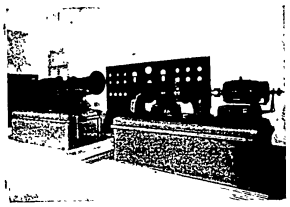
COSTRUZIONI MECCANICHE RIVA s.p.a.
Uffici ed Officine in MILANO - Via Stendhal 34
Telef.: 479.151-2-3-4-5 - Telegr.: RIVATURBIN-MILANO

POMPE ASSIALI E CENTRIFUGHE

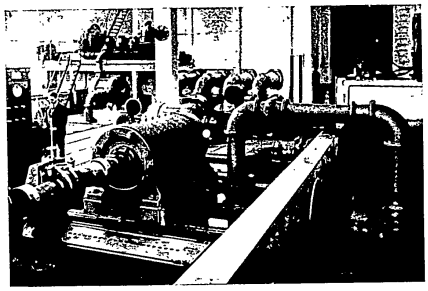
Grande importanza assume lo studio degli elementi costruttivi delle pompe in relazione alle caratteristiche delle installazioni.
In effetti una pompa, anche se di ottima costruzione, può comportarsi nel modo più sfavorevole qualora le condizioni dell'impianto non corrispondano esattamente alle sue caratteristiche e, riguardo al consumo di energia, non è tanto il rendimento della pompa che interessa quanto il *rendimento dell'impianto*. Ne consegue la necessità di creare tipi speciali adatti alle particolari esigenze delle varie installazioni.

UFFICIO TECNICO RIVA - Sezione Costruzioni.

★ L'UFFICIO TECNICO RIVA è in grado di affrontare qualsiasi problema e di corrispondere nel migliore dei modi alle esigenze di ogni singolo impianto.



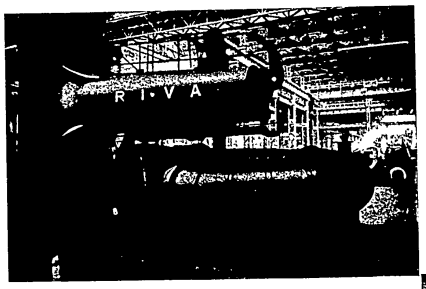
SALA SPERIMENTALE PROVE IDRAULICHE - Sezione prove stroboscopiche su modelli in scala ridotta.



SALA SPERIMENTALE PROVE IDRAULICHE - Sezione prove, taratura e collaudo pompe

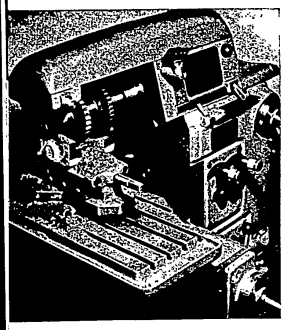
★ La SALA PROVE IDRAULICHE POMPE è corredata dei più moderni mezzi di indagine, sia modello a scopo di ricerca, sia sull'esecuzione industriale a scopo di controllo, taratura e collaudo delle unità approntate.

★ Le OFFICINE, dotate delle più moderne macchine utensili e di potenti attrezzature, rispondono pienamente alle esigenze tecnologiche di una produzione che può variare dalle piccole pompe della potenza di pochi cavalli alle grandi unità di massima potenza.



TORNIO VERTICALE RIVA - diametro massimo di tornitura mm 12.000

TRAPANO RADIALE RIVA - diametro massimo di alesatura 400 mm; raggio di azione 5.000 mm.



FRESATRICE RIVA PER ATTREZZISTI.

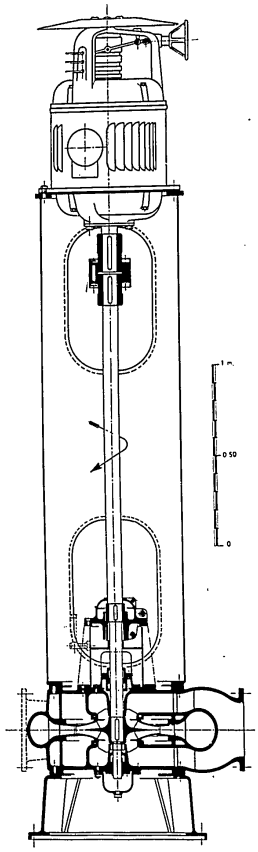
CLASSIFICAZIONE GENERALE DELLE POMPE

In ordine tecnico le pompe vengono classificate in base alla velocità caratteristica *ns*.
In pratica è però utile distinguerle in relazione alla prevalenza generata, che può essere *bassa*, *media* e *alta*, o meglio in base alla natura del servizio cui sono destinate.

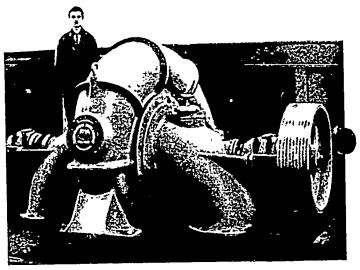
I servizi più comuni sono:

* ACQUEDOTTI URBANI E INDUSTRIALI
* IRRIGAZIONE
* BONIFICA
* ESTRAZIONE ACQUA DA POZZI PROFONDI O TRIVELLATI
* FOGNATURA
* ALIMENTAZIONE CALDAIE E CIRCOLAZIONE ACQUA CALDA
* STAZIONI MOBILI O GALLEGGIANTI
* ESAURIMENTO BACINI DI CARENAGGIO
* ACCUMULAZIONE DI ENERGIA.

Dal lato costruttivo si distinguono i tipi centrifughi da quelli assiali ad elica. Le varie soluzioni risultano a semplice e doppia aspirazione, a un solo corpo o a corpi multipli in serie, ad asse orizzontale o verticale, ecc.

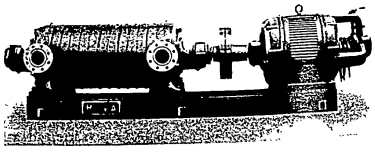


ACQUEDOTTO DI NAPOLI - Elettropompa verticale a doppia aspirazione per 200 lit/sec, H=75 m, con trasmissione in aria.



IMPIANTO TORRELAVEGA, SPAGNA - Pompa a doppia aspirazione per bassa prevalenza da 750 lit/sec, comando a cinghie trapezoidali

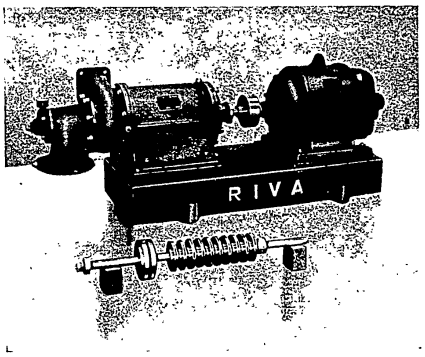
ACQUEDOTTO DI S. REMO - Uno dei 6 gruppi elettropompe forniti per una prevalenza di m 240, portata 2.500 litri al minuto

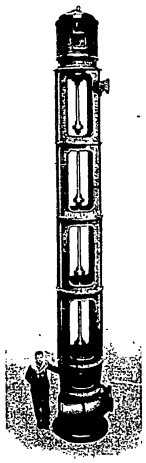


POMPE PER ACQUEDOTTI URBANI ED INDUSTRIALI

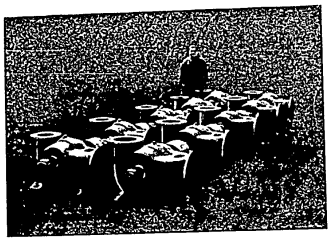
La natura del servizio richiede da queste pompe un elevato rendimento esteso per un vasto campo di variazione della portata.
Inoltre il lungo funzionamento continuo, con utilizzazioni che possono superare le 4000 ore annue, esige oltre a particolare robustezza nelle costruzioni, materiali con spiccate qualità di resistenza alla fatica, alla corrosione e alla erosione, per mantenere il rendimento nel tempo.
Il macchinario per piccoli impianti è del tipo di serie, a una ruota per le Medie prevalenze, a ruote multiple in serie per Alte e Altissime prevalenze.
Varie esigenze, quali la protezione contro gli allagamenti, la riduzione degli ingombri in pianta, le condizioni di aspirazione, impongono spesso soluzioni ad asse verticale, nelle quali il comando avviene a mezzo di trasmissioni in aria, più o meno accessibili.
Centinaia di impianti sono stati installati in Italia dalla RIVA con pompe di primo e secondo sollevamento, con gruppi lavoranti in forte aspirazione, alimentati da casse d'aria sotto vuoto di anche 8 metri, con unità della potenza di 1000 HP. ed oltre.

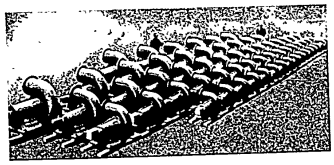
GRUPPO MONOBLOCCO TURBINA - POMPA e GENERATORE ELETTRICO - per la produzione di energia elettrica ed il contemporaneo rifornimento di acqua potabile.



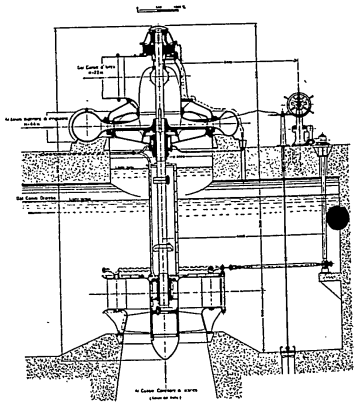


ELETTROMPOMPA CENTRIFUGA VERTICALE - Con trasmissione in aria, per pozzi accessibili.



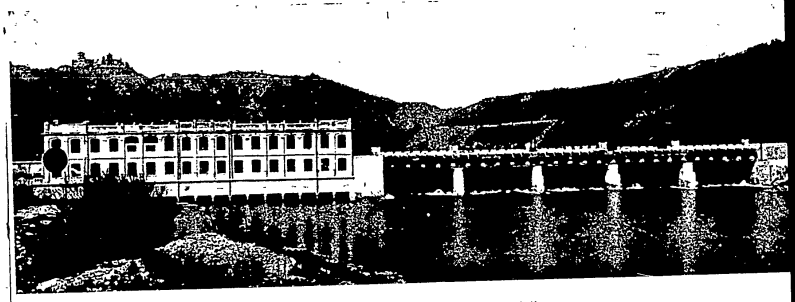


STOCKS DI POMPE DI SERIE per irrigazione.

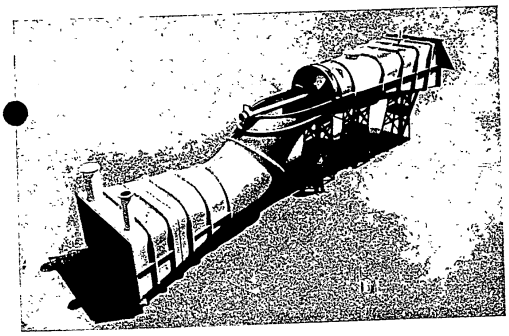


IMPIANTO DI IRRIGAZIONE DI CIGLIANO - Trasformatore idraulico costituito da un gruppo turbina - pompa verticale, da 750 HP, portata della pompa 1800 lit/sec.

POMPE AD ELICA VERTICALI per irrigazione - Portata 1600 lit/sec.



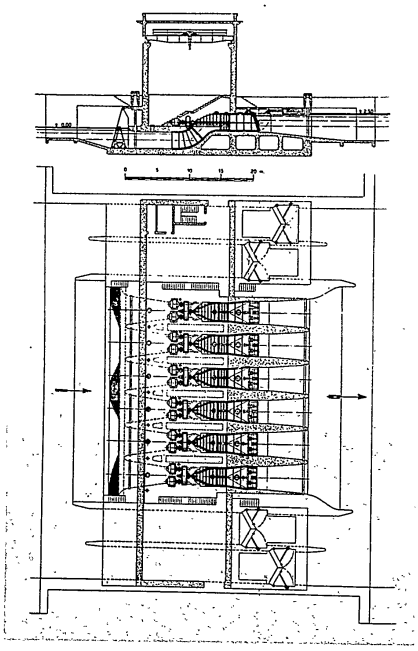
IMPIANTO DI IRRIGAZIONE DI MAZZÈ CANAVESE - Vista della centrale e dello sbarramento. Questo impianto è equipaggiato con 4 gruppi trasformatori idraulici RIVA, costituiti da turbine a bassa caduta accoppiate a pompe d'irrigazione. In alternativa le turbine possono comandare generatori elettrici per la produzione di energia.



IMPIANTO DI IRRIGAZIONE DI BERRA - Pompa ad elica da 6000 lit/sec 4 di queste unità, per complessivi 24.000 lit sec, sono state impiegate in una centrale irrigua, in sostituzione di 2 pompe centrifughe lente, già esistenti, da 12.000 lit sec. complessivi. Il raddoppio della portata con macchine veloci non ha richiesto alcun aumento nelle dimensioni d'impianto.

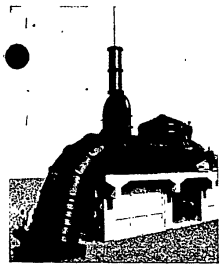
Quando le prevalenze sono basse e le portate forti, si adottano soluzioni ad elica a pale fisse o regolabili, da fermo o in moto. Il comando da motore elettrico può essere diretto o a mezzo di riduttore.
Questi impianti vengono completati con dispositivi di disadescamento rapido, comando automatico del clapet, comando centralizzato delle paratoie, ecc.

IMPIANTO D'IRRIGAZIONE DI BORETTO - Disposizione di impianto di 6 elettropompe ad elica a pale orientabili per complessivi 60.000 lit/sec.

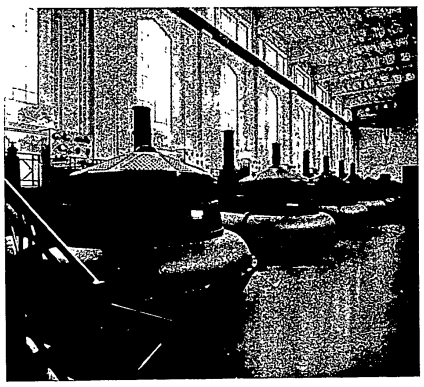


POMPE PER BONIFICA

Nella bonifica sono caratteristiche le basse prevalenze e le grandi portate, ma le prevalenze e le portate sono fortemente variabili in relazione alle vicende climatiche e alla necessità di mantenere i franchi di bonifica.
Una delle soluzioni più caratteristiche per tali impianti è quella con scarico a sifone, con sfioro sistemato al di sopra del massimo livello di piena. In mancanza di corrente il disadescamento rapido automatico del sifone impedisce il ritorno in bonifica dell'acqua pompata. Il sifone consente il massimo ricupero dell'energia di scarico dell'acqua con minima perdita. Tale disposizione – che costituisce priorità di affermazione della RIVA, che la brevettò sin dal 1912 – è stata adottata successivamente da numerose primarie Case costruttrici italiane ed estere.
Per le basse e bassissime prevalenze le pompe sono del tipo ad elica con possibilità, eventualmente, di orientamento delle pale per assicurare l'esaurimento delle acque in magra con buon rendimento.

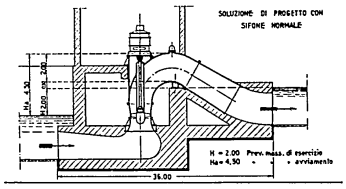


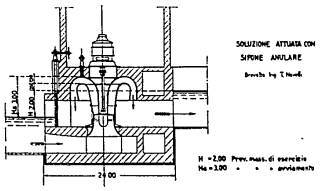
ANNO 1922 - IMPIANTO DI S. SIRO-MONDINE - Vista della pompa centrifuga da 8.000 lit/sec. (*a sinistra*) e interno della imponente centrale di bonifica, nella quale sono stati installati 13 gruppi, per complessivi 100.000 lit/sec. tuttora in servizio.



Negli impianti a bassissima prevalenza varie considerazioni di ingombro e di riduzione della potenza installata militano a sfavore del sifone normale. Studi fatti dall'Ufficio Tecnico della RIVA portarono ad una brillante soluzione del problema. L'idea di sviluppare in forma anulare il sifone permise di realizzare notevoli vantaggi, come risulta evidente dai seguenti due schemi.

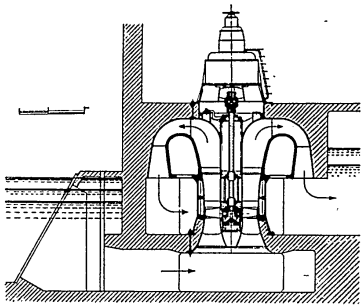
SIFONE ANULARE RIVA - Il comune sifone di scarico in un impianto di bassa prevalenza richiede all'avviamento una potenza doppia del normale per l'adescamento del sifone. Col sifone anulare (brevetto RIVA del 1936) la potenza di avviamento non supera il sovraccarico normale del motore. L'ingombro in pianta è ridotto del 35%.

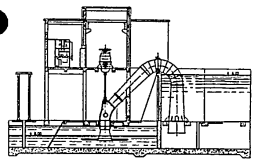


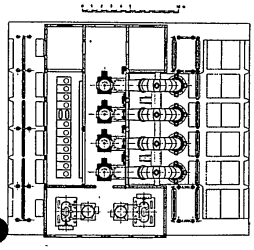


IMPIANTO DI BONIFICA DELLA CECCATA - Interno della Sala macchine, equipaggiata con pompe ad elica a sifone anulare per complessivi 10.200 lit/sec.

IMPIANTO DI BONIFICA DI CODIGORO - Disposizione tipica di una pompa ad elica a sifone anulare, con pale regolabili in moto, portata 7000 lit/sec.

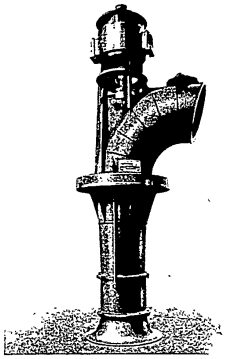


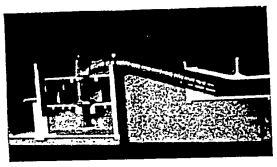




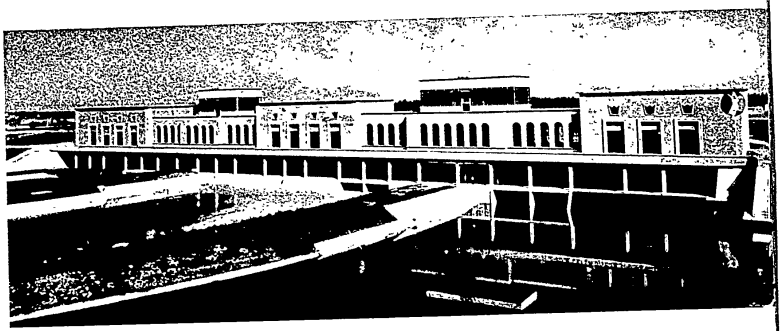
IMPIANTO DI BONIFICA DI RAMADI EDFU - EGITTO - Disposizione di impianto di pompe ad elica ad asse verticale per una portata di 8.000 lit/sec.

IMPIANTO DI BONIFICA TERRENI FERRARESI Pompa ad elica da 600 lit/sec.

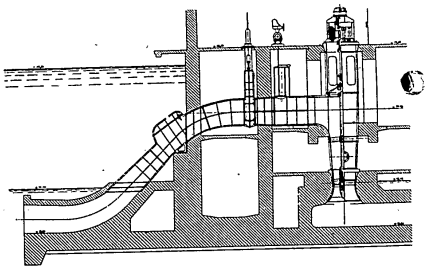




IMPIANTO DI BONIFICA MAZZOCCHIO - Modello di pompa ad elica verticale - Sette pompe di questo tipo sono state installate nella Centrale, per una portata complessiva di 42.000 lit/sec.



IMPIANTO DI BONIFICA DI S. MATTEO - Sezione della pompa ad elica da 4.000 lit/sec., con comando a due velocità (*a destra*), e vista della centrale, equipaggiata con pompe ad elica e centrifughe per una portata complessiva di 35.000 lit/sec. (*sopra*).

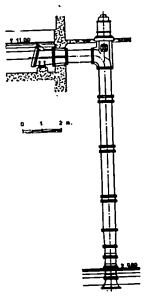


POMPE PER POZZI PROFONDI E TRIVELLATI

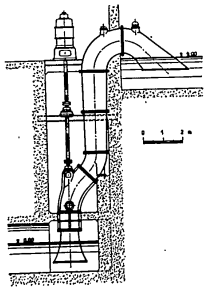
Le applicazioni di queste pompe sono diverse a seconda della natura del pozzo ed il servizio cui esse debbono assolvere. Le esecuzioni possono essere di serie con corpi normali e trasmissioni in aria, oppure speciali con corpi sommersi e trasmissioni parzialmente o interamente in acqua.
Nel pozzo semplicemente trivellato per portate fino al massimo di qualche centinaio di litri al secondo viene introdotto il corpo di pompa tubolare, che può da solo generare tutta la prevalenza richiesta oppure può funzionare da gruppo di primo sollevamento, mentre alla bocca del pozzo è sistemato il gruppo di secondo sollevamento direttamente collegato da trasmissione in acqua con quello sottostante.
Le pompe, di tipo assiale o semiassiale, risolvono efficacemente il problema dello smaltimento di grandi portate anche a prevalenze discrete con dimensioni diametrali ridotte.

POMPA PER POZZO TUBOLARE con elementi assiali

POMPE CON CORPO SOMMERSO per irrigazione in Uruguay, con ruote ad elica in serie, portata 900 lit/sec



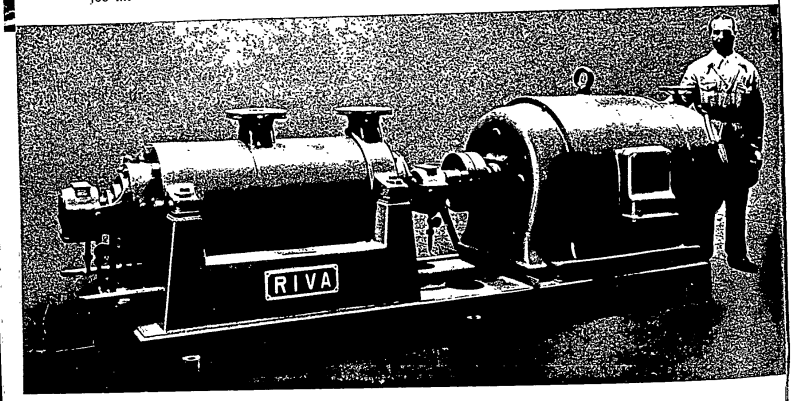
DISPOSIZIONE TIPICA DI POMPA ad elica per pozzo collettore stagno, per irrigazione in Egitto, da 1.600 lit-sec.



POMPE PER ALIMENTAZIONE CALDAIE

Tali tipi di pompe sono costruiti per acque a medie e alte pressioni a temperature elevate. Le ruote hanno tracciati appositamente studiati per la natura del servizio e per prevenire le cavitazioni che sono facili a verificarsi in conseguenza della temperatura.
Le strutture sono realizzate in modo da consentire le dilatazioni termiche senza che venga ad essere alterato l'allineamento dell'albero.
Premistoppa e supporti sono di accurata esecuzione e abbondantemente raffreddati.

POMPA CENTRIFUGA MULTIPLA per alimentazione caldaie, prevalenza 500 mt

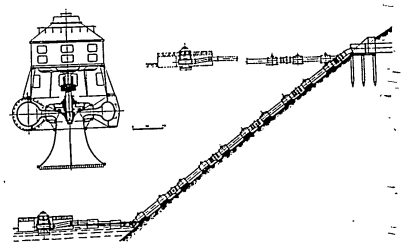


POMPE PER STAZIONI MOBILI E GALLEGGIANTI

A seconda della natura del sollevamento e del mezzo di comando esse presentano varie applicazioni. Caratteristiche sono le soluzioni speciali installate su pontoni per lo svaso di laghi oppure in stazioni galleggianti mobili impiegabili in bonifica per il periodo di avviamento.

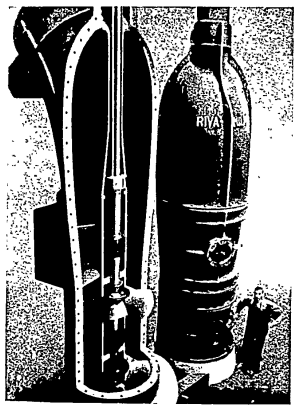
POMPE TRASPORTABILI PER INCENDIO.

IMPIANTO GALLEGGIANTE DEL LAGO MOLVENO - Sezione di una pompa e disposizione schematica dell'impianto su 2 pontoni, di due pompe ciascuno - Potenza installata complessiva 6.000 HP, portata complessiva 14.000 lit/sec, prevalenza variabile da 0 a 40 metri.



POMPE PER ESAURIMENTO BACINI DI CARENAGGIO

A questi impianti la RIVA ha dedicato il proprio studio sin dal 1914 equipaggiando con possenti e lente pompe centrifughe i principali bacini nazionali.
L'avvento delle ruote ad elica ha consentito l'efficace impiego di questo tipo di ruota anche negli impianti di esaurimento e ciò sia per il minor ingombro in pianta che ne consente la installazione in pozzi ristretti ricavati nelle murature del bacino, sia per le grandi economie in peso realizzabili nella parte idraulica e nella parte elettrica conseguenti all'aumento della velocità di lavoro, sia per le ottime prestazioni consentite da questo tipo di ruota veloce in caso di forti variazioni di prevalenza.
Per le prevalenze normali si usano ruote ad elica in serie.

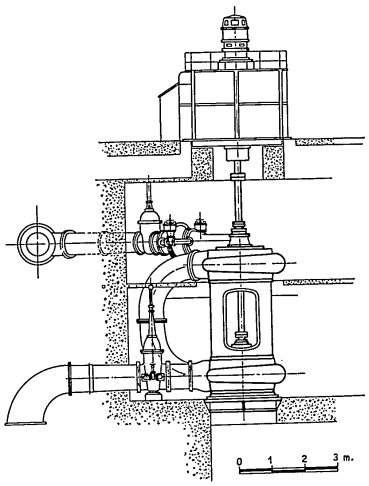


BACINO DI CARENAGGIO DI TARANTO - Pompa verticale ad elica - portata 5.500 lit/sec, prevalenza variabile da 0 a 17 metri.

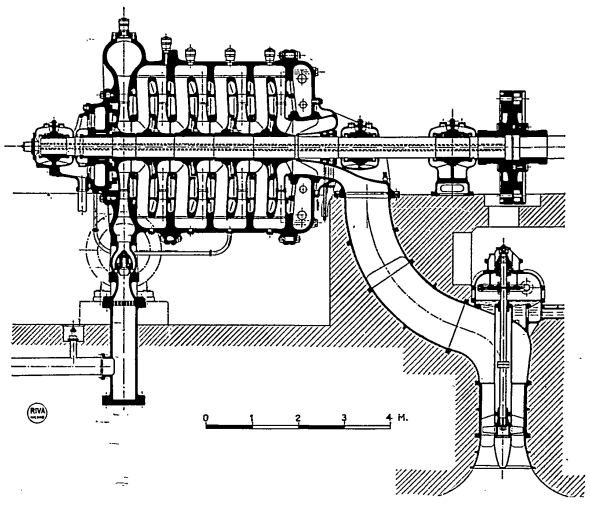
POMPE PER ACCUMULAZIONE DI ENERGIA

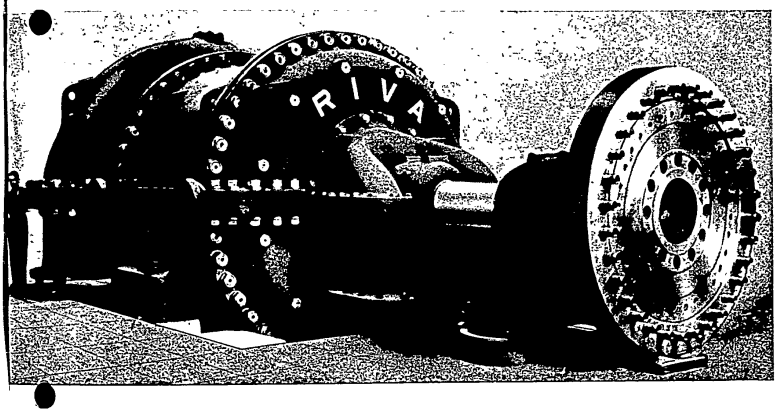
Nelle grandi centrali di produzione a serbatoio può convenire di mantenere invariato il livello del lago di carico alimentandolo con pompe di accumulazione mosse da motori utilizzanti l'energia si superò delle centrali ad acqua fluente. Trattasi in generale di impianti di grande potenza, il cui primo requisito è quello del massimo rendimento.
In Italia questo problema venne affrontato dalla RIVA sin dal 1912 all'impianto di Viverone, tuttora in servizio, con gruppi da 5.000 HP e 160 metri di prevalenza.

IMPIANTO D'ACCUMULAZIONE DEL SAVUTO - Disposizione delle pompe centrifughe verticali da 150 mt. di prevalenza e da 1 000 lit-sec. ciascuna



Possiamo inoltre vantare altre ardite e brillanti affermazioni quali ad esempio la pompa dell'impianto Ponale che con l'assorbimento di 40.000 HP. fornisce la portata di 4.000 litri al secondo alla prevalenza di 600 metri.





GRANDE IMPIANTO DI ACCUMULAZIONE DEL PONALE - Sezione trasversale della pompa da 40 000 HP - 600 mt - 4.000 lit/sec. (*a sinistra*) e vista d'insieme (*sopra*). Il gruppo è costituito da una pompa ad elica di 1° sollevamento, comandata da Turbinetta Pelton, e da una pompa centrifuga principale multipla di 2° sollevamento. Il lanciamento del gruppo al sincronismo avviene a mezzo di turbina Pelton (non visibile in figura).

DATI OCCORRENTI PER LA COMPILAZIONE DI OFFERTA:

PREVALENZA O PRESSIONE TOTALE, comprese le perdite di carico.

VARIAZIONI NEI LIVELLI DI ASPIRAZIONE E SCARICO, precisando i massimi e i minimi, normali o eccezionali.

ALTEZZA STATICA DI ASPIRAZIONE, misurata fra il minimo livello aspirante e la mezzaria della pompa.

PORTATA per unità di tempo, richiesta da ogni pompa. Qualora la portata dovesse essere variabile, precisare il valore normale, nonchè quello massimo e minimo.

NATURA del liquido pompato (se acqua pulita e non corrosiva, oppure sabbiosa, ad azione acida od alcalina e così via).

NUMERO DELLE UNITÀ richieste e tipo della disposizione (se ad asse orizzontale o verticale) e se la riserva è stata prevista o meno.

NATURA DEL SERVIZIO cui le pompe vengono adibite e caratteristica del funzionamento (continuo o meno, valore approssimato annuo della utilizzazione).

TIPO DEL COMANDO, se con motore elettrico (precisare le fasi, la tensione ed i periodi) o motore termico.

DISPOSIZIONI GENERALI DI IMPIANTO - E' consigliabile inviare uno schizzo in alzato e in pianta della disposizione, indicante i livelli, i diametri e le lunghezze delle tubazioni, la sistemazione delle valvole, e le opere di presa e scarico, ecc.

INFORMAZIONI GENERICHE sulle particolarità dell'impianto: clima, temperatura dell'acqua, altezza di installazione ecc.

PRODUZIONE RIVA

IMPIANTI IDROELETTRICI

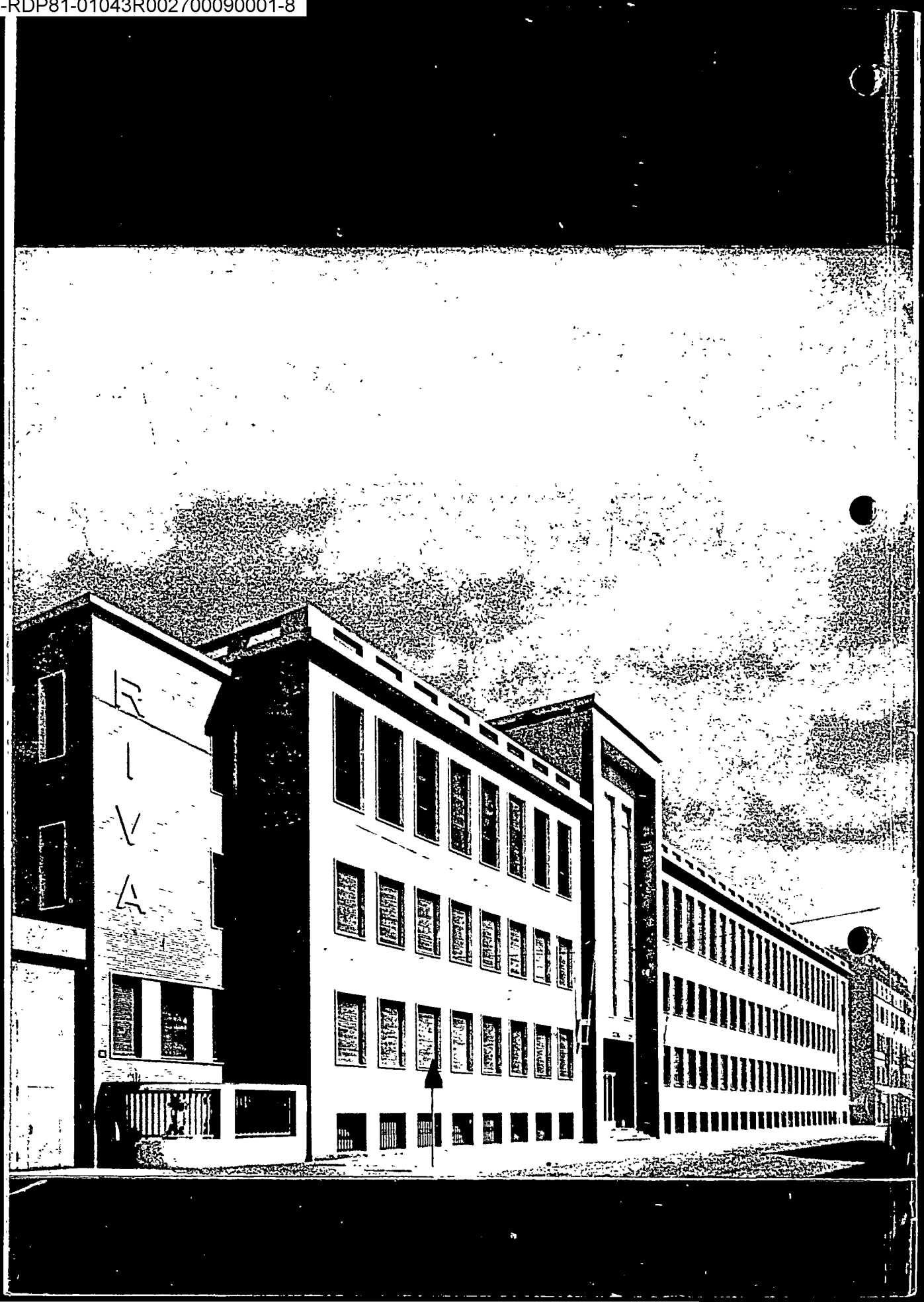
NUMERO DELLE UNITÀ INSTALLATE: **oltre 7.000**

POTENZA RESA COMPLESSIVA. **oltre 8 milioni di HP**

IMPIANTI DI POMPAGGIO

NUMERO DELLE UNITÀ INSTALLATE: **oltre 5.000**

PORTATA COMPLESSIVA: **oltre 5 miliardi di lt/sec**



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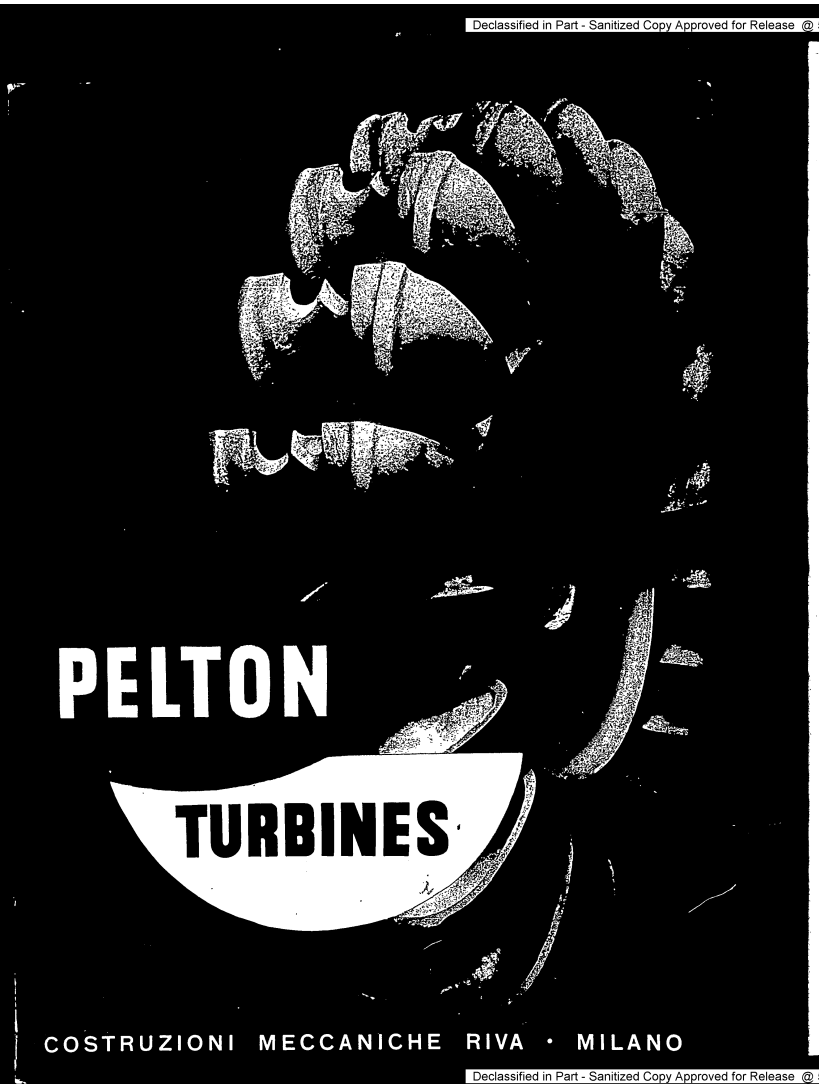


PELTON

TURBINES

COSTRUZIONI MECCANICHE RIVA • MILANO

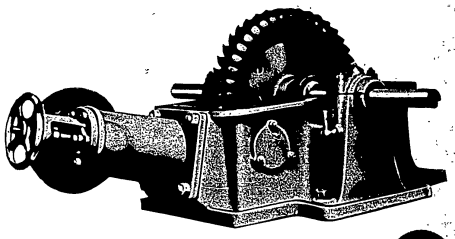
COSTRUZIONI MECCANICHE **RIVA**

MILANO (ITALY)
VIA STENDHAL 34
TEL. 479.151/2/3/4/5

Declassified in Part - Sanitized Copy Approved for Release @ 50-Yr 2013/11/15 : CIA-RDP81-01043R002700090001-8

PELTON

TURBINES



1896

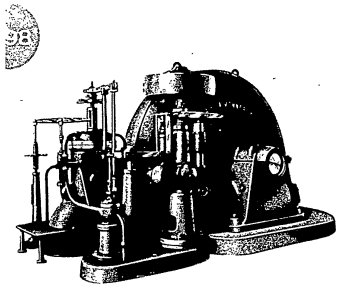
- Hydraulic turbines and pumps
- Valves and gates
- Special machine tools

The first developments, before 1900

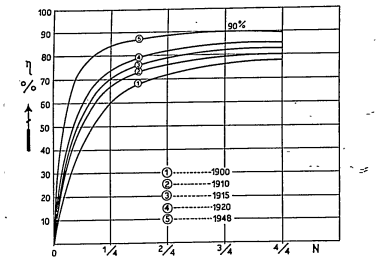
At the end of the last century, the exploitation of high heads, in general above 300 metres (984 feet). saw the birth and the development of the impulse wheel with double cup buckets, tangentially fed by a circular nozzle.

This turbine, remarkable for its simplicity and high efficiency, took its name from L.A. Pelton, who designed it in 1880.

Its field of utilization is very large: from heads of a few hundred metres up to 1,700 metres (5.200 feet) or even higher heads. The unit capacity can also be very large although the discharge is limited-according to the height of the head which can be utilized.



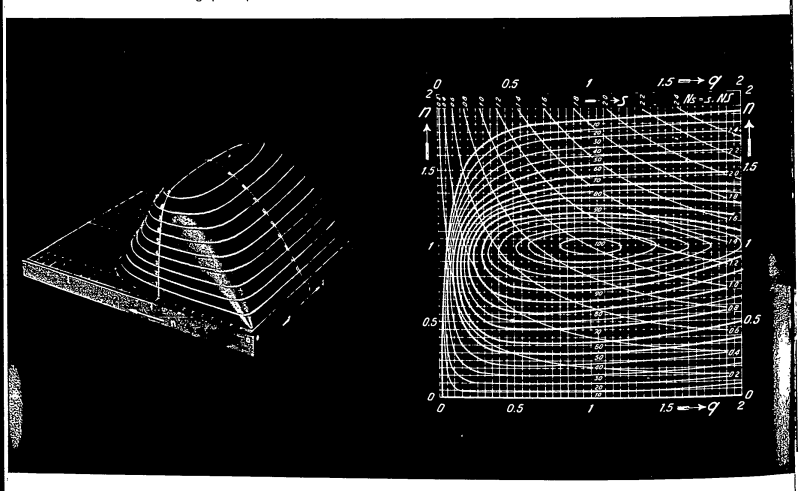
Pelton turbine with water speed governor and relief valve

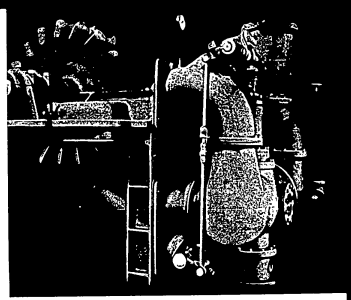


Pelton efficiency advance from 1900 up to the present time

The improvements obtained in efficiencies in recent years form the best proof of the experience gained and research accomplished by the manufacturers.
Special devices allow our engineers to reproduce on a small scale, and to examine thoroughly, the actual working conditions of the industrial sized turbine. Each element of the turbine - the choice of the proper type of runner in relation to the characteristic curves, experimental tests of the strength of the materials, investigation of cavitation, and mechanical water corrosion phenomena, is subject to extensive research in our test laboratory.

Three-dimensional and graphic representation of a Pelton characteristic curve



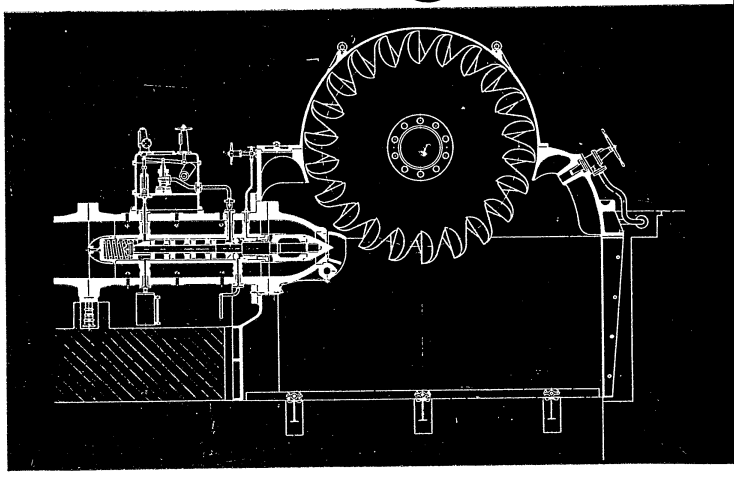


1900

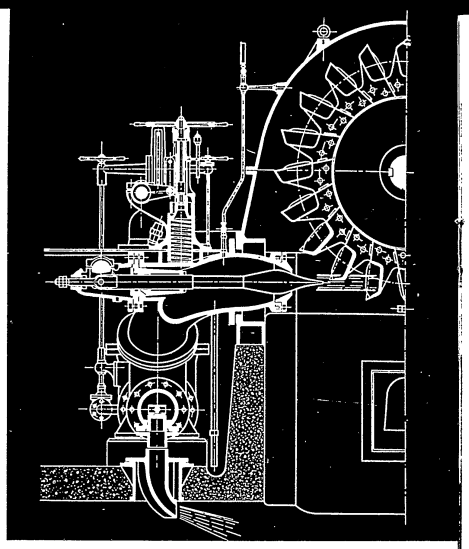
The development of the nozzle

At the end of the last century the feeding of the wheel was carried out through a rectangular nozzle, with a moving tongue for discharge variations.
At the beginning of this century, the application of the Doble circular distributor with regulating needle, which allowed the discharge to be perfectly proportioned, keeping all the advantages of the circular nozzle, represented a very important advance.
The shape of both the nozzle and the needle were studied and experimentally checked in order to obtain a water jet as far as possible cylindrical and homogeneous at every degree of opening. The nozzle which feeds the distributor was developed with larger and larger radii, and has today attained the straight shape (Riva - Battistin patent, 1942). For small and medium units the needle control is now carried out mechanically, while for more important units it is dealt with through an oil-controlled inner servo-motor with multiple pistons. The water jet obtained through this type of nozzle is thus perfectly cylindrical and compact, even under the highest heads.

1950



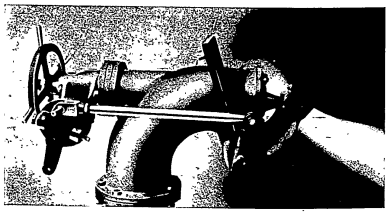
1900



Pelton turbine with relief valve

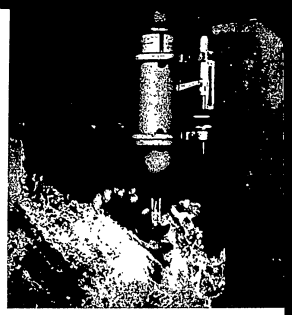
For Pelton turbines fed by penstocks having a small diameter compared to their length, the relief valve (which had to be adopted to avoid dangerous water overpressure for a rapid distributor closure) was a considerable handicap both in regard to reliability and efficiency.
This special problem was solved, in 1908, by a Riva patent for replacing the relief valve with an automatic jet deflection system and a slow needle closure.
This system actuates the jet interception by means of a steel deflector placed between the nozzle tip and the wheel, which allows the flow to be partially or totally deviated instantaneously, while the needle closes later, thus avoiding unacceptable increases of pressure in penstock.
Since then this system has been applied to several thousands of units, and it is still unequalled for its safety and simplicity.

1908



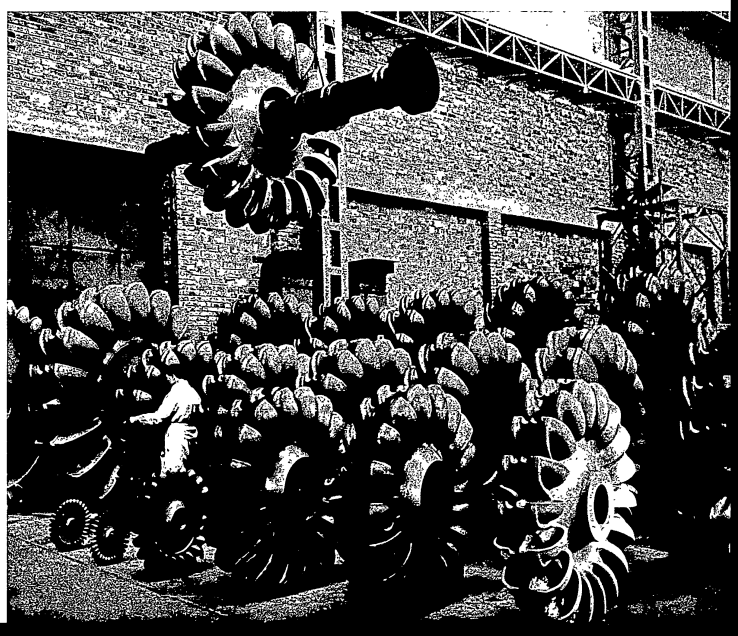
Automatic jet deflector

The wheel, which at its periphery carries the characteristic double cup shaped buckets, requires very special care in design and during manufacture, since turbine efficiency and resistance to corrosion principally depend on the shape and the machining of the buckets.
The very large number of tests executed in our hydraulic laboratory, the studies accomplished by means of stroboscopic light, and the thousands of Pelton units manufactured (with a total output of nearly 5 million horse-power) ensure that Riva turbines are of the highest possible standard, both in regard to efficiency and reliability.

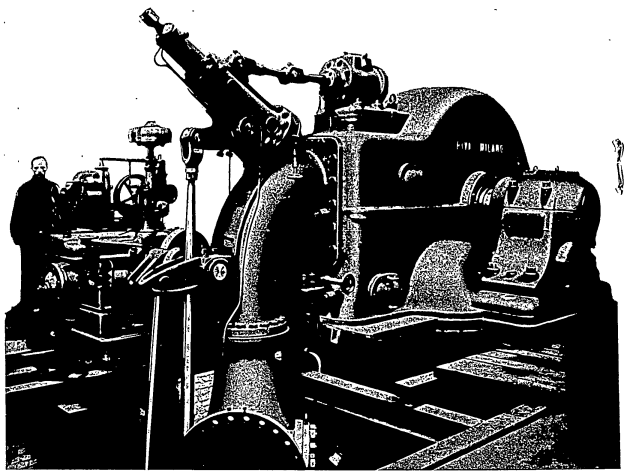


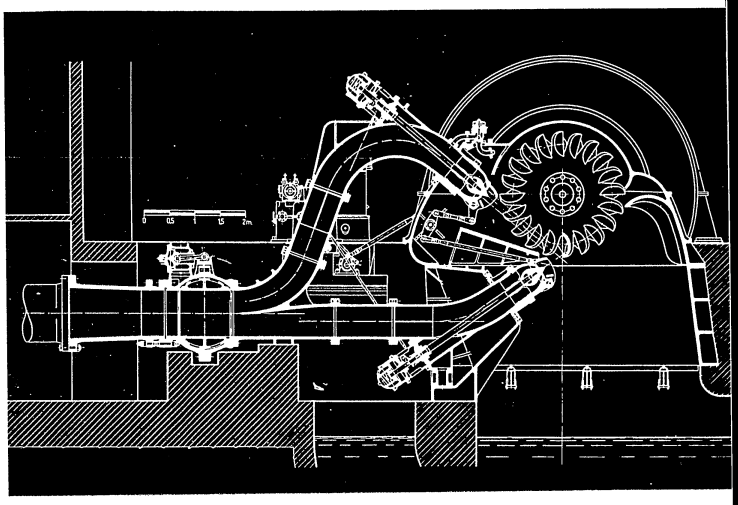
Stroboscopic view of a Pelton wheel in operation

Machining of Pelton wheels



1923

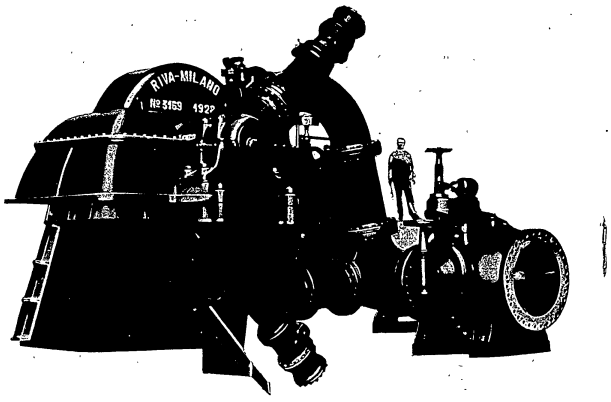




Mese Power Station Single wheel, double-jet turbine

H = 740 m Q = 4400 l/sec. P = 35000 HP n = 500 r. p. m.

1928



Ponale Power Station Single wheel, double-jet turbine

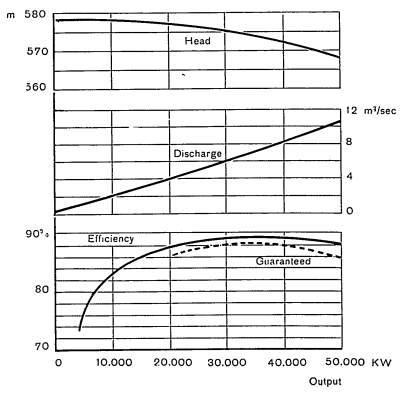
H = 520 m Q = 8000 l/sec. P = 45000 HP n = 500 r. p. m.

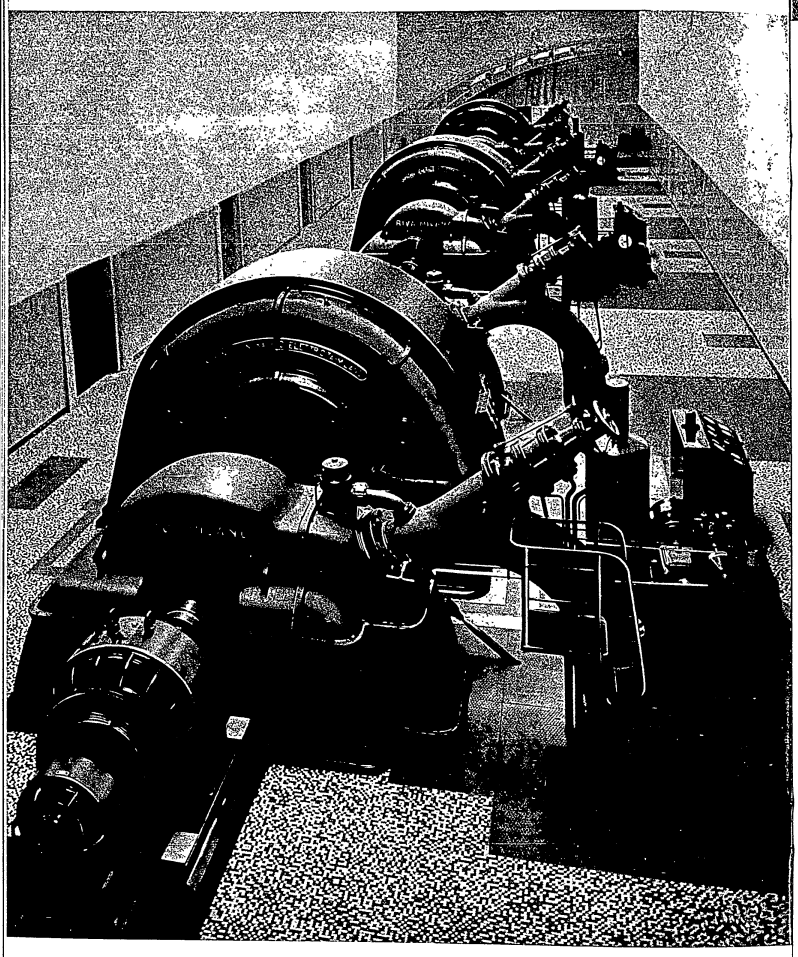
Glorenza Power Station

Double overhung turbine with four jets

H = 586 m
Q = 10400 l/sec.
P = 70000 HP
n = 500 r. p. m.

Diagrams obtained at the official tests

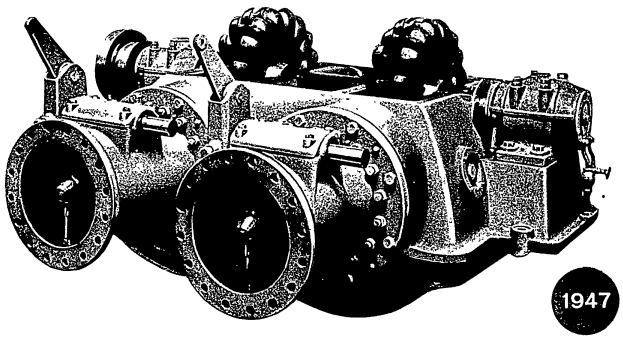




1941

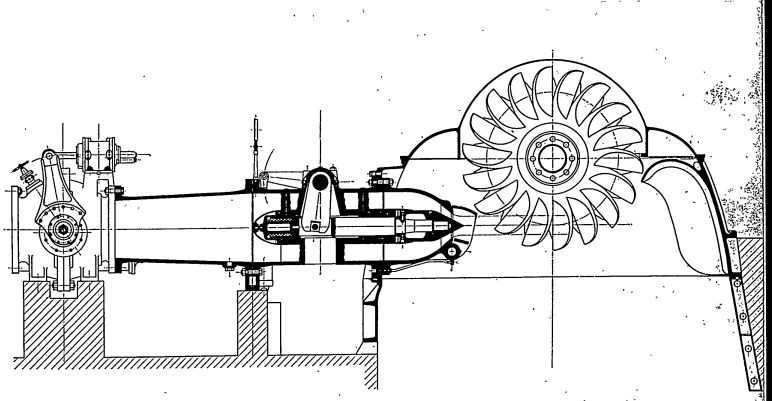
Ampezzo Power Station Three turbines, each with two overhung wheels and four jets
H = 470 m Q = 5000 l/sec. P = 27400 HP n = 600 r. p. m.

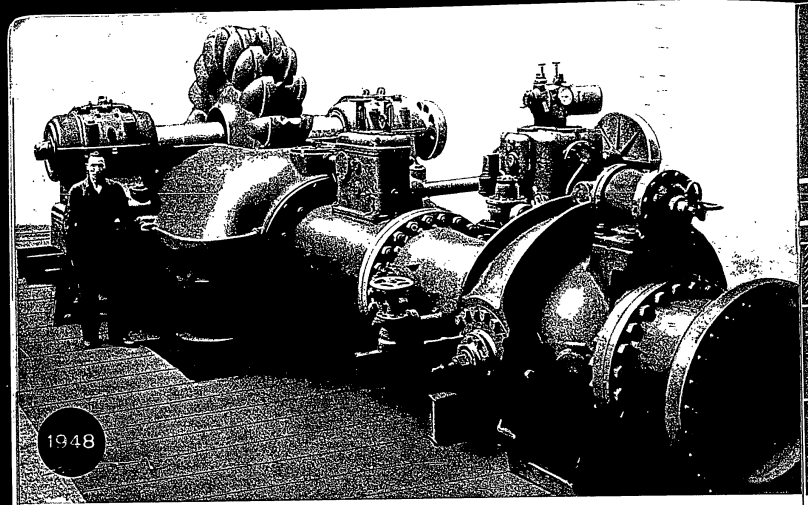
Typical contracts carried out during [illegible]



1947

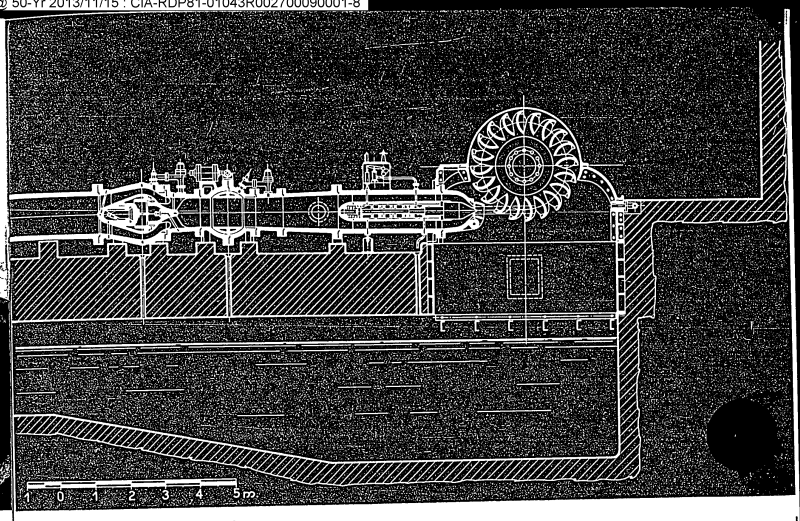
Valsassina Power Station Double wheel tubine with two jets, straight flow nozzle and mechanical needle control
H = 200 m Q = 600 l/sec. P = 1350 HP n = 1000 r. p. m.





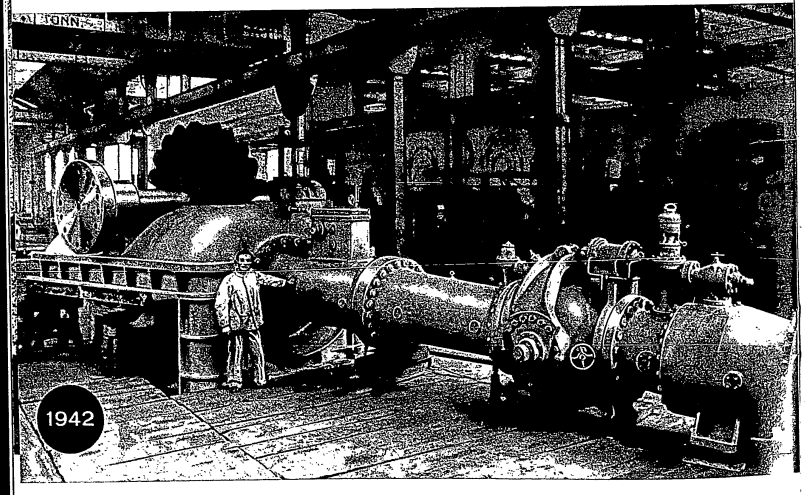
Lete Power Station Single wheel, single-jet turbine with straight flow nozzle and oil needle control

H = 545 m Q = 2600 l/sec. P = 16500 HP n = 500 r. p. m.



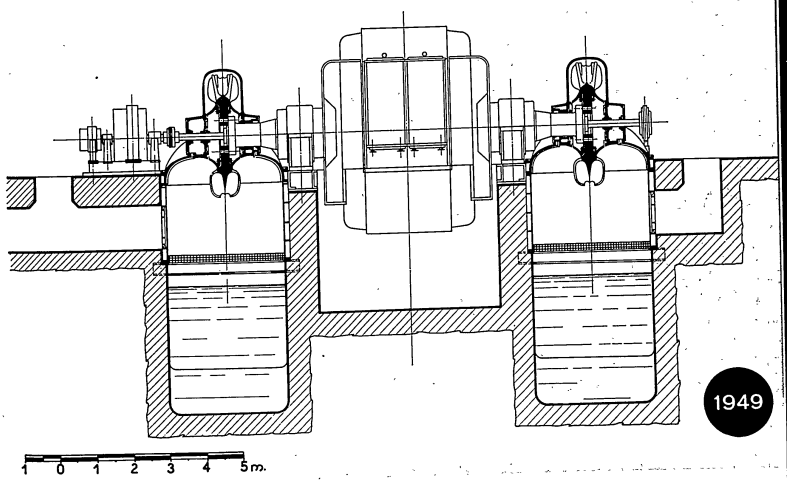
Avise Power Station Single weel, single-jet turbine

H = 1050 m Q = 5100 l·sec. P = 62000 HP n = 500 r. p. m.



Rosone Power Station Single wheel, single-jet turbine with straight flow nozzle and oil needle control. Spherical valve and axial emergency valve

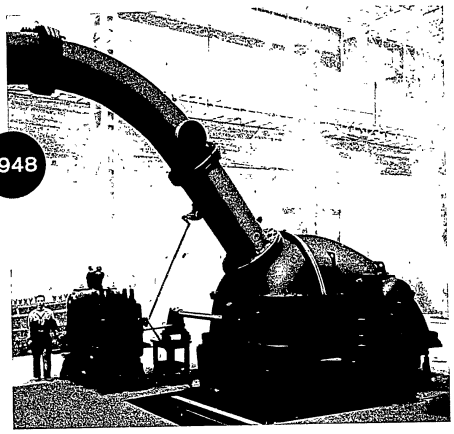
H = 809 m Q = 2285 l/sec. P = 22100 HP n = 600 r. p. m.



Mucone Power Station Double overhung turbine with two jets

H = 630 m Q = 10400 l/sec. P = 77000 HP n = 375 r. p. m.

1948

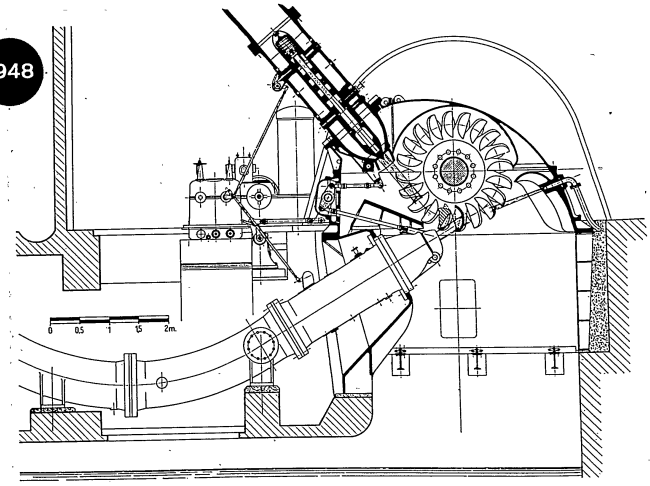


Cogolo - Palù Power Station

Single wheel, double-jet turbine with straight flow nozzle

H = 570 m
Q = 4200 l sec.
P = 28000 HP
n = 600 r. p. m.

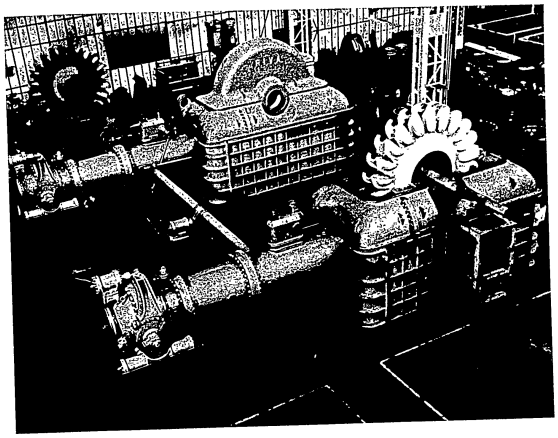
1948



S. Massenza Power Station

Double overhung turbine with four jets

H = 540 m Q = 7150 l sec. P = 45000 HP n = 600 r. p. m.

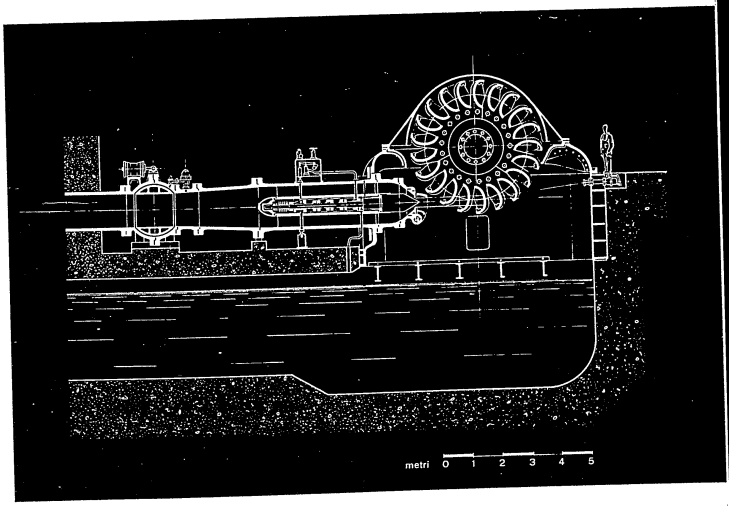


1951

Premadio Power Station

Double overhung turbine with two jets

H = 680 m
Q = 12500 l/sec.
P = 100500 HP
n = 300 r. p. m.



Cimego Power Station

Double overhung turbine with two jets

H = 721 m Q = 17750 l/sec. P = 150000 HP n = 300 r. p. m.

List of some of the most important Pelton turbine power stations

Year	Purchaser	Number of units	Head m	Single discharge l/sec.	r. p. m.	Single output HP
1896	Cassa Rurale Strozza - Strozza	1	185	60	520	110
1897	Tranvie Elettriche Varesino - Cunardo	3	106	360	450	370
1899	Società Elettrica Ossolana - Villadossola	2	256	585	417	1500
1902	Erba, Curletti, Zironi - Ponte Caffaro	3	246	1020	315	2500
1903	Società Elettrica Ossolana - Villadossola	1	250	800	417	2000
1908	Società Generale Elettrica Adamello - Poglia	5	450	1000	420	4700
1908	Imprese Elettriche Conti - Goglio	4	503	1000	420	5000
1908	Municipio di Milano - Grossotto	3	318	3700	315	12000
1911	Soc. Elettr. Riviera di Ponente - S. Dalmazzo Tenda	5	700	1950	500	14000
1913	Imprese Elettriche Conti - Verampio	4	535	1300	504	7000
1917	Società Italiana E. Breda - Pont S Martin	2	525	2500	504	14000
1918	Società Italiana E. Breda - Gressoney	2	700	1500	630	11200
1920	Imprese Elettriche Conti - Valdo	2	730	2100	504	16500
1920	Forze Idriche Moncenisio - Venaus	3	1020	2430	500	26000
1920	Società Generale Elettrica Adamello - Lago d'Avio	2	710	1500	504	11000
1922	Società Forze Idriche Alto Brembo - Carona	2	570	2500	600	15000
1923	Società Elettrica Interr. Cisalpina - Mese	3	740	4400	500	35000
1925	Imprese Elettriche Conti - Cadarese	2	440	6600	420	30000
1925	Società Generale Elettrica Adamello - Temù	2	710	2300	500	17600
1926	Città di Torino - Rosone	4	800	2350	500	20500
1926	Società Generale Elettrica Tridentina - Cogolo	2	725	3000	504/600	24000
1928	Cons. Ind. Roverato e Riva - Ponale	1	520	8000	420/500	45000
1929	A. E. M. Milano - Viola Fraele	1	480	3900	504	21000
1929	Società Elettrica Interr Cisalpina - Mese	2	740	5500	420/500	46200
1935	Società Edison - Goglio	4	510	2600	600	15000
1935	A E. M. Milano - Viola Fraele	2	480	3700	504	20000
1938	Società Idroelettrica Piemonte - Castiglione Dora	2	259,40	6000	375	17700
1940	Società Volta - Verampio	2	540,30	5250	600	32900
1941	Società Cogne - Balteo	3	336	5000	500	19200
1941	Società Adriatica Elettricità - Ampezzo	3	470	5000	600	27400
1941	Società Elettrica Alto Adige - Glorenza	2	586	10400	500	70000
1942	A. E. M. Torino - Rosone V	1	809	2285	600	22100
1943	A. E. M. Torino - Piantonetto VI	1	1200	2030	600	28000
1948	Tiroler Wasserkraftwerke - Lienz (Austria)	1	218	1250	500	3100
1948	Società Edison - Cogolo-Palù	1	569	4180	600	28000
1948	Società Edison - Cogolo-Palù	1	592	2100	600	15000
1948	Società Meridionale Elettricità - Lete	1	545	2600	500	16500
1948	Idroelettrica Sarca Molveno - S. Massenza I	2	540	7150	600	45000
1949	Società Meridionale Elettricità - Sangro	3	424	6650	375	33000
1949	Electricité de France - Baralet (France)	2	306	1700	500	6000
1949	Electricité de France - Ballandaz (France)	1	190	2500	375	5500
1949	Società Meridionale Elettricità - Mucone	2	630	10430	375	77000
1949	Società Edison - Liro I	2	643	3870	600	30000
1949	Società Idroelettrica Piemonte - Avise	2	1050	5100	500	62000
1950	Società Vizzola - Carona	1	580	3000	500	20000
1951	Electricité de France - Glandon (France)	1	280	3200	500	10350
1951	A. E. M. Milano - Premadio	2	680	12600	300	100500
1952	Società Montecatini - Lasa	1	951	6500	500	72500
1952	A. E. M. Torino - Rosone Telessio	1	1195	4140	600	58000
1953	Società Idroelettrica Piemonte - Avise III	1	1030	6500	500	77600
1953	Società Idroelettrica Alto Chiese - Cimego	2	721	17750	300	150000
1954	Electricité de France - Orlu (France)	2	980	5010	600	58000

RIVA REFERENCES

Hydro-electric Power Plants

Number of units installed: 8.000
Total output: 10 millions horsepower

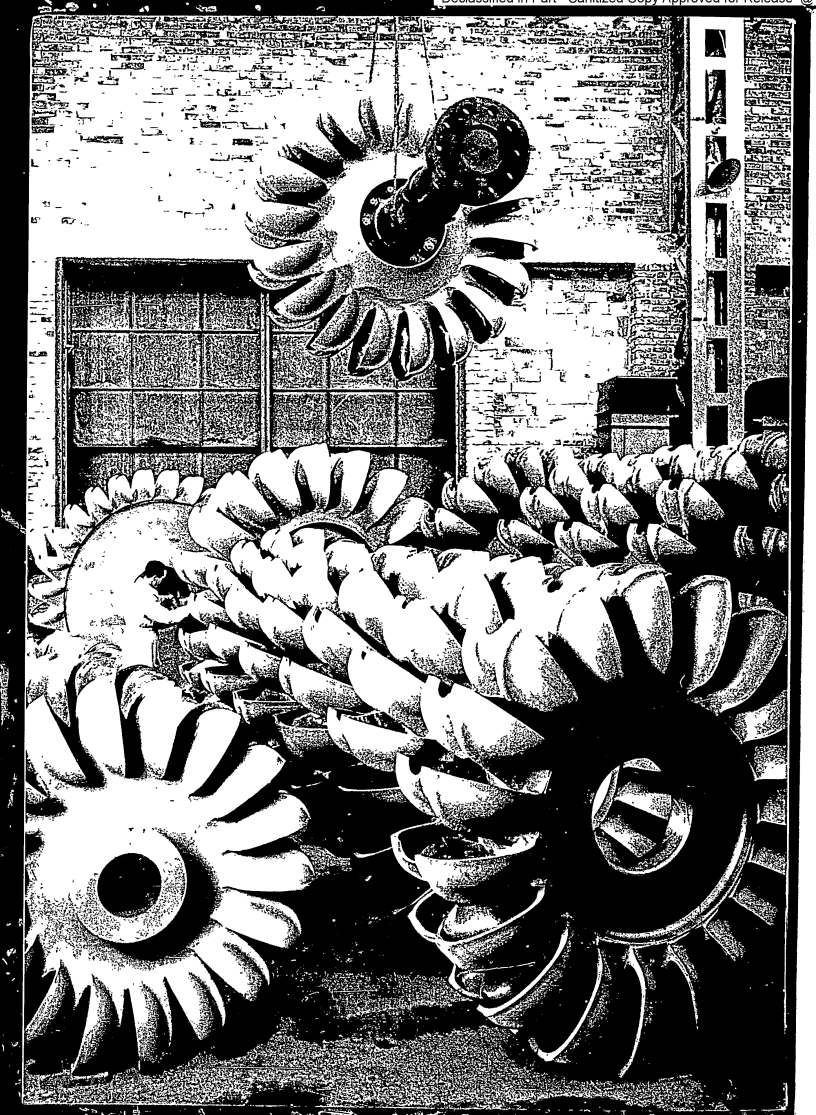
Pumping Plants

Number of units installed: over 5.000
Total discharge: 6 billions l/hour

1100 Pelton
for a total output of 4.600.000 HP

Progetto Alfe

Officina d'Arte Grafica A. Lucini e C. – Milano



FRANCO TOSI
SOCIETÀ PER AZIONI
LEGNANO

FRANCO TOSI EQUIPMENT

AT THE POWER STATIONS

OF LARDERELLO Soc. p. Az.

Circ. 80 - 1953

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STEAM UTILIZATION AT LARDERELLO PLANTS

The following explanations will give a rough idea of the various methods used to utilize the natural steam of Larderello. Among the various systems of utilization of natural steam power, three are those presently in use at Larderello, as shown on schemes 1, 2 and 3 following the text.

Scheme n. 1 is a typical example of direct utilization, where the natural steam as coming from the "soffioni" enters the turbine at 4,40 atm. abs. (62,5 psia) and 185° C (365° F) and leaves at a pressure slightly higher than atmospheric (1,08 atm. abs. 15,4 psia) and 105° C (221° F.), ready to be conveyed to the chemical plants for the extraction of boric acid, ammonia and of the other minor substances present in the steam. No condenser is required in this case.

Under the system illustrated by scheme n. 2, the steam issuing from the "soffioni" is sent to steam transformers, or evaporators, where it is condensed. From there, the condensate is sent to the secondary of the transformers by means of a pump; the secondary steam, produced at 2 atm. abs. (28,5 psia) appr., is supplied to the turbine which discharges to the mixing condenser at a pressure of 0,10 atm. abs. (1,42 psia).

The heat transferred to the circulating water is dispersed by evaporation in the cooling towers. In this case, a considerably smaller amount of gas passes through the turbine, as compared with the system illustrated by scheme n. 3. The gases are extracted from the condenser by a piston pump and discharged to the atmosphere.

In scheme n. 3 the steam issuing from the "soffioni" is sent direct to the turbine which discharges to a mixing condenser at a pressure of 0,10 atm. abs. (1,42 psia). In this case, the gases contained in steam pass through the turbine and reach the condenser from which, after cooling, they are extracted by powerful electric- and turbine-driven centrifugal compressors.

HISTORY OF THE INSTALLATIONS MADE BY FRANCO TOSI ON BEHALF OF LARDERELLO Soc. p. Az.

Franco Tosi took in hand the problem of utilization of the natural steam "soffioni" of Larderello as early as 1911, and in 1912 received a first order for a steam condensing turbine of 250 KW for operation with purified natural steam.

In 1914, an order was placed with Tosi for three 2,750-KW condensing turbines to operate with purified natural steam.

In 1935, following new important drillings made by Societa' Larderello, Franco Tosi started the design of Lardello Station n. 2 and in 1936 received an order for four sets of 12,000 KW each, with condensers and pumps, for operation with steam purified in special transformers.

Seven more 12,000 KW condensing turbines of similar type were ordered Tosi in 1939, five of which for the Castelnuovo Val di Cecina Station and two for Larderello Station n. 2.

In 1940, Franco Tosi started new studies on behalf of Societa' Larderello, which led to an order for four 26,000-KW condensing turbines - for operation with steam as issued from the drillings - and turbo-compressors for extracting incondensable gases from the condensers.

In the same year Franco Tosi furnished Societa' Larderello two sets of 3,000 KW each for operation with steam as coming from the "soffioni" and to discharge to the atmosphere (without condensing equipment). These sets were installed at the Serrazzano Station.

The retreat of the German troops during the war caused the destruction of all of the turbines - twelve in all - installed at Castelnuovo Val di Cecina Station, at Larderello Station n. 2 and at Serrazzano. Reconstruction was started soon after the end of the war and by the middle of 1948 all these turbines were set into operation again.

The end of the war made it possible also to resume the costruction of the four condensing turbines of 26,000 KW which are now in operation at Larderello Station n. 3.

The present production of Societa' Larderello's plants is of about two milliard kilowatts per hour a year with an installed power of 280.000 KW appr.

These figures are bound to increase continually as new drillings, which have recently made available considerable amounts of steam, will be followed by the erection of power stations to utilize this steam.

As it appears from the above, Franco Tosi has an experience of over forty years in the field of power generation from natural steam, all of which have been devoted to the development and improvement of natural steam plants. It is to be noted also that Franco Tosi is alone in having designed and constructed natural steam condensing turbines complete with all accessories.

Franco Tosi's production in the line of natural steam plants is the following:

- Condensing steam turbines also for steam flows above the 280 tons per hour obtained sofar.
- steam transformers for purifying natural steam;
- condensers for purified and natural steam;
- circulating pumps both for purified steam condensers and for natural steam condensers;
- turbo-extractors of great volumetric capacity for removing incondensable gases from condensers;
- special devices and mechanisms to be mounted on the steam, gas and water conduits, for providing a perfect operation of the whole plant;
- gas and water pipings and valves for operation in contact with the corrosive fluids which are generally encountered in this kind of equipment.

To conclude Franco Tosi is the only constructor in a position to overcome all problems connected with the construction and operation of thermal equipment for power generation from natural steam

The following pages contain a brief description of the thermal equipment constructed by Franco Tosi for the four main stations of Societa' Larderello, now in operation, the first turbines up to 3,000 KW built prior to 1935 being omitted.

SERRAZZANO STATION

This station is designed following scheme n 1 and consists of two direct-coupled turbine-generators of 3,000 KW maximum continuous power at terminals, rated at 50 cycles, 3,000 r.p.m.

The turbines, designed and constructed by Franco Tosi, are of the back-pressure, single-cylinder purely reaction type. They are designed for the following steam conditions, inlet pressure 4.75 atm. abs. (67,5 psia) at 185° C (365° F), exhaust pressure 1,08 atm. abs. (15,4 psia).

Steam flow at maximum load 58 tons per hour. The admission of steam into the turbines is automatically regulated by a throttle valve - controlled by various safety mechanisms - and by two automatic valves, the opening of which is controlled by a centrifugal speed governor with hydraulic control transmission. The inlet valve lifts are controlled by oil whose pressure is regulated by the centrifugal governor; each valve is operated by a powerful servomotor of its own.

This station is of simple design, moderate dimensions and easy to run. The two turbine-generators now in operation have been reconstructed and reinstalled in the early postwar period.

LARDERELLO STATION N. 2

This station operates under the system illustrated by scheme n. 2 and consists of seven 12,000 KW turbines direct-coupled to generators running at 3,000 r.p.m., 50 cycles.

The turbines, designed and constructed by Franco Tosi, are of the purely reaction, double flow, single-cylinder, condensing type, for a steam inlet pressure of 2 atm abs. (28,5 psia) and an exhaust pressure of 0,10 atm. abs. (1,42 psia). Each turbine is fed by 150 tons steam per hour.

Each turbine has two throttle valves controlled by various safety mechanisms. Each of these valves sends steam to the turbine through an automatic valve which regulates the steam flow according to the load. The opening of the automatic valve is controlled by a centrifugal speed governor with hydraulic control transmission Each valve is operated by a powerful oil pressure servomotor

Each turbine discharges to a mixing condenser, also designed and constructed by Franco Tosi, provided with a barometric pipe for discharging the mixture. The gases, which in this case are in a small quantity, pass through a spray cooler and are then extracted by a piston compressor.

The oil coolers are water-operated in some sets and blown air-operated in others.

A battery of 28 transformers, each designed to produce 35 tons of secondary steam per hour, is installed outdoors.

The pumping equipment of the plant is installed in a separate station and consists of five horizontal shaft centrifugal pumps - direct counled to asynchronous motors - of Tosi's design and construction, each delivering 6,000 tons (26,500 Gal/min.) water per hour against a head of 25 mt. (82 ft.).

These pumps draw the hot water discharged from the barometric pipes and send it to the cooling towers

CASTELNUOVO VAL DI CECINA STATION

In this station are installed four 12,000 KW turbo-generators with condensers and pumps, all of which are of Tosi's design and manufacture

These sets operate as shown in scheme n. 2 and have the same characteristics of those installed at Larderello n. 2.

Also this plant is equipped with accessories, designed and constructed by Tosi, such as: steam transformers, mixing condensers, barometric pipes and circulating pumps, similar to those installed at Larderello Station n. 2, except for the arrangement of the circulating pumps.

LARDERELLO STATION N. 3

This is the largest and most modern among the power stations of Societa' Larderello. It operates under the system illustrated by scheme n 3 and contains the following equipment:

- Four Tosi steam turbines direct coupled to alternators of 26,000 KW, rated at 50 cycles, 3,000 r.p.m.
- Four Tosi mixing condensers.
- Two 9,000 KW auxiliary turbine-generators with condensers.
- Four electrically-driven circulating pumps of Tosi's manufacture.
- Seven electrically-driven compressors, five of which were manufactured by Tosi and two by another Firm
- One Tosi compressor of the same power as those specified above, driven by a Tosi steam turbine.
- Barometric pipes, steam, water, gas conduits and valves, expansion joints and other accessories, also manufactured by Franco Tosi.

All the equipment installed at this station was designed and constructed by Franco Tosi at its Works in Legnano, with the exception of two compressors and two auxiliary turbine-generators. A brief description of this equipment may be of interest to the reader.

Tosi steam turbines

Each turbine was designed for operation with natural steam at the following conditions:

Maximum continuous power and economical output	26,000 KW
Rotating speed	3,000 r.p.m.
Inlet steam pressure	4,8 atm. abs. (68 psia)
Inlet steam temperature	185° C (365° F)

These turbines are of the direct-coupled, single-cylinder, double-flow type. The maximum steam flow is of 280 tons per hour.

Two throttle valves send steam to the turbine through two inlet valves which regulate automatically the steam flow according to the load.

The opening of the inlet valves is controlled by a centrifugal speed governor with hydraulic control transmission and by powerful oil pressure servomotors.

Designed and constructed in the first years of the war, the turbines could not be installed before 1948 and were set into operation late in 1949

Tosi mixing condensers.

Each turbine is equipped with a mixing condenser with barometric pipe and with a double-chamber cooler for cooling the gases going to the compressors.

The barometric pipe discharges into an underground conduit leading to a tank. By means of circulating pumps (see following chapter) the mixture of water and condensed steam is then pumped from this tank and passes into the upper ducts of the cooling towers. From the lower tank of these towers the cooled water is sucked into the condenser.

Tosi water circulating pumps.

The pumps are four in number, each driven by an electric motor, and are located in the lower part of the Station.

They are designed for the following operating conditions:

- Maximum delivery	13,000 cu.mt. (460,000 cu.ft.) per hour
- Manometric head	21,30 mt. (70 ft.) w.c.
- Electric motor power	1,050 KW
- Rotating speed	300 r.p.m.

Tosi electrically-driven gas compressors to remove incondensable gases

These, five in number, were also designed and manufactured at Legnano. They are of the centrifugal type and consist of two coaxial bodies, i.e. a. low pressure body with double flow, side intake and delivery at center, and a high pressure body with single flow. Speed of rotors : 4,500 r.p.m.

The compressors are driven by electric motors of 1,000 KW at 1,500 r.p.m. through a speed multiplier with spur hellical gears. The reduction gearing was also designed and manufactured by Franco Tosi.

During compression the gases are cooled three times by mixing coolers.

The compressors are designed for 90 000 cu.mt. (3,200,000 cu.ft.) gas per hour measured at the intake and they discharge to the atmosphere.

Various protection devices are fitted on each compressor such as those against the excessive increase of pressure at the intake, no voltage and lack of lubricating oil.

Tosi turbine-driven gas compressor

This, of Tosi's design and manufacture, is identical in type to the electrically-driven compressors. The steam turbine, of 1,000 KW, is direct coupled and of the combined impulse and reaction type, with single cylinder. It is fed at 4,8 atm. abs. (68 psia) and 185° C (365° F) and discharges to a mixing condenser, the circulating water of which is kept in circulation by the four main circulating pumps.

The turbine is fitted with all normal governing and protection mechanisms, as well as with the protection devices provided for the electrically-driven compressors.

Accessories

Water, steam, gas pipings and valves, expansion joints and other accessories of unusual characteristics and dimensions had to be provided, for Larderello Station n. 3. For example, a valve of 2 mt. (80") diameter was mounted on the circulating cold water collector. Attached is a photograph of an automatic servomotor valve having a diameter of 1,3 mt. (50") which was also installed at Larderello Cast-iron pipings of 2 mt. (80") diameter and bellows expansion joints to balance thermal expansion on the various pipings were installed as well. All these accessories were designed and manufactured by Franco Tosi

Of Tosi's design and construction are also the oil pressure operated remote control systems for the eight gate valves, 1 mt. (40") diameter, situated at the gas entrance to the compressors, and for the four gate valves, 1,3 mt. (50") diameter, placed at the delivery of the four circulating pumps.

These valves are controlled automatically according to the service requirements, and the necessary pressure oil is supplied by an oil system fitted with a hydropneumatic oil reservoir, pumps, various mechanisms and signalling apparatuses, etc.

Another oil pressure equipment controls automatically the opening of the four valves which return the water from the delivery of the four circulating pumps to the tank from which these draw. These valves keep the water level in the tank practically constant.

Operation of plant

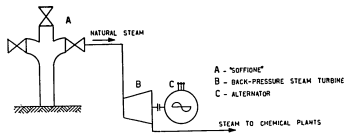
The Larderello Station n 3 has been started up in December 1949 and has been operating continuously for four years

The operation records of the year 1952 show that the equipment of the station has run from 1st January to 31st December at full load for 8 550 hours which is 97 6% of the hours of the year

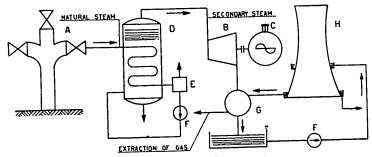
These four years of service are a confirmation of the advantages represented by the use of natural steam for feeding the turbines Thus the Larderello Company has commissioned to Tosi in this month of December 1953 the whole equipment of the Serrazzano new condensing station which consists of two sets of 12 500 KW each This station is to operate with raw steam under the same system as Larderello Station n 3 except for a number of improvements in the design and layout of the equipment which are meant to further reduce the annual average steam consumption per KW/hr and to facilitate and diminish the cost of operation maintenance and so on

This new condensing station will replace the Serrazzano Station described earlier in these pages which operates now at 1 08 atm. abs exhaust pressure and will therefore be placed out of service.

SCHEME N. 1



SCHEME N. 2



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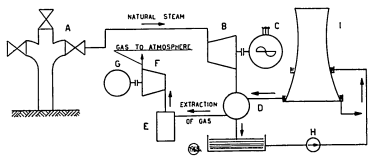
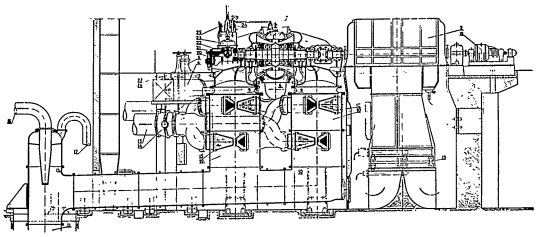
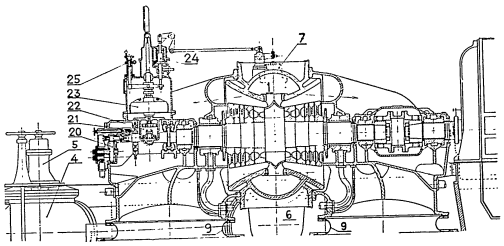


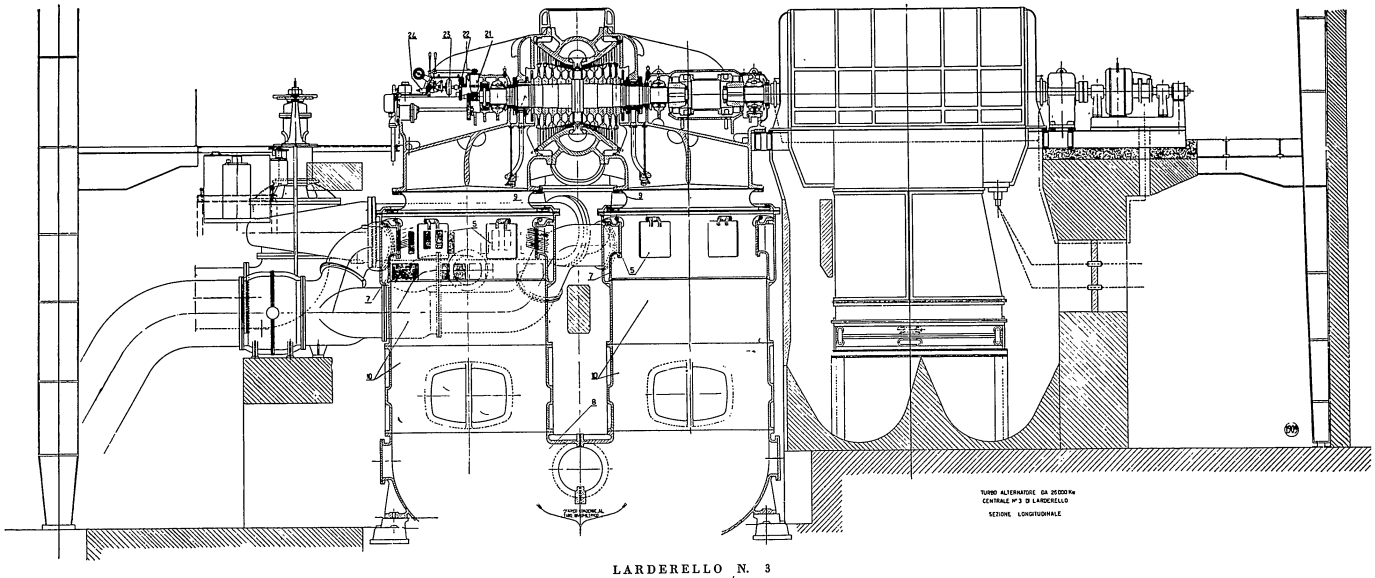
SCHEMES OF THE THREE METHODS
OF STEAM UTILIZATION IN USE AT LARDERELLO



LONGITUDINAL SECTION OF A 12.000 KW TURBINE-GENERATOR SET
INSTALLED AT LARDERELLO N. 2



LONGITUDINAL SECTION OF A 12.000 KW TURBINE
INSTALLED AT LARDERELLO N. 2

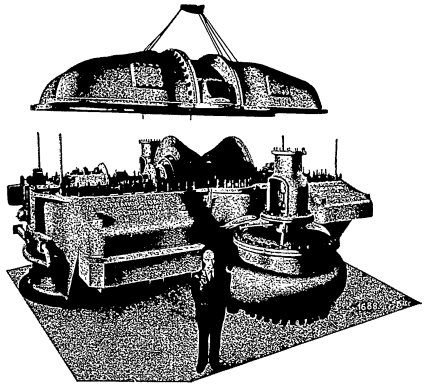


LARDERELLO N. 3

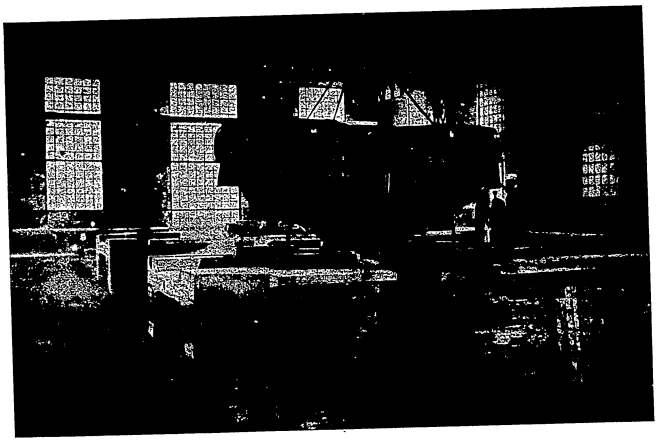
LONGITUDINAL SECTION OF A 26.000 KW TURBO-ALTERNATOR

LARDERELLO N. 2
TURBINE ROOM WITH 7 TURBINE-GENERATORS OF 12.000 KW

LARDERELLO N. 3
PARTIAL VIEW OF THE TURBINE ROOM WITH
TWO 26.000 KW TURBINE-GENERATORS AND TWO GAS COMPRESSORS.
IN THE ROOM ARE INSTALLED IN ALL: FOUR 26.000 KW TURBINE-GENERATORS,
TWO 9.000 KW AUXILIARY TURBINE-GENERATORS AND EIGHT GAS COMPRESSORS.

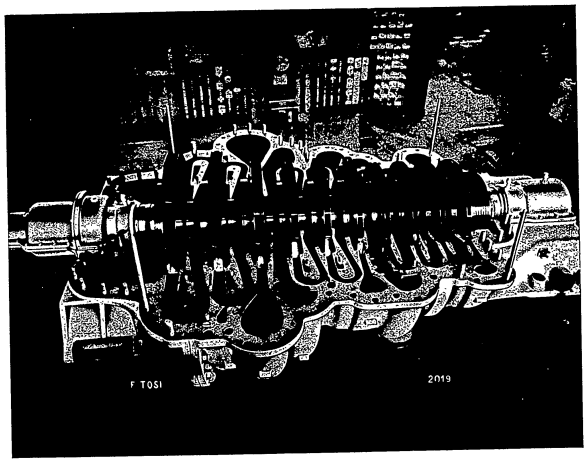


VIEW OF A 26.000 KW TURBINE AT LEGNANO
(This turbine is now in operation at Larderello n. 3)

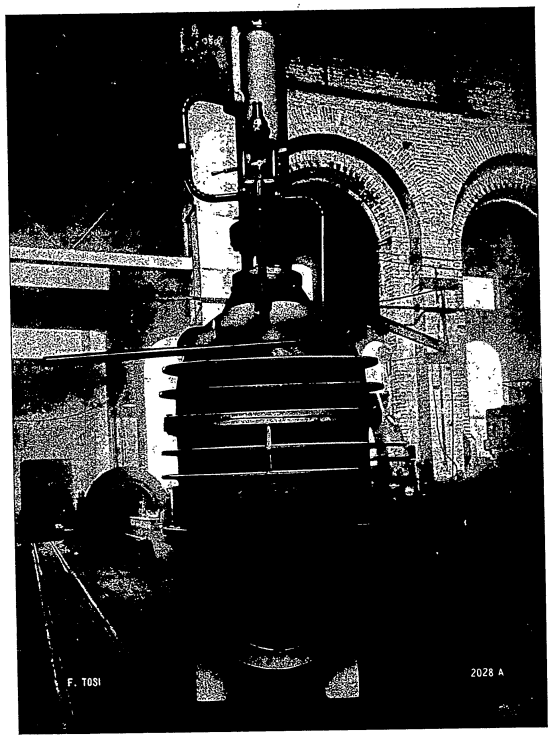


LARDERELLO N. 3 - APRIL 1949

THE LOWER TANK OF THE CONDENSER
FOR THE FIRST TURBINE OF 26.000 KW BEING ASSEMBLED

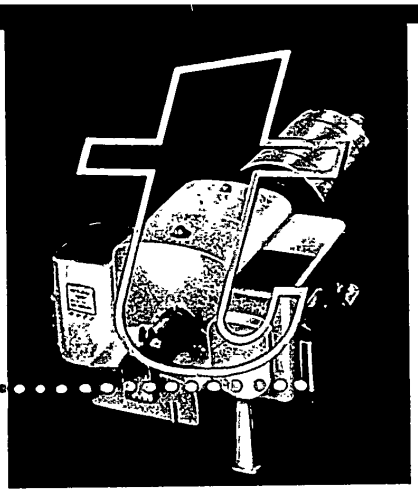


HIGH PRESSURE BODY AND ROTOR OF A CENTRIFUGAL COMPRESSOR AT LEGNANO
(Now in operation at Larderello n. 3)



A HYDRAULICALLY REMOTE CONTROLLED CAST-IRON VALVE OF 1,3 MT. (50") DIA.,
NOW INSTALLED ON THE DELIVERY OF THE CIRCULATING PUMPS AT
LARDERELLO N. 3
In Franco Tosi 's factory before shipment.

FRANCO TOSI s.p.a. LEGNANO

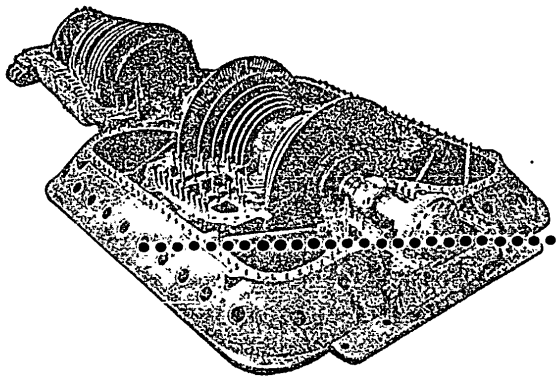


turbine a vapore

per
impianti fissi

STEAM TURBINES FOR STATIONARY PLANTS

Circ. 106 - 1956



STEAM TURBINES

FOR STATIONARY PLANTS

FRANCO TOSI s. p. a.

LEGAL SEAT - MILANO - VIA BRISA 3 - TELEPHONE 875.243
HEAD OFFICE - LEGNANO - TELEPHONE 47.690
METALLURGICAL WORKS AND FOUNDRIES - LEGNANO

Circ. 106 - 1956

THE FRANCO TOSI S.p.A.

has, through its achievements in Italy and abroad, secured for itself a foremost position in the field of metallurgical industry.

Founded in 1876, Tosi developed rapidly to its present extensions; it employs today about 4.000 people and the total area of the plants has reached 260.000 sq. m. of which more than 136.000 are covered.

Included in the Legnano industrial complex are also the steel, cast iron and other alloy foundries, together with the forging division; the thermal treatments division with its laboratories is among the most modern and better equipped in Europe.

Thanks to this equipment, to the experience acquired, and to the high degree of specialization of its workmen, FRANCO TOSI is able to design and construct complete thermo-electrical power stations according to the most rational principles of modern technique.

To integrate its own building experience with that acquired by industries all over the world in the field of major ratings, FRANCO TOSI has concluded agreements for cooperation with the main industries abroad producing thermo-electric steam power stations, and precisely:

- with COMBUSTION ENGINEERING INC. of New York for steam boilers of all dimensions, whether of the natural or controlled circulation types;
- with WESTINGHOUSE ELECTRIC INT. CO. of New York, for steam turbines of all ratings, condensers, pumps and fans;
- with COPES VULCAN DIVISION, of Erie (Pa) U.S.A., for soot blowers of modern design;
- with SVENSKA ROTOR MASKINER AKTIEBOLAG of Stockholm, Sweden, for air preheaters of the Ljungstrom type;
- with TODD OIL BURNERS LTD. of London, for fuel oil burners.

The ever increasing use of steam turbines in electrical power generating and distributing stations and in industries which require steam for technological purposes, has enabled FRANCO TOSI to develop always more this important sector of its production, to deepen its own constructional experience and to bring continuous improvements to its turbines.

In order to be able to obtain always more elevated efficiencies the rotating velocity of the rotors has been considerably increased together with the temperatures and pressures of the steam let in the turbines.

To face the difficulties of a constructional and functional character deriving from the above, a particular care has been taken in the selection of the materials and sensible innovations have been brought to the most delicate organs of the machine.

The regulating and lubricating systems together with the safety devices have been most carefully designed in order to avoid that the turbine operates under abnormal or dangerous conditions. Among the improvements we mention, the safety device against overspeed which acts by discharging the oil from the servomotor which keeps open the turbine supply valve, and rapidly stops the machine when the number of revolutions per minute of the rotor exceeds for any cause, the pre-established maximum.

Equally interesting is the automatic device designed to eliminate trouble caused by oscillations of frequency during operation in parallel of the turboalternators supplied with pressure regulators.

To summarize, the main characteristics of the Tosi turbines are: elevated efficiencies, safety of operation, easy starting and maintenance conditions.
Counterpressure, extraction and counterpressure, pure condensation, extraction and condensation turbines can be actually built by Tosi up to the highest ratings attained by modern technique.

To this result a large contribution was given by the cooperation of the important turbine building American « WESTINGHOUSE ELECTRIC CORPORATION » whith whom Tosi signed a license agreement.

BRIEF NOTES FOR PLANNING THERMOELECTRIC STATIONS FOR THE PRODUCTION OF ENERGY AND HEAT

Classification and nomenclature of steam turbines

Counterpressure turbines, the steam discharged by which is used by the industry. In this category are included the turbines with hot condenser, where the steam discharges into a heat exchanger to heat the water destined to industrial uses.

Extraction and counterpressure turbines, with two steam taps at two different pressures, of wich one intermediate and one final.

Extraction and condensation turbines, where a part of the steam gets supplied to the industry and a part to the condenser.

Condensation turbines, for producing electrical energy only; all the steam allowed into the turbine gets discharged in the condenser.

All the above types of turbines, whether having or not an intermediate steam tap may be supplied with one or more « unregulated » taps constituted by simple bleedings at determined points of the turbine; the pressure of the steam bled being a function of the steam capacity downstream of the bleeding point.

On request, *FRANCO TOSI* builds also more complex types of turbines or suitable to other uses besides the above mentioned.

Solutions for an Energy producing plant

The type of energy producing plant may be determined according to the following criteria:

a If the industry requires an electric load always inferior or equal to that which may be given by the steam or the hot water necessary to the various services, a counterpressure or a hot condenser turbine should be foreseen;

in such a case the steam discharged by the turbine will be a function of the electric load and what is required by the industry over that will be taken directly from the boiler through a pressure reducing valve controlled by a pressure regulator, or in the case of a hot water plant by a thermostat

b If the total energy produced in a certain period with a given steam absorbtion diagram is equal or superior to the energy required (though different in each instant) a counterpressure and hot condenser turbine should be foreseen, with an accumulator for steam or, respectively, for hot water.
Also in this case the steam discharged by the turbine will depend on the electric load.

c Should the total energy produced be inferior to the total energy absorbed, then it will be necessary to revert to another source of energy such as the external network, adopting the system of running in parallel; in such case the power developed by the turbine will be a function of the steam absorbed and the exterior electrical network will supply the remaining load necessary to the industry.
Another solution is given by the plant with an extraction and condensation turbine. In this case the turbine may satisfy independently within wide limits the request both for energy and for steam.

d Plants for producting energy only with a condensation turbine are to be foreseen should there be no absorbtion of steam at all. Evidently the steam discharged is a function of the load.
It is pointed out that in the above examination is implicitly admitted the fact that the industrial steam taps may be more than one, as one could foresee extraction and counterpressure turbines, or with two extractions and hot condenser, etc. Moreover, it must be borne in mind that the energy produced according to each case can be increased by a percentage often not to be neglected, by providing adequate steam bleedings non regulated for deaerating and preheating the boiler feedwater.
Such possibilities get studied case by case as they depend on the steam supply and discharge conditions, on the exploited thermal jump of the turbine, on the temperature of the condensate, and finally on the boiler type and on the nature of its combustion.

SCHEMES OF THERMAL PLANTS

a *Counterpressure turbine Plant* the steam discharged by which besides being sent to the factory for industrial uses, serves in part for deaerating and preheating the condensate in an atmospherical deaerator where the temperature of 100°C is reached; this simple scheme finds an application so much more convenient as the turbine counterpressure is near to atmospherical pressure.

b *Counterpressure turbine Plant* having the same characteristics of the above, with the addition of a high pressure preheater, fed by a steam bleeding.

c *Turbine having a high pressure steam extraction* and the discharge at a lower pressure. The steam drawn at constant pressure, besides serving the industry, feeds a high pressure preheater while the discharge supplies both the industry and the deaerator.

d *Extraction and condensation plant.* The industrial and turbine condensates get deaerated and preheated by means of a deaerator fed from extraction. In the instance of large ratings, condensates are preheated further by means of one or more bleedings.

e *Small rating pure condensation plant* (1000 ÷ 2000 kW). The deaerator is preceded by a low pressure preheater; each is fed by a special bleeding of steam not regulated.

f *Mean and large rating condensation plant.* Three or more preheating stages are foreseen, each fed by a special bleeding; provision is also made for a distilling apparatus for the boiler addition-water, which, in important cases, may also be double or treble acting. In plants of recent design, the addition-water is purified by an ion exchange resin demineralizer.

SELECTION OF THE STEAM CONDITIONS

For an annual operation of about 3000 hours, the following references may be borne in mind for guidance:

Steam conditions in boiler atm./°C	Admission in turbine atm./°C	Preheating Temper. in °C	Preheating N° of steps	PRACTICAL LIMITS OF RATING IN kW Counterpressure turbines	Extraction turbines	Condensation turbines
27/400	25/385	100	1	50 - 500	100 - 500	100 - 500
36/415	33/400	130	1 - 2	500 - 2.000	500 - 3.000	500 - 5.000
45/450	41/435	150	1 - 3	2.000 - 5.000	3.000 - 5.000	5.000 - 30.000
63/485	60/480	220	2 - 5	5.000 - 10.000	5.000 - 10.000	30.000 - 70.000
105/540	103/538	230	3 - 5	10.000 - 20.000	10.000 - 30.000	70.000 - 100.000
130/540	126/538	230	3 - 6	20.000 - 30.000	30.000 - 40.000	100.000 - 150.000

As regards the counterpressure it is necessary to fix the lowest possible pressure admissible for industrial utilization, bearing in mind that in the case of already existing plants, with heavy losses of load, it is worth while in general modifying the plant in order to lower the counterpressure, as the disbursement for modification is nearly always compensated by the greater amount of energy obtained.

Finally one must take into account eventual modifications of the schedules of work, in order to obtain steam and energy absorbtion diagrams with a flow as constant as possible.

Power produced by a steam turboalternator

The power at maximum efficiency and economy, in kW, at the clamps, which may be developed by a counterpressure or condensation turboalternator, is expressed by the formula:

$$N_E = \frac{G_E \cdot \lambda \cdot \eta_E}{860}$$

where

G_E = steam discharged by the turbine in Kgs/hour;

λ = adiabatic jump in calories per Kg. between steam conditions at the inlet and at the discharge, read in Mollier's diagram (pag. 13) on the basis of the absolute pressures (normally ata = atm. + 1) and of the superheating temperature. In the case of a condensation turbine where circulating water is available at a temperature of 15-20°C; a discharge pressure of 0,045 ata or of 0,06 ata may be considered;

η_E = efficiency at maximum economy of the turboalternator, which can be read approximately from diagrams 1 & 2.

The quantity of steam discharged by a 1000 kW. turbine at different conditions of inlet and discharge, varies, for guidance, as shown in diagram 3.

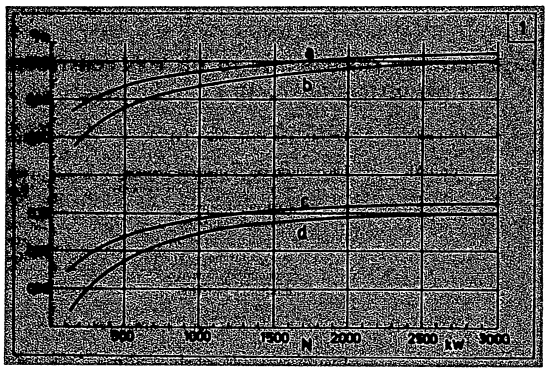
BASIC DATA TO COMMUNICATE TO THE FIRM CONSTRUCTING THE THERMOELECTRICAL PLANT

BOILER	Pressure and temperature (1)	atm./°C
TURBINE	Intermediate tap: extraction pressure	atm.
	maximum continuous capacity	Kgs/hour
	economical capacity	»
	minimum capacity	»
	Discharge: discharge pressure	atm.
	max. continuous capacity	Kgs/hour
	economical capacity	»
	minimum capacity	»
CONDENSER	Nature of circulating water available (2)	
	Mean temperature of circulating water	°C
	Capacity of available circulating water	m³/hour
INDUSTRIAL CONDENSATE	Temperature	°C
	Quantity of return condensate	Kgs/hour
ENERGY	Maximum continuous capacity	kW
	Economical capacity	»
	Tension of the current	Volts
	Frequency of the current	cycles/secs.
SUNDRIES	Operating hours expected per year	hours
	Possibilities for operating in parallel	

(1) If the local circumstances do not impose given boiler conditions keep to the pressures and temperatures indicated in Page 8.

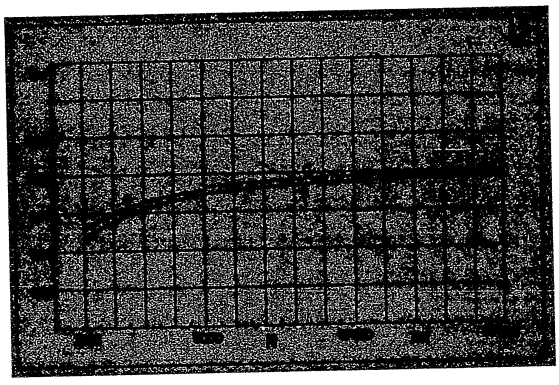
(2) Fresh or sea water.

DIAGRAM 1 - INFORMATIVE DIAGRAM OF A COUNTERPRESSURE TURBINE EFFICIENCY



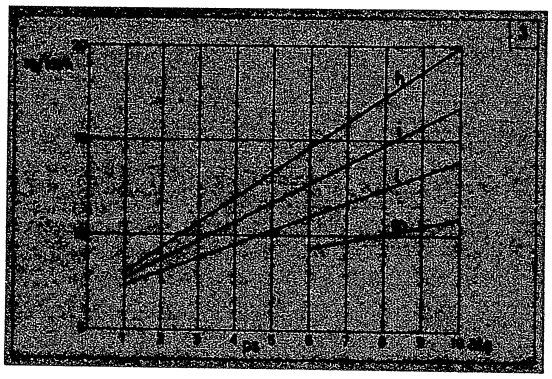
a - Efficiency curve at the generator clamps of a counterpressure turbine, with steam supply at 26 ata/385°C and discharge at 6 ata.
b - as above, but for: steam supply at 42 ata/435°C and discharge at 6 ata.
c - as above, but for: steam supply at 26 ata/385°C and discharge at 2 ata.
d - as above, but for: steam supply at 42 ata/435°C and discharge at 2 ata.
N - Economical power at clamps - kW.

DIAGRAM 2 - INFORMATIVE DIAGRAM OF A CONDENSATION TURBINE EFFICIENCY

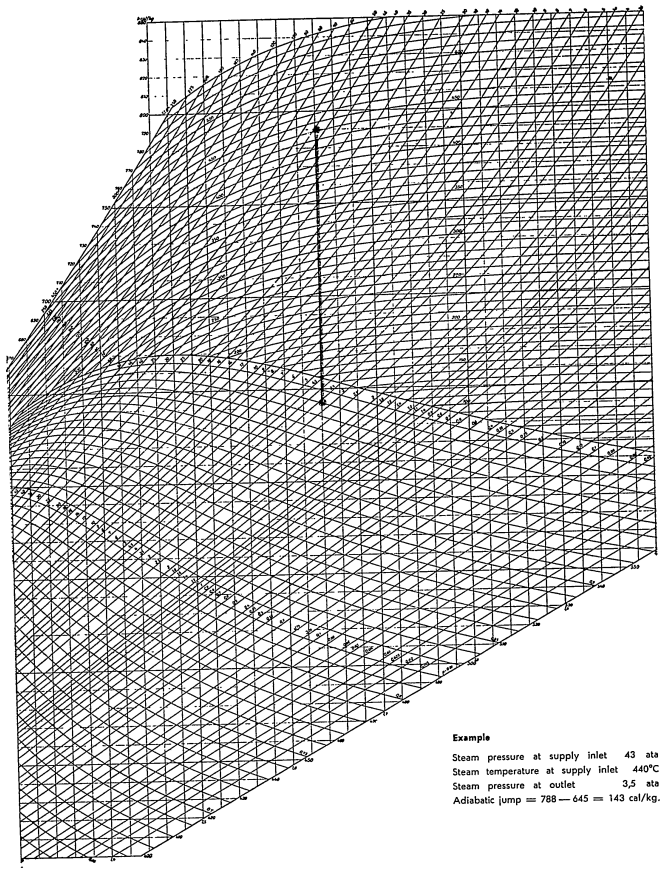


e - Efficiency curve at the clamps for a turbine of 1 cylinder and steam supply at 26 ata/385°C.
f - Efficiency curve at the clamps for a turbine of 1 cylinder and steam supply at 42 ata/435°C.
g - Efficiency curve at the clamps for a turbine of 2 cylinders and steam supply at 42 ata/435°C.
N - Economical power at clamps - kW.

DIAGRAM 3 - INFORMATIVE DIAGRAM OF A COUNTERPRESSURE TURBINE SPECIFIC STEAM CONSUMPTION



h - for turbine with steam supply at 26 ata/385°C.
i - for turbine with steam supply at 34 ata/400°C.
l - for turbine with steam supply at 42 ata/435°C.
m - for turbine with steam supply at 61 ata/480°C.
ps - discharge pressure of the turbine.



Example

Steam pressure at supply inlet 43 ata
Steam temperature at supply inlet 440°C
Steam pressure at outlet 3,5 ata
Adiabatic jump = 788 — 645 = 143 cal/kg.

MOLLIERS' DIAGRAM FOR WATER STEAM.

STATEMENT OF STEAM TURBINES FOR STATIONARY PLANTS SUPPLIED

EXTRACTION - COUNTERPRESSURE AND EXTRACTION - CONDENSATION TURBINES

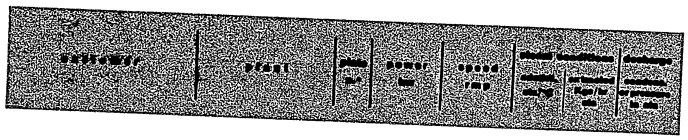
CONDENSATION TURBINES

COUNTERPRESSURE TURBINES

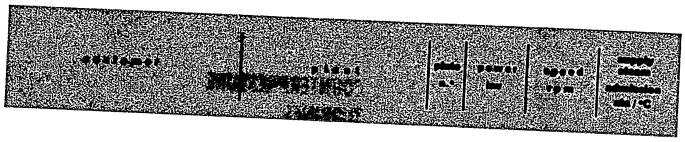
Franco Tosi s.p.a.

ATTENTION - Top headings on page 17 - 21 - 29 shall be read in English:

Page 17



Page 21



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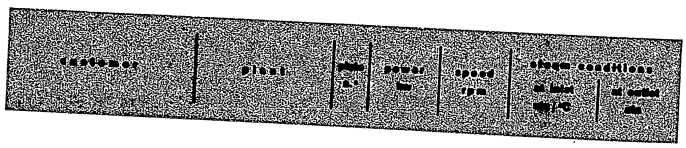
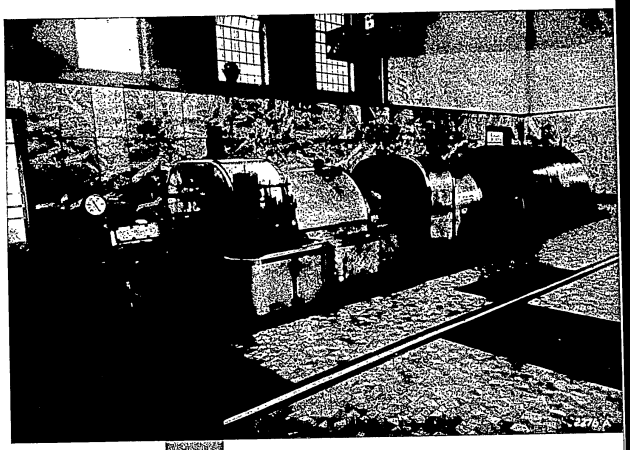


TURBINE A: DERIVAZIONE E CONTROPRESSIONE
DERIVAZIONE E CONDENSAZIONE

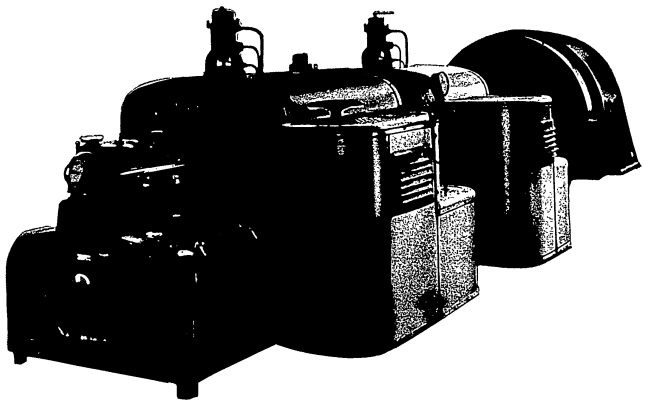
Cliente	impianto	matr. n.	potenza kW	velocità giri 1'	condiz. ammiss. ate C	vapore derivato Kg h/ate	Scarico condens oppure pressione in ate
Bahn Wohronesch	Russia	69	330	3000	12,5/325	4500/1	Condens.
Bahn Wohronesch	Russia	70	330	3000	12,5/325	4500/1	Condens.
G. Marzotto e Figli	Maglio di Sopra	220	600	2520	15/300	7000/3	Condens.
F. Bonecchi e C.	Rho	224	340	3000	15/300	7850/2	Condens.
Vonwiller e C.	Romagnano Sesia	256	500	2520	15/300	5000/1	Condens.
Vonwiller e C.	Romagnano Sesia	257	500	2520	15/300	5000/1	Condens.
Soc. Dinamite Nobel	Avigliana	373	260	3000	12/310	4000/2	Condens.
Tintoria Comense	Como	782	200	5260/1000	14/300	2000/2	Condens.
Forno Comunale incen. immond.	Trieste	784	300	5400/840	10/250	3000/2	Condens.
Comp. Industrial de Estancia	Bahia	787	500	4580/720	14/300	4500/1,5	Condens.
Cotonificio Cantoni	Legnano	810	500	4580/750	14/325	4500/2	Condens.
Usine Metallurgique de	Ploeste	813	200	5260/1000	12/300	1200/0,3	Condens.
Centrale Elettrica di	Pernambuco	816	240	5260/1000	12/300	2000/1	Condens.
Manifatt. Cotoniere Meridion.	Napoli	818	1400	2520/2760	15,5/325	16000/2	Condens.
Mercado de Abasto	Buenos Aires	864	500	4500/800	14/300	6300/4	Condens.
Mercado de Abasto	Buenos Aires	865	500	4500/800	14/300	6300/4	Condens.
Manifatt. Seta Artificiale	Casale	908	170	5650/840	24/350	2800/4	Condens.
Soc. An. Seta Artif. Cremona	Pizzighettone	914	450	5800/840	12/300	7500/2	Condens.
Comp. Fiacao e Tecidos	Maceiò	915	500	5670/750	13/300	2000/2	Condens.
Fiacao Tecelagem e Estamparia Jpiranga - Jafet	S. Paulo	958	1300	3600	10/275	12000/2,1	Condens.
Cotonificio Turati - Milano	Lavagna	1111	1400/1600	6500/4600	12/300	1500/2	Condens.
Soc. An. Ambrogio Paleari	Monza	1113	150	13000/840	12/300	4500/3	Condens.
Manifatt. Tessuti Candidi	Cerano	1310	250	9986/1260	22/350	3500/2,5	Condens.
Rappres. Italia Comm. est. URSS	Nikolask - Ussurijsk	1311	2500	3000	19/350	17000/5,5	Condens.
Rappres. Italia Comm. est. URSS	Nikolask - Ussurijsk	1312	2500	3000	19/350	17000/5,5	Condens.
Rappres. Italia Comm. est. URSS	Katta Kurgana	1321	3000	3000	19/350	16000/6	Condens.
Rappres. Italia Comm. est. URSS	Katta Kurgana	1322	3000	3000	19/350	16000/5	Condens.
Rappres. Italia Comm. est. URSS	Jewaakowo	1344	1500	3000	16/325	12000/4	Condens.
Soc. An. Cotonificio Cantoni	Legnano	1659	3500	3000	35/400	15000/2,5	Condens.
Soc. An. Cotonificio Cantoni	Legnano	1660	3500	3000	35/400	15000/2,5	Condens.
Raffineria Olii Minerali S.A.	Fiume	2290	500/600	9488/1260	30/400	7000/13	6
Raffineria Olii Minerali S.A.	Fiume	2291	500/600	9488/1260	30/400	7000/13	6
Cellulosa Naz. S.A. Celna - Roma	Finale di Rero	2364	1085/1260	6595/1260	32/350	5850/10	3
Soc. An. Junghans - Venezia	Venezia	2404	180/225	13007/1260	31/375	1800/2,5	Condens.
Soc. An. Junghans - Venezia	Venezia	2405	180/225	13007/1260	31/375	1800/2,5	Condens.

cliente	impianto	matr. n.	potenza kW	velocità giri l'	condiz. vapore ammiss. ate	C	derivato Kg.h/ate	Scarico condens. oppure pressione in ate
S.A. Faesite - Padova	Faè di Longarone	3474	1000/1180	5643/1260	45/400		16500/18	9
Fabbr. It. Derivati Acetilene	Ferrara	3480	820/815	7791/1260	40/400		3600/12	2,5
Conceria Cogolo - Udine	Zugliano	3492	110/150	12982/1260	23/350		1950/0,7	Condens.
Motores Marelli per l'Argentina		3497	480/600	9988/1500	39/380		3200/10	2,2
Fiat - Torino	Mirafiori	3524	16500	3000	95/440		68700/9,5	Condens.
Comp. Ind. S.A. Viscosa - Roma	Napoli	3548	1540	7126/3600	28/380		17000/3,5	Condens.
Comp. Ind. S.A. Viscosa - Roma	Napoli	3549	1540	7126/3600	28/380		17000/3,5	Condens.
Manifatt. G. Marzotto - Valdagno	Pisa	3778	600/800	7200/1500	33/380		9500/3	Condens.
Soc. Fond. Agric. Ind. Valdagno	Portogruaro	3779	600/800	60/501260	33/380		9500/3	Condens.
Manifatt. G. Marzotto - Valdagno	Mortara	3780	1400	6680/1260	35/400		7000/2	Condens.
Stadtwerke	Klagenfurt	3808	3200	3000	35/425		22800/13/5	Condens.
Cisa Viscosa - Rieti	Rieti	3820	2000	5742/1500	28/380		19000/3	Condens.
Manifatt. di	Leggiuno	3826	750	7823/1500	32/385		3000/2,5	Condens.
S.N.I.A.F.A.	Platanos	3844	3844	1600	38/430		16000/3,5	Condens.
S.N.I.A.F.A.	Platanos	3845	1600	5660/1500	38/430		16000/3,5	Condens.
Manifatt. Lane G. Marzotto	Brugherio	3848	625/850	6084/1260	35/400		9500/2,5	Condens.
Snia Viscosa	per il Brasile	3851	500	8219/3600	36/380		5500/3,5	Condens.
Snia Viscosa	per il Brasile	3852	500	8219/3600	36/380		5500/3,5	Condens.
Cartiera di	Marzabotto	3856	600	8281/1500	30/400		4400/2	Condens.
Soc. Ind. Chimiche - Milano	Porto Marghera	3873	1900	5649/1500	45/450		8200/18	5
Delville Estates	Durban	3875	750	7170/1500	20/390		4250/3	Condens.
Snia Viscosa	in Brasile	3879	500	8219/1800	36/380		5500/3,5	Condens.
Motores Marelli per Ditta Atanor	Buenos Aires	3881	1500	6028/1500	32/300		3500/6	Condens.
Snia Viscosa - Milano	in Messico	3882	4400	3600	45/540		18000/12 / 28700/3,5	Condens.
Snia Viscosa - Milano	in Messico	3883	4400	3600	45/450		18000/12 / 28700/3,5	Condens.
Cartiera Italiana - Torino	Serravalle Sesia	3886	2000	5694/1500	32/400		9050/18	Condens.
Snia Viscosa - Milano	Varedo	4014	4500/5650	3000	45/450		40650/3,5	Condens.
Cartiera Marsoni - Venezia	Villorba	4016	1890	6066/1500	29/375		12300/2,5	Condens.
Delville Estates	Durban	4029	1000	7170/1500	20/390		9100/3	Condens.
Stanic Ind. Petrolifera	Livorno	4039	3500	3000	36/430		45500/8	Condens.
Fabbr. Riunite Amido Glucosio								
Destrina	Castelmassa	4057	2000/2500	5585/1500	38/440		8000/8	0,5
Soc. Ind. Agric. du Niari	Niari	4081	1000	7200/1500	22/310		5000/1,35	Condens.
S.A.R.O.M.	Ravenna	4086	1680	5600/1500	41/410		16500/17,5	3
S.A.R.O.M.	Ravenna	4087	1680	5600/1500	41/410		16500/17,5	3
Raffineria Italia	Cremona	4109	2200	6000/1500	42/440		12.700/13	Condens.
Raffineria Italia	Cremona	4110	2200	6000/1500	42/440		12700/13	Condens.
A.N.I.C.	Ravenna	4120	37500	3000	115/538		314000/49	Condens.
A.N.I.C.	Ravenna	4121	37500	3000	115/538		314000/49	Condens.



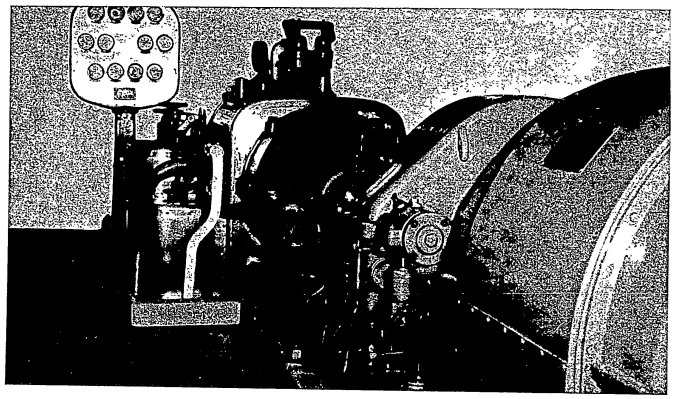
4650 KW bicylindrical extraction and condensation turbine wih direct coupling-3000 rpm
(SNIA VISCOSA - Varedo Plant - 1950).

16.500 KW bicylindrical extraction and condensation turbine - 3000 rpm
Steam characteristics at inlet: 95 ata/440°C
(SOCIETA' FIAT - Mirafiori Plant - 1949).



2000 KW bicylindrical extraction and condensation turbine - 5944/1500 rpm.
(CARTIERA ITALIANA - Serravalle Sesia 1953)

1000 KW monocylindrical extraction and condensation turbine - 7300/1500 rpm
(NGOYE PAPER MILLS LTD - Durban - 1955).



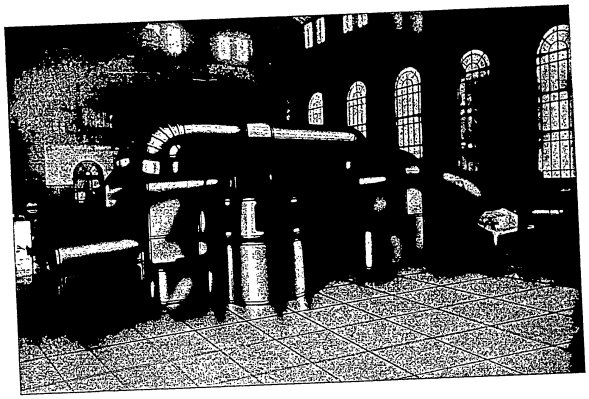
TURBINE A CONDENSAZIONE

Cliente	impianto	matr. n.°	potenza kW	velocità giri 1'	vapore ammissione ate °C
Manifattura Festi & Rasini	Villa d'Ogna	1	450	3000	11/250
Filatura Cascami di Seta	Novara	2	400	2400	12/300
Deutsche Ueberseeische El.G.	Buenos Aires	3	4000	1500	12/300
Deutsche Ueberseeische El.G.	Buenos Aires	4	4000	1500	12/300
Soc. Lomb. Distr. Energ. Elettrica	Castellanza	5	5000	1000	12/270
Porta e C.	Brescia	6	680	2520	11/250
Soc. It. Utilizzaz. Forze Idr.		7	1200	1260	12/250-300
A. G. Elektrische Kraft	Balai	8	2200	1500	11,5/300
A. G. Elektrische Kraft	Balai	9	2200	1500	11,5/300
Società An. Trams	Cairo	10	1500	1500	9,5/300
Società An. Trams	Cairo	11	1500	1500	9,5/300
Soc. Lombarda D.E.E.		12	5000	1000	12/275
Municipio di Torino	Torino	13	750	3000	12/280
Municipio di Torino	Torino	14	750	3000	12/280
Soc. Alti Forni e Fond.	Piombino	15	1100	1500	9/200
Soc. Alti Forni e Fond.	Piombino	16	1100	1500	9/200
Soc. An. Tramways	Cairo	17	1500	1500	9,5/300
Soc. An. Cucirini Cantoni Coats	Legnano	18	1600	1500	12/300
Deutsche Ueberseeische El.G.	Buenos Aires	19	3750	1500	12/300
Soc. Elettrica Bresciana		20	1800	1260	11/250
Ditta Alberto De Bary e C.	Buenos Aires	21	350	3000	10/350
Deutsche Ueberseeische El.G.	Buenos Aires	22	7500	750	12/300
Deutsche Ueberseeische El.G.	Buenos Aires	23	7500	750	12/300
Deutsche Ueberseeische El.G.	Buenos Aires	24	7500	750	12/300
Soc. Napoletana p. Imp. Elettriche		25	3000	1260	12/250-260
Soc. Lombarda D.E.E.		26	2500	1500	12/275
Soc. Lombarda D.E.E.		27	2500	1500	12/275
Soc. Tramvay Napoletani		28	3000	1500	9,5/260
Soc. Utilizz. Forze Idrauliche del Veneto		29	3000	1260	12/250-280
Soc. Adriatica di Elettricità	Padova	30	1800	1260	12/280
Soc. Napoletana Impr. Elettriche		31	2000	1260	12/260
Municipio di Torino		32	3100	1500	12/275
Municipio di Torino		33	3100	1500	12/275
Carbonifera Italiana	Cardiff	35	750	3000	9,5/275
Soc. Italo Svizzera	Genova	36	500	3000	9/250
Soc. Mineraria Valdarno		37	1500/2000	1500	12/280
Soc. Mineraria Valdarno		38	1500/2000	1500	12/280
Soc. Lombarda D.E.E.		39	3000	1500	12/280

cliente	impianto	matr. n.°	potenza kW	velocità giri 1'	vapore ammissione ate °C
Michelin e C.	Clermont Ferrand	40	1720	1500	12/300
Esposiz. Bruxelles - Soc. Edison		41	3000	1260	12/250
Consorzio Chiappella	Porto Genova	42	300	3000	10/275
Municipio di Roma		43	3000	1500	14/300
Municipio di Milano		44	6000	1260	11,5/250
Soc. Elettr. Riviera di Ponente		57	7800/10000	1000	12/300
Michelin e C.	Clermont Ferrand	59	1750	1500	10/300
Soc. Friulana di Elettricità	Udine	60	350	3000	9/300
Gaetano Marzotto e C.	Valdagno	61	350	2280	7/280
Soc. Mineraria	Monteponi	62	540	3000	12/300
Borsalino Giuseppe e F.llo	Alessandria	65	200	3000	13/275
Soc. Boracifera	Larderello	68	250	3000	10,10/180
Soc. Adriatica di Elettricità	Ravenna	72	1000	3000	12/300
Soc. Elettr. Sarda - Livorno	Cagliari	73	1000	3000	11,5/300
Rossari e Varzi - Galliate	Ivrea	86	750	3000	12/300
National Radiator	Berlino W.	198	50	3000	10/290
Soc. An. Imprese Idrauliche	Porto Vesme	199	3000	3000	12/300
Soc. An. Imprese Idrauliche	Porto Vesme	200	3000	3000	12/300
Soc. Elettrica Riviera di Ponente		201	7800/10000	1000	12/300
Comp. Italo Argentina - Milano	Buenos Aires	203	5000	1500	13/325
Municipio di Roma	Roma	211	3000	2700	14/300
Soc. Boracifera	Larderello	221	2500	3000	1/35
Soc. Boracifera	Larderello	222	2500	3000	1/35
Soc. Boracifera	Larderello	223	2500	3000	1/35
Soc. Ligure Toscana	Livorno	78	4000	3000	11,5/300
Soc. Dinamite Nobel	Avigliana	463	1100	3000	12/310
Soc. An. Torbiere d'Italia	Roma	797	5000	1000	18/325
Soc. An. Torbiere d'Italia	Roma	798	5000	1000	18/325
Soc. An. Torbiere d'Italia	Roma	799	5000	1000	18/325
Azienda Elettrica Municipale	Roma	800	6000	2760	14/300
Soc. It. Edison Elettricità	Milano	801	10000	2520	16,5/325
Soc. It. Edison Elettricità	Milano	802	10000	2520	16,5/325
Soc. Lombarda Distrib. Energia Elettrica	Milano	803	10000	3000	12/280
Cotonificio Wild e C. - Torino	Novara	812	1500	2520	12/300
Ministerio Obras Publicas	Buenos Aires	819	4000	3000	16,5/350
Ministerio Obras Publicas	Buenos Aires	820	4000	3000	16,5/350
Ministerio Obras Publicas	Buenos Aires	821	4000	3000	16,5/350
Soc. Gen. Elettrica Sicilia	Catania	822	6000	3000	13/300
Soc. An. Fabbr. Cemento Portland	Sucurac (Spalato)	828	1200	3000	12/275

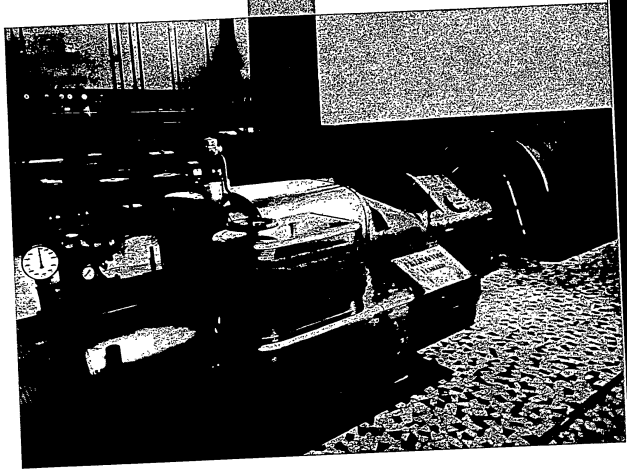
cliente	impianto	matr. n.°	potenza kW	velocità giri 1'	vapore ammissione ate °C
Municipalità della Città di	Zamosc (Polonia)	863	500	3000	12/300
Comp. Italo Argentina Elettricità	Buenos Aires	911	20000	1500	14/325
Soc. Elettr. Bresciana	Brescia	945	4800	2520	18/325
Soc. Elettr. Bresciana	Brescia	946	4800	2520	18/325
Soc. Lombarda Distr. Energia Elettrica	Castellanza	947	10000	3000	12/280
Az. Elettr. Municipale	Milano	948	10000	2520	24/350
Soc. Gen. Elettrica Sicilia	Catania	961	9000	3000	24/350
Soc. An. Elettricità e Gas	Roma	964	10000	2700/2750	12/280
Soc. An. Elettricità e Gas	Roma	965	10000	2700/2750	12/280
Soc. Adriatica Elettricità	Venezia	966	15400	2520	25/375
Soc. Adriatica Elettricità	Venezia	967	15400	2520	25/375
Soc. Unione Utenti Conti	Monza	971	3000	2520	12/300
Soc. Unione Utenti Conti	Monza	972	3000	2520	12/300
Soc. Elettricità e Gas	Roma	981	10000	2700/2750	12,5/280
Soc. Idroelettrica Piemonte	Turbigo	982	25000	1500	26/375
Azienda Elettrica Municipale	Milano	984	10000	2520	24/350
Off. Elettriche Genovesi	Sampierdarena	991	12500	3000	24/350
Soc. Elettrica Sarda	Cagliari	993	6000	3000	26/375
Soc. des Usines du Laurium	Atene	1083	1000	3000	14/325
Todorovits Schlick e C.	Belgrado	1128	1200	10200/1000	12/325
Az. Serv. Pubblici Municipalizzati	Fiume	1129	2700	2520	11/300
Soc. It. Utilizzazione Forze Idrauliche	Venezia	1186	26500	2520	25/375
Az. Servizi Pubblici Municipalizzati	Fiume	1258	4000	2520	11/300
Soc. An. E. Marelli - Milano	S. Barbaro	1260	150	9968/1500	22/375
Rappresent. in Italia per comm. est. URSS	Cererowsk	1306	2500	3000	17/350
Azienda Elettrica Bengasina	Bengasi	1346	1500	3000	16/400
Azienda Elettrica Bengasina	Bengasi	1347	1500	3000	16/400
Lanificio di	Manerbio	1482	750	1260	31/400
Rappresent. per il commercio est. URSS	Kondopoga	1495	4000	3000	28/400
Soc. It. del Litopone		1632	200	10000/1500	36/425
Soc. Boracifera Larderello	Larderello	1650	250	3000	
Soc. An. Cementi ed Affini	Monopoli	1651	700	5300/1350	18/325
Oleificio Ligure Pugliese	Bari	1656	200	1000/1350	18/375
Oleificio Ligure Pugliese	Bari	1657	200	10000/1350	18/375
Eridania Zuccher. Nazionali	Sampierdarena	1479	440	6000/1500	15/325
Eridania Zuccher. Nazionali	Sampierdarena	1480	440	6000/1500	15/325
Lanificio di	Manerbio	1682	1000	9000/1260	31/400
Soc. Gen. Elettr. Sicilia - Milano		1784	6000	3000	26/350
S. A. Dott. Calvi & C. - Milano	Rogoredo	1788	40	14000/1260	22/325
Soc. An. Ilva - Genova	Servola	1866	1850	4650	10/250

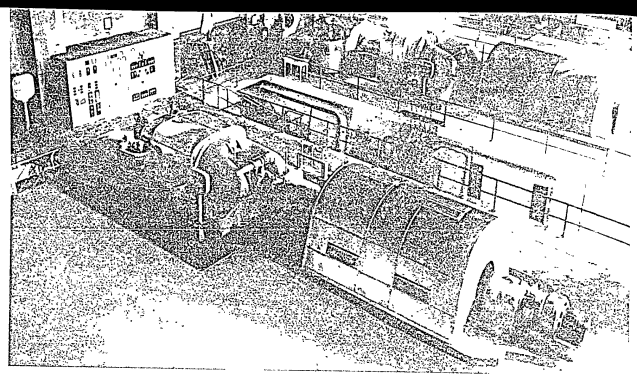
Cliente	impianto	matr. n.°	potenza kW	velocità giri 1'	vapore ammissione ate °C
Soc. An. Ilva - Genova	Bagnoli	1861	**2200**	**4750**	**28/380**
Soc. An. Ilva - Genova	Bagnoli	1862	**2200**	**4750**	**28/380**
Soc. An. Ilva - Genova	Bagnoli	1863	**4500**	**2700**	**28/380**
Soc. An. Ilva - Genova	Bagnoli	1864	**4500**	**2700**	**28/380**
Soc. An. Ilva - Genova	Bagnoli	1835	**4500**	**2700**	**28/380**
Soc. Montecatini	S. Giuseppe di Cairo	1869	**6000**	**3000**	**35/425**
Soc. Montecatini	S. Giuseppe di Cairo	1870	**130**	**5990/1460**	**35/425**
Soc. Boracifera	Larderello	1927	**10000**	**3000**	**1**
Soc. Boracifera	Larderello	1928	**10000**	**3000**	**1**
Soc. Boracifera	Larderello	1929	**10000**	**3000**	**1**
Soc. Boracifera	Larderello	1930	**10000**	**3000**	**1**
Soc. di Monteponi - Torino	Porto Vesme	2153	**3500/4000**	**3000**	**32/400**
S.A.F.F.A. - Milano	Ponte Nuovo di Magenta	2154	**350/450**	**7966/1260**	**22,5/350**
Soc. An. Ilva - Genova	Portoferraio	2155	**1850**	**4650**	**8/280**
G. F. Dell'Acqua e C. - Cerro M.	Arluno	2165	**250**	**12987/1500**	**32/400**
Soc. Elettr. Sarda - Roma	S. Caterina	2174	**9000/12500**	**3000**	**37/400**
Soc. Elettr. Sarda - Roma	S. Caterina	2175	**9000/12500**	**3000**	**37/400**
Montecatini Acna	Cesano Maderno	2194	**1600**	**4762/1500**	**32/400**
Giuseppe Borsalino e F.lio	Alessandria	2199	**350**	**6658/3000**	**40/425**
Vetrocoke - Milano	Mestre	2251	**5500/7000**	**2520**	**36/400**
Az. It. Petroli Albania	Devoli	2259	**1600/1500**	**4762**	**28/380**
Feder. Naz. Consorzi per la Vitic. - Roma	Ciampino	2265	**150**	**12916/1350**	**13/325**
Feder. Naz. Consorzi per la Vitic. - Roma	Bolzano	2266	**150**	**12987/1500**	**13/325**
Soc. Adriatica Elett. - Venezia	Tripoli	2292	**3200/4000**	**3000**	**26/375**
Soc. Boracifera	Larderello	2365	**10000/12000**	**3000**	**1**
Soc. Gen. Sicilia - Palermo	Catania	2368	**12000**	**3000**	**25/350**
Ilva - Alti Forni d'Italia	Piombino	2369	**2800/3760**	**4900/6000**	**34/450**
Ilva - Alti Forni d'Italia	Piombino	2370	**2800/3760**	**4900/6000**	**34/450**
Ilva - Alti Forni d'Italia	Piombino	2371	**2800/3760**	**4900/6000**	**34/450**
Soc. Boracifera	Larderello	2372	**10000/12000**	**3000**	**1**
Soc. Boracifera	Larderello	2373	**10000/12000**	**3000**	**1**
Soc. Boracifera	Larderello	2374	**10000/12000**	**3000**	**1**
Soc. Boracifera	Larderello	2375	**10000/12000**	**3000**	**1**
Soc. Boracifera	Larderello	2376	**10000/12000**	**3000**	**1**
Soc. Boracifera	Larderello	2377	**10000/12000**	**3000**	**1**
Soc. Romana Elettricità	Roma	2378	**16000/20000**	**2700**	**40/400**
Az. Governat. Elettr. ed Acque	Roma	2389	**16000/20000**	**2700**	**40/400**
Acciaierie Ferr. Lombarde Falck	Sesto S. Giovanni	2390	**7400**		**40/400**
Soc. An. Vetrocoke - Milano	Mestre	2391	**5500/7000**	**2520**	**36/400**

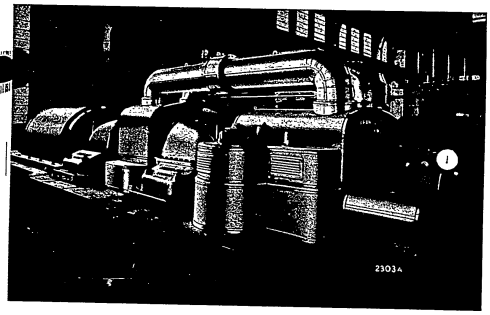


26.000 KW bicylindrical condensation turbine (SOCIETA' VIZZOLA - Castellanza - 1950).

2500 KW condensation turbine with reduction gear - 5686/1260 rpm (LANIFICIO MARZOTTO - Maglio di Sopra plant - 1952).



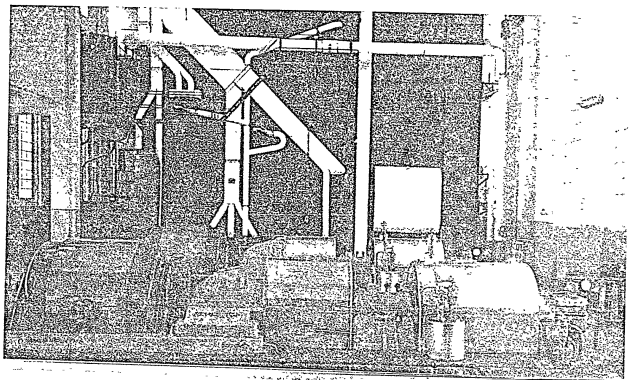




In the forefront: 11000 monocylindrical condensation turbine - 3000 rpm
In the background 26.000 KW bicylindrical condensation turbine (SOCIETA' VIZZOLA - Castellanza - 1950).

33.000 KW condensation turbine - 3.000 rpm.
(SOCIETA' TERMOELETTRICA VENETA - Marghera - 1951)

Two 5000 KW condensation turbines - 3000 rpm
(SOCIETA' ITALCEMENTI - Villa di Serio Plant - 1950).



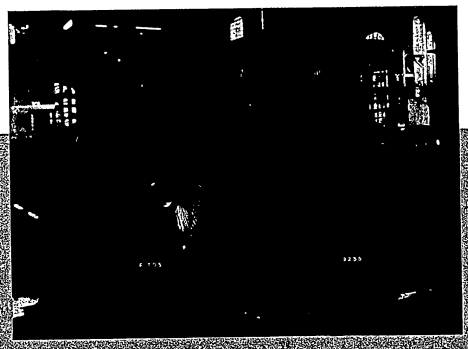
cliente	impianto	matr. n.°	potenza kW	velocità giri/1'	vapore ammissione ate/°C
Az. Governat. Elettr. Acque	Roma	2401	3000/3250	2700	40/400
Soc. An. Gas y Elettricidad	Palma di Maiorca	2406	5000/6000	3000	14/340
Soc. Boracifera	Larderello	2799	22000/26000	3000	3,8/s.
Soc. Boracifera	Larderello	3000	22000/26000	3000	3,8/s.
Soc. Boracifera	Larderello	3001	22000/26000	3000	3,8/s.
Soc. Boracifera	Larderello	3002	22000/26000	3000	3,8/s.
Soc. Boracifera	Larderello	3487	10000/12000	3000	1/s.s.
Vetreria di	Vernate	3506	90/110	15041/1500	22/325
Ilva - Alti Forni Acc. d'Italia	Piombino	3522	2940/3930	4000/4500	34/450
Ilva - Alti Forni Acc. d'Italia	Piombino	3523	2940/3930	4000/4500	34/450
Soc. Boracifera	Larderello	3527	10000/12000	3000	1/s.s.
Vizzola	Castellanza	3530	10000	3000	27/375
Vizzola	Castellanza	3531	10000	3000	27/375
Soc. An. Larderello	Larderello	3533	1000	4500	3,75/185
Centrale Electrica del Estado	Mar del Plata	3534	5000	3000	45/460
Centrale Electrica del Estado	Mar del Plata	3535	5000	3000	45/460
Centrale Electrica del Estado	Mar del Plata	3536	10000	3000	45/460
Ilva - Genova	Bagnoli	3550	2220/2430	4000/4150	28/380
Centr. Zaopatrzenia Hutniczego	Katowice	3551	2250/2550	4000/4200	12/325
Centr. Zaopatrzenia Hutniczego	Katowice	3552	2250/2550	4000/4200	12/325
Manifattura Lane Marzotto	Manerbio	3777	650/750	7114/1260	31/400
Soc. Romana Elettricità	Roma	3790	10000/12500	3000	40/400
Transport Engineering Co.	Edfu	3792	5000/6000	3000	30/360
Transport Engineering Co.	Edfu	3793	480/600	6300/1500	30/360
Transport Engineering Co.	Edfu	3794	480/600	6300/1500	30/360
S.p.A. Ing. Olivetti	Ivrea	3797	1500	6630/1500	12/325
Vizzola - Milano	Castellanza	3799	20000/26000	3000	33/420
Soc. Monteponi - Torino	Portovesme	3807	10000/12000	3000	34/410
Italcementi - Bergamo	Villa di Serio	3809	4200/5000	3000	46/425
Italcementi - Bergamo	Villa di Serio	3810	4200/5000	3000	46/425
Italcementi - Bergamo	Monopoli	3812	2100/2500	3000	32/375
Italcementi - Bergamo	Genova	3814	2100/2500	3000	16/400
Soc. Termoelettrica Veneta	Marghera	3818	30000/33000	3000	36/420
Oesterreichische Draukraftwerke	S. Andrea	3827	6000/7500	3000	36/450
Vizzola	Castellanza	3834	10000/11000	3000	33/420
Vizzola	Castellanza	3835	10000/11000	3000	33/420
Entreprise Commerciale D'Etat Metalimp.	Andree	3836	4000/5000	3000	15/400
S.N.I.A.F.A.	Platanos	3842	900/1200	6610/3750	38/430

Cliente	impianto	matr. n.°	potenza kW	velocità giri 1'	vapore ammissione ate C
S.N.I.A.F.A.	Platanos	3843	900/1200	6610/3750	38/430
Manifattura Lane G. Marzotto	Maglio di Sopra	3849	2100/2500	5686/1260	34/420
Termoelektro - Belgrado	Benovici	3860	4000/5000	3000	29/360
Termoelettrica Veneta	Marghera	3885	30000/33000	3000	36/420
Admin. Generale de l'Elect. et Tramways	Damas	3887	4000/5000	3000	39/410
Admin. Generale de l'Elect. et Tramways	Damas	3888	4000/5000	3000	39/410
Termoelettrica Veneta	Marghera	3895	20000/24000	3000	36/420
Italcementi - Bergamo	Trieste	4008	2500/2750	3000	26/390
Italcementi - Bergamo	Monopoli	4009	2500/2750	3000	32/375
Termoelettrica Veneta	Marghera	4017	70000	3000	60/482
S.p.A. Larderello	Serrazzano	4022	12500	3000	1
S.p.A. Larderello	Serrazzano	4023	12500	3000	1
S.p.A. Larderello	Serrazzano	4024	3500	3000	1
Italcementi - Bergamo	Genova	4025	2100/2500	3000	16/400
Italcementi - Bergamo	Genova	4025	2100/2500	3000	16/400
Italcementi - Bergamo	Villa di Serio	4026	9000/11000	3000	46/425
Ethiopian Electric Light & Power	Dessiè	4037	240/300	5075/1500	17/360
S.p.A. A.G.I.P. Mineraria	Cortemaggiore	4041		4900/5300	Turbopomp.
Soc. Romana di Elettricità	Roma	4042	11000/12500	3000	40/400
Direccion de Electricidad y Mecanica - Buenos Aires	Bahia Blanca	4063	20000/25000	3000	42/440
Ilva - Genova	Piombino	4067	2940/3930	4900/6000	34/450
Elektroprojekt di Sarajevo	Bor Rtany	4070	11000/12500	3000	35/425
S.A. Shaikh Sir Abdulla Al Salim, Principe del Kuwait	Kuwait « B »	4075	8000/10000	3000	28/425
S.A. Shaikh Sir Abdulla Al Salim, Principe del Kuwait	Kuwait « B »	4076	8000/1000	3000	28/425
S.A. Shaikh Sir Abdulla Al Salim, Principe del Kuwait	Kuwait « B »	4077	8000/10000	3000	28/425
S.A. Shaikh Sir Abdulla Al Salim, Principe del Kuwait	Kuwait « B »	4078	8000/10000	3000	28/425
Corp. Venezuelana de Fomento	Puerto Cabello	4093	30000/33000	3600	60/482
Corp. Venezuelana de Fomento	Puerto Cabello	4094	30000/33000	3600	60/482
Corp. Venezuelana de Fomento	Puerto Cabello	4095	30000/33000	3600	60/482
Cartificio Ermolli	Moggio Udinese	4102	600/750	7200/1500	33/380
T.I.F.E.O.	Augusta	4103	66000/70000	3000	102/538
T.I.F.E.O.	Augusta	4104	66000/70000	3000	102/538
Gov. Petrol. Refinery	Suez	4112	4000/5000	3000	42/440
Gov. Petrol. Refinery	Suez	4113	4000/5000	3000	42/440
Gov. Petrol. Refinery	Suez	4114	500/600	7200/1500	42/440
Gov. Petrol. Refinery	Suez	4115	500/600	7200/1500	42/440

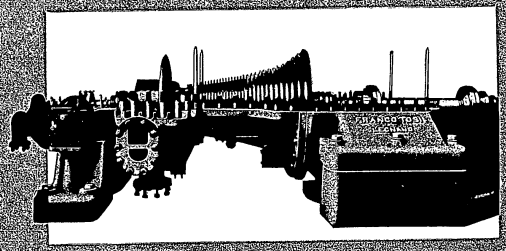
TURBINE A CONTROPRESSIONE

Cliente	impianto	matr. n.	potenza kW	velocità giri 1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Zucch. Distill. Alcools Gulinelli	Ferrara	58	500	3000	12/270	2,5
Gillet et Fils	Como	63	350	3000	13/300	4
G. B. Borsalino fu Lazzaro	Alessandria	64	330	2520	12/300	3
Soc. Utilizz. Combust. Italiani	Milano	66	250	3000	12/300	1,5
Soc. Utilizz. Combust. Italiani	Milano	67	250	3000	12/300	1,5
Soc. Ligure Lomb. Raff. Zucch.	Genova	87	400	3000	15/300	4
Soc. Ligure Lomb. Raff. Zucch.	Genova	88	400	3000	15/300	4
G. Gagarelli e C. Milano		202	250	3000	15/300	2,25
Compagnia Italo Argentina	Buenos Aires	204	120	3200	Turbopompa	
Compagnia Italo Argentina	Buenos Aires	205	120	3200	Turbopompa	
Ferrovie dello Stato	Chiappella-Genova	206	120	3200	Turbopompa	
Soc. Agric. Ind. Lamone	Mezzano	279	750	3000	12/275	1,5
Soc. An. Off. Elett. Genovesi	Genova	416	100	3200	Turbopompa	
Soc. Dinamite Nobel		464	550	3000	12/310	2
Tintoria Comense	Como	783	500	3600/750	14/300	4
Soc. Ligure Lomb. Raff. Zucch.	Genova	792	220	3500/750	15/300	3
Cotonificio Cantoni	Legnano	794	420	3440/750	14/300	2,5
Soc. Antonio Bernocchi	Legnano	795	280	3000	17/300	4,5
Soc. Ligure Lomb. Raff. Zucch.	Sampierdarena	796	400	3000	15/300	4
Lanificio di Manerbio		804	260	2520	12/300	2, 5 a 3
Soc. An. Distillerie Italiane	Milano	805	700	2520	12/300	1
Soc. Seta Artificiale di	Padova	807	170	3500/880	15/320	5 a 2
Soc. Seta Artificiale di	Padova	808	170	3500/880	15/320	5 a 2
Cotonificio Cantoni	Legnano	809	900	3000	15/325	2
Coton. Ligure Soc. An. - Milano	Rossiglione	811	510	3380/500	12/300	2
Gaetano Marzotto e Figli	Mortara	814	430	3390/840	13/350	2
Cotonificio F.lli Dell'Acqua	Legnano	815	350	3440/1000	9/250	2
Comp. Generale di Elettricità	Milano	817	400	3390/840	14/300	2,5
Lanificio Rossi - Milano	Rocchette	823	350	3440/1000	14/300	4
Soc. An. Distillerie Italiane	Zucch. Jolanda	826	700	2520	14/300	2
Soc. An. Distillerie Italiane	Zucch. Jolanda	827	700	2520	14/300	2
Unione It. Fabbriche Viscosa	Venaria Reale	829	400	4200/1000	14/300	3,5
Soc. Saccarifera Lombarda	Polesella	830	700	2520	12/300	1
Soc. Torbiere d'Italia	Roma	831	1200	3000	18,5/325	1
Soc. Distill. Italiane	Sesto S. Giovanni	866	300	2520	15/300	4

committente	impianto	matr. n.	potenza kW	velocità giri/1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Soc. An. It. La Soie de Chatillon	Ivrea	868	300	3000	13/300	2
Soc. An. It. La Soie de Chatillon	Ivrea	869	300	3000	13/300	2
Cartiera di Verzuolo	Verzuolo	870	1100	3000	13/300	2
Lanificio Rossi	Schio	871	280	5800/840	14/325	2,5
Imprese Elett. America Latina	Lima (Perù)	912	130	5500	Turbopompa	
Imprese Elett. America Latina	Lima (Perù)	913	130	5500	Turbopompa	
Soc. Naz. Ind. Applicaz. Viscosa	Pavia	918	400	5250/630	16/325	4
Soc. Ligure Toscana Elettricità	Livorno	922	180	5500	Turbopompa	
Imprese Elett. America Latina		957	180	5500	Turbopompa	
Industrias Reunidas Matarazzo	S. Paulo (Brasile)	959	240	5600/900	12/300	4
Industrias Reunidas Matarazzo	S. Paulo (Bresile)	960	240	5600/900	17/300	4
E. e P. Gavazzi - Milano	Desio	962	260	5800/840	13/280	3
Soc. Seterie Stampate	Portichetto	963	300	6000/1000	18/300	3
Soc. Adriatica Elettricità	Venezia	970	295	3200	Turbopompa	
Soc. Idroelettrica Piemonte	Turbigo	983	310	4200	Turbopompa	
Borsalino Giuseppe e Fr.	Alessandria	935	1100	3000	35/375	2,5
Soc. An. Bernocchi	Legnano	986	850	5670/750	26/360	4
Soc. Elettrica Sarda	Cagliari	994		4200	Turbopompa	
Fabbr. Cappelli di feltro Vanzina	Pavia	1046	50	9950/840	23/350	3
Cotonificio Venzaghi	Busto Arsizio	1110	175	6000/1000	17/350	4
Soc. An. Ambrogio Paleari	Monza	1112	430	4400/840	12/300	3,5
Soc. An. Ledoga	Milano	1167	210	6000/1000	9,5/273	1,5
Soc. An. Ledoga	Milano	1167	210	6000/1000	9,5/273	1,5
Soc. An. Orsi Mangelli	Forlì	1181	120	1200/840	14/325	4
Soc. An. Orsi Mangelli	Forlì	1182	120	1200/840	14/325	4
Ditta Anselmo Giletti	Ponzone	1183	120	9950/840	22/350	3
Soc. Meridionale Elettricità	Napoli	1184		5000	24/400	Turbopom.
Soc. An. Cartiera Rossi	Vicenza	1185	450	6000/840	28/375	3
Soc. Ligure Lombarda	Genova	1187	525	2520	14/300	2,5
Soc. Ligure Lombarda	Genova	1188	525	2520	14/300	2,5
Soc. An. Saccarifera Lombarda	Jolanda	1189	700	2520	14/300	2
Soc. An. Saccarifera Lombarda	Molinella	1190	700	2520	14/300	2
Sig. Bertuletti e C.	Buenos Aires	1191	25	5000/1000	Turboventilat.	
Sig. Bertuletti e C.	Buenos Aires	1194	25	5000/1000	Turboventilat.	
Distillerie Italiane	Pontelagoscuro	1224	150	9860/1260	23/375	4
Soc. It. Utilizz. Forze Idrauliche	Venezia	1255	295	5500	Turbopompa	
Soc. Gen. de Sucreries	Spinetta Marengo	1256	200	5911/840	13/s.s.	0,8

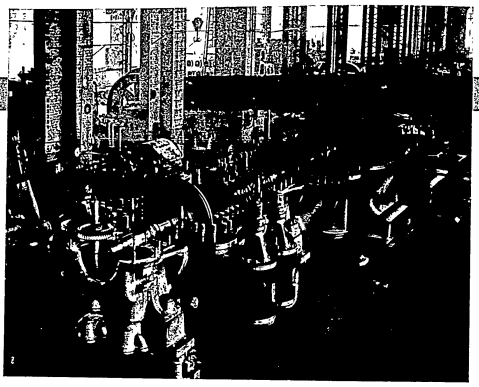


24.000 kW condensation turbine rotor
(SOC. ANSALDO - 1946)

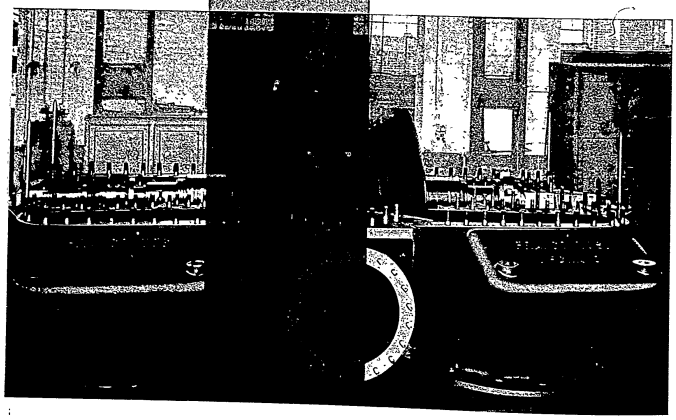


Condensation turbine under assembly
(SOC. ILVA - Piombino - 1947)

30.000 kW condensation turbine under assembly - 1926.



12.000 kW condensation turbine under assembly - (SOC. LARDERELLO) - 1937.



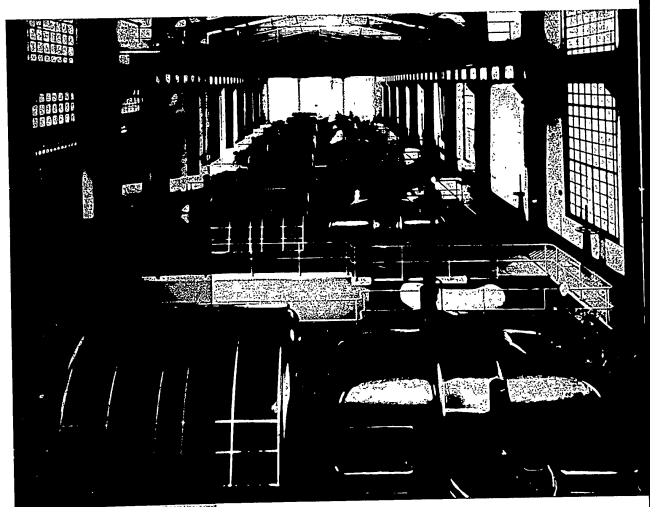
cliente	impianto	matr. n.	potenza kW	velocità giri 1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Tintoria It. B. Pessina	Como	1257	250	9968/1500	23/375	3
Cartiera E. Boimond	Sora	1259	130	9968/1500	22/350	2
Soc. Ac. Lanificio Rossi	Milano	1261	500	6000/1260	23/375	2,5
Minis. Comunic. Ferrovie Stato	Milano	1262	90	5500	Turbopompa	
Minis. Comunic. Ferrovie Stato	Milano	1263	90	5500	Turbopompa	
Soc. An. Supertessile	Rieti	1264	1000	6045/1500	28/385	3
Istituto Chimico Farmaceutico	Firenze	1277	75	10200/1000	23/375	4
Istituto Chimico Farmaceutico	Firenze	1278	125	10200/1000	23/375	4
Raffineria It. Olii	Imperia	1296	150	9968/1500	18/350	2
Zuccherificio di	Sermide	1305	1400	3000	12,5	2
Soc. An. Mira Lanza	Genova	1307	350	6000/1500	28/375	3,5
Soc. An. Mira Lanza	Genova	1308	175	9968/1500	28/375	3,5
Soc. An. Mira Lanza	Genova	1309	175	9968/1500	28/375	3,5
Eridania Zuccherif. Nazionali	Codigoro	1313	900-1200	3000	15/320	2,5
Tomaso Moro e Figli	Genova	1315	140	9968/1500	17/350	3
Eridania Zuccherif. Nazionali	Codigoro	1314	900-1200	3000	15/320	2,5
Soc. An. Wild e C.	Torino	1316	350	6000/1260	28/375	4
Rappresentante in Italia Commercio Estero dell'URSS	Katta Kurgana	1323	130	5500/1500	19/350	2
Ditta Motta	Milano	1324	27	9973/1260	12/300	2
Ditta P. Garavaglia e C.	Busto Arsizio	1339	80	9968/1500	26/325	2
Rappresentante in Italia Commercio Estero dell'URSS	Gruscinsky	1345	1200-1500	3000	20/350	2
Rappresentante in Italia Commercio Estero dell'URSS	Erzielsky	1352	2000 -	3000	20/370	2
Ing. Aldo Gini	Milano	1397	90	9973/1260	16/300	4
Soc. Petrolifera Italiana	Fornovo Taro	1412	60	9973/1260	20/325	1,5
Soc. It. Industria Zuccheri	Granaiolo	1415	300	6000/1500	15,5/280	3
Cotonificio Pietro Bellora	Gallarate	1417	550/600	6000/1500	23/375	2
Jutificio Agostino Notari	Milano	1432	85	14000/1260	20/350	4
Cartiera Isidoro Cima	Lecco	1433	75	14000/1260	13-15/300	1,5
Eridania Zuccher. Nazionali	Genova	1452	1600	3000	15/325	0,7
L'Appula Soc. Ind. Chimica Ital.	Milano	1453	1100	2520	13,5/330	2,5
Cart. Prealpine Antonio Sterzi	Intra	1454	170	9973/1260	27,5/375	2,5
Eridania Zuccher. Nazionali	Forlì	1477	1350	3000	15/320	2,5
Eridania Zuccher. Nazionali	Forlì	1478	1350	3000	15/320	2,5
Soc. An. Industria Olii	Monza	1481	25	14000/1260	6/300	1,5
Soc. It. Industria Zuccheri	Granaiolo	1490	300	6000/1500	15,5/280	3

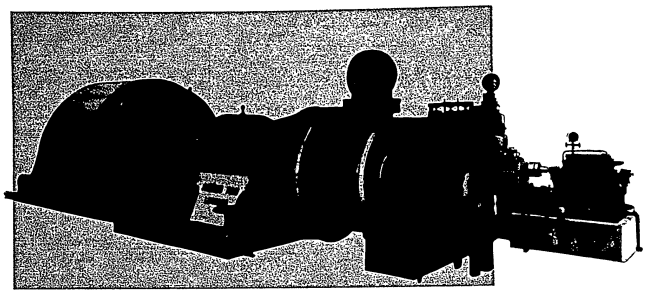
cliente	impianto	matr. n.	potenza kW	velocità giri 1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Soc. It. Industria Zuccheri	Cesena	1491	350/400	6000/1500	15,5/280	3
Soc. It. Industria Zuccheri	Cesena	1492	350/400	6000/1500	15,5/280	3
Soc. An. Cartonificio Samec	Vedano Olona	1494	42	14000/1500	13/325	1,5
Giacomo Costa fu Andrea	Genova	1499	200	10000/1350	23/375	4,5
Giacomo Costa fu Andrea	Genova	1500	100	14000/1350	23/375	4,5
Commisariat du Peuple Sindacat						
Central Maschinoimport Moscan	Verschnie Udinsk	1509	3000	3000	28/400	9
Soc. An. Marca Aeroplano	Milano	1510	55	14000/1260	22/300	3,5
A. Pellizzari e Figli - Arzignano	Sesto S. Giovanni	1619	100	6000	15/260	3
Giuseppe Borsalino e F.llo	Alessandria	1620	600/750	8780/3000	40/420	2
Soc. It. Litopone - Milano	Livorno	1621	450/530	450/530	8957/1500	5
Soc. It. Litopone - Milano	Livorno	1622	450/530	8957/1500	36/425	5
S.A.F.F.A. - Milano	Ponte Nuovo (Magenta)	1627	350	6000/1260	22,5/375	4
Bycla S. A. Limitata	Buenos Aires	1630	120	10000/1500	20/340	3
Soc. It. Litopone - Milano		1649	30	5700	Turbopompa	
Ist. Naz. Previd. Sociale - Roma	Forlì	1652	100	14000/1260	18/325	3,25
Ist. Naz. Previd. Sociale - Roma	Forlì	1653	35	14000/1260	18/325	3,25
Distillerie Agricole - Bologna	Tresigallo	1654	185	10000/1260	15/250	0,85
Distillerie Italiane - Milano	Pontelagoscuro	1655	250	10000,1260	22/300	1,5
Lanificio Marzotto	Brugherio	1658	500	7800/1260	36/425	1,5
Soc. An. Cotonificio Cantoni	Legnano	1661	3000	3000	35/400	2,5
Soc. It. Industria Zuccheri	Littoria	1691	500	9000/1350	20/350	44
Soc. It. Industria Zuccheri	Littoria	1692	800	9000/1350	20/350	3
Soc. An. Bernocchi	Legnano	1785	1500	6512/1500	25/400	2,5
Soc. An. Prodotti Alim. Arrigoni	Trieste	1787	150	9000/1500	12/275	2
Soc. Veneta Industr. Zuccheri	Cartura	1825	500	2520	21/360	3
Soc. It. Ind. Zuccheri - Genova	Rieti	1826	500/550	9000/1500	14/300	2,5
Distillerie Italiane - Milano	Casalmaggiore	1827	400/500	9000/1260	23/325	2
Giacomo Costa fu A. - Genova	Taranto	1843	270	8986/1350	23/375	4,5
Polverificio R. E. Liri	Pallerone	1844	650	8982/1260	27/375	1,5
Polverificio R. E. Liri	Pallerone	1845	250	13007/1260	27/375	1,5
Polverificio R. E. Liri	Villafranca	1846	650	8982/1260	27/375	1,5
Polverificio R. E. Liri	Villafranca	1847	250	13007/1260	27/375	1,5
Soc. Montecatini	Marghera	1848	2700	2520	36/425	4
Soc. Montecatini	Marghera	1849	2700	2520	36/425	4
Soc. An. Ind. Cellulosa - Napoli	Foggia	1852	1080	7939/1000	29/400	3
Soc. Gen. It. Viscosa - Roma	Roma	1853	1400	6404/1350	15/320	3,5

cliente	impianto	matr. n.	potenza kW	velocità giri 1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Soc. Gen. It. Viscosa - Roma	Roma	1854	1400	6404/1350	15/320	3,5
Ministero della Guerra	Casaralta	1855	65	13898/1260	16/310	2
Ministero della Guerra	Casaralta	1856	65	13898/1260	16/310	2
Eridania Zuccher. Nazionali	Sampierdarena	1859	1600	3000	15/325	0,7
Soc. Veneta Ind. Zuccheri	Cartura	1860	1000	2520	21/360	3
Soc. An. Distillerie di	Cavarzere	1867	1500	2520	21/360	3
Soc. An. Conserve Alim. Cirio	S. Giovanni a Teduccio	1868	100	14001/1350	25/350	4
Soc. It. Ind. Zuccheri	Rieti	2152	500/550	8957/1500	14/300	2,5
Soc. An. Supertessile	Rieti	2156	2000	5742/1500	28/380	3
Dinamite Nobel	Avigliana	2157	1290	7297/1500	33/400	5
Soc. An. Tintoria Pessina	Como	2161	450/500	8957/1500	18/350	4
L'Appula - Milano	Barletta	2162	240/300	8780/1260	14,5/350	2
Snia Viscosa - Milano	Torino Stura	2163	2650	5384/1500	29/380	5
Snia Viscosa - Milano	Torino Stura	2164	2650	5384/1500	29/380	5
Az. Naz. Idrogenaz. Combustib.	Livorno	2166	2400	5633/1500	36/430	5.5
Az. Naz. Idrogenaz. Combustib.	Livorno	2167	2400	5633/1500	36/430	5,5
Az. Naz. Idrogenaz. Combustib.	Livorno	2168	2400	5640/1350	35/430	5,5
Az. Naz. Idrogenaz. Combustib.	Livorno	2169	2400	5640/1350	36/430	5,5
« Chatillon » Soc. An. It. Fibre Tessili Artificiali	Chatillon	2170	350	8957/150	9,5/290	2,5
« Chatillon » Soc. An. It. Fibre Tessili Artificiali	Chatillon	2171	350	8957/1500	9,5/290	2,5
S. A. Conserve Aliment. Cirio	S. Giovanni a Teduccio	2172	100	14001/1350	25/350	4
Soc. An. Conceria Gilardini	Cengio	2173	100	13897/1500	27,5/350	3
Distill. Italiane - Milano	Savona	2176	250	12987 1500	23/330	6
Cart. Marsoni - Venezia	Villorba	2177	250	13007/1200	29/375	1,75
Cart. Burgo - Torino	Treviso	2178	465/665	8453/2250	13/320	1,5
Cart. Burgo - Torino	Romagnano Sesia	2179	550/735	8964/1260	29,5/400	1,7
Chatillon S. A. It. Fibre Tessili	Ivrea	2181	1850	6093/1500	30/400	2,5
Chatillon S. A. It. Fibre Tessili	Ivrea	2182	1850	6093/1500	30/400	2,5
L'Appula S.A. Ind. Chim. - Milano	Linate	2183	2000	5820/1260	36/400	2,5
S.A. Agricola Volturno - Napoli	Capua	2184	730	9041/1500	20/325	2
Marelli - Milano per A. Rizzo Irmaos e C.	Porto Alegre	2185	120	12987/1500	18/325	2
Soc. It. Ind. Zuccheri - Genova	Legnago	2195	2000	5823/1260	40/400	2
Soc. It. Ind. Zuccheri - Genova	Legnago	2196	2000	5823/1260	40/400	2
Snia Viscosa - Milano	Venaria Reale	2197	750	8958/1500	14/300	3,5
Giuseppe Borsalino e F.llo	Alessandria	2198	420	11025/3000	40/425	2,5

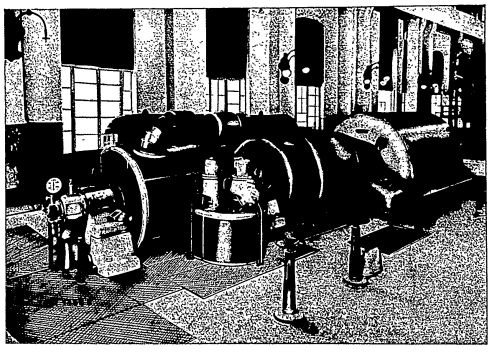
cliente	impianto	matr. n.	potenza kW	velocità giri/1'	condiz. vapore all'ammissione ate °C	condiz. vapore allo scarico ate
Vetrocoke - Milano	Mestre	2252	815/1030	7832/1260	35/400	5
S.A. Prodotti Alim. Arrigoni	Cesena	2253	450/500	10048/1500	29/375	5
S.A. Prodotti Alim. Arrigoni	Cesena	2254	450/500	10048/1500	29/375	5
Eridania - Zucch. Naz. Genova	Cavanella Po	2255	600/800	9065/1260	18/360	3
Eridania - Zucch. Naz. Genova	Cavanella Po	2256	600/800	9065/1260	18/360	3
Soc. An. Bonifiche di	Torre Zuino	2257	1000/1100	7832/1260	38/400	5
Soc. An. Bonifiche di	Torre Zuino	2268	1000/1100	7832/1260	38/400	5
Soc. It. Prod. Sintetici - Milano	Ferrara	2260	390	10863/1260	30/375	5,5
Soc. Gen. It. Viscosa - Roma	Padova	2261	420/500	9984/840	23/350	3
Ass. Naz. Idrogenaz. Combust.	Livorno	2262	2400	5633/1500	36/430	5,5
Soc. An. Iris - Cartiera di	Marzabotto	2263	120/150	13007/1260	27/350	2,5
Lanificio Marzotto - Valdagno	Pisa	2264	700/800	8923/1500	35/400	3,5
Saccarifera Lombarda - Milano	Jolanda di Savoia	2277	1100/1300	6514/1260	15/275	2
Soc. Italo-Americana Petrolio	S. Sabba	2278	200	12987/1500	15/260	2
Soc. It. Ind. Zuccheri - Genova	Mirandola	2279	400/500	9511/1500	18/350	3
S.A. Bombrini Parodi D. - Roma	Colleferro	2280	1000	7777/1350	37/380	7
S.A. Bombrini Parodi D. - Roma	Colleferro	2281	250	12916/1350	37/380	7
Distillerie Italiane - Milano	Sesto S. Giovanni	2282	400/500	10080/1260	31/375	3
La Papelera Argentina	Buenos Aires	2283	1750/2000	5602/1500	32/400	3
Soc. It. Aeroplani Idrovolanti Savoia Marchetti - Sesto Calende	Vergiate	2284	200/250	12987/1500	12/325	2
Cellulosa d'Italia « Celdit »	Chieti	2285	1080	7820/1500	32/400	3
Cellulosa d'Italia « Celdit »	Cuneo	2286	770/1000	775/1500	32/350	3
Consor. Prov. per la Olivicoltura di Messina	S. Agata Militello	2287	40	14976/1350	17/325	
Consor. Prov. per la Olivicoltura di Reggio Calabria	Locri	2288	60/75	14976/1350	17/325	3
Consor. Prov. per la Olivicoltura di Catanzaro	Catanzaro	2289	80/100	14976/1350	30/350	3
Soc. It. Ind. Zuccheri - Genova	Granaiolo	2294	900/1000	7762/1500	16/300	2,5
Soc. It. Prod. Sintetici - Milano	Villadossola	2356	150	13007/1260	30/375	5,5
Ass. Naz. Bieticoltori - Bologna	Tresigallo	2357	500/550	10018/1260	20/325	2
S. A. Promotrice Ind. Agricole	nel Maccarese	2358	400/500	10009/1350	22/350	2
Cartiera Vismara - Sesto S. Giov.	S. Cesario Modenese	2359	170/200	13007/1260	31/375	2
Cotonificio Venzaghi	Busto Arsizio	2360	300/375	11038/1500	31/375	1,75
Fed. Naz. Consorzi Viticoltura - Roma	Meldola	2366	150/180	13007/1260	31/365	0,7
Soc. Saccarifera Lomb. - Milano	Bondeno	2367	800/1000	7794/1260	18/380	3

Power station with seven condensation turbines of 12.000 KW each.
(SOCIETA' LARDERELLO - 1937).

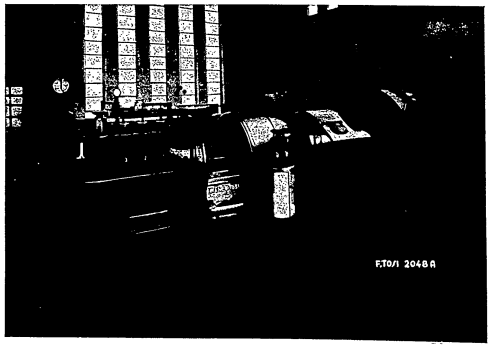




7400 KW condensation turbine 4000/3000/840 rpm. (SOCIETA' FALCK - Sesto San Giovanni Station - 1940).



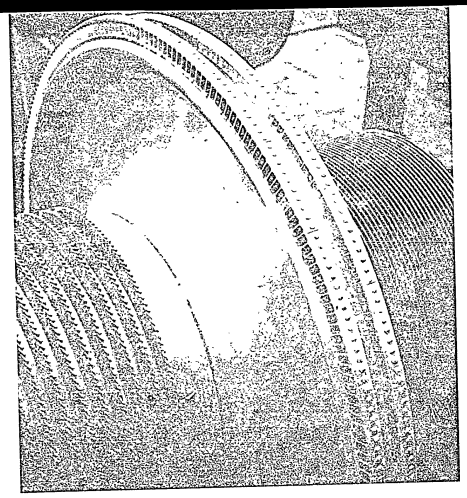
20.000 KW bicylindrical condensation turbine - 3000 rpm. (AZIENDA ELETTRICA GOVERNATORATO DI ROMA - 1943).



Extraction and condensation 2400 KW turbine - 5635/1500 rpm (SNIA VISCOSA - Cesano Maderno Station - 1943).

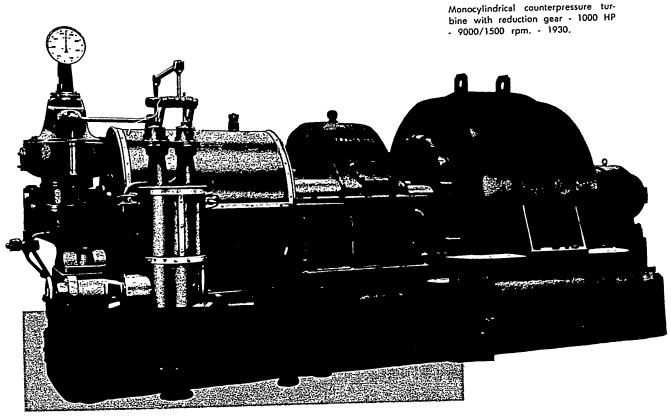
cliente	impianto	matr. n.	potenza kW	velocità giri/1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Eridania Zucch. Nazion. Genova	Pontelagoscuro	2379	200/250	12987/1500	18,5/325	3
Eridania Zucch. Nazion. Genova	Parma	2380	550/650	9058/1260	18,5/325	2,5
Eridania Zucch. Nazion. Genova	Cologna Veneta	2382	800/960	7794/1260	18,5/325	2,5
Eridania Zucch. Nazion. Genova	Cavanella Po	2385	800/960	7794/1260	18,5/325	2,5
Eridania Zucch. Nazion. Genova	Sarmato	2383	800/960	7794/1260	18,5/325	2,5
Eridania Zucch. Nazion. Genova	Sarmato	2384	800/960	7794/1260	18,5/325	2,5
Eridania Zucch. Nazion. Genova	Montagnana	2381	800/960	7794/1260	18,5/325	2,5
S. A. Saccarifera Lomb. - Milano	Bondeno	2386	800/1000	7794/1260	18/380	3
Cartificio Ermolli - Milano	Moggio Udinese	2387	250/270	13007/1260	33/375	2,5
Cotonificio Pozzi	Busto Arsizio	2388	200/250	12987/1500	31/375	2,5
Soc. An. E. Marelli e C. - Milano		2392	180/210	12987/1500	10/300	2
S. It. Produz. Gomma Sintetica	Ferrara	2393	1680/1830	5584/1260	45/400	4,5
Soc. An. Cokitalia - Milano	S. Giuseppe Cairo	2394	120/135	14415/1450	14/300	2
Cellulosa d'Italia Celdit - Roma	Capua	2395	900/1050	7796/1350	23/350	2
S.A. Bombrini Parodi D. - Roma	Colleferro	2396	400/450	9912/1350	33/380	5
S.A. Bombrini Parodi D. - Roma	Colleferro	2397	400/450	9912/1350	33/380	2
Comp. Ind. Sacc. Cissel - Roma	S. Eufemia Lamezia	2398	700/800	7777/1350	13/300	2
Comp. Ind. Sacc. Cissel - Roma	S. Eufemia Lamezia	2399	700/800	7777/1350	13/300	2
Soc. Gen. Esplosivi e Munizioni - Milano	Orbetello	2400	180/210	12916/1350	12/300	3
Soc. Romana Fabbric. Zuccheri Roma	Arezzo	2402	300/375	9987/1500	18/330	3
Ditta Giuseppe Parisio - Manifatt. Rayon - Milano	Borgounito (Bergamo)	2403	150/210	12987/1500	23/360	1
S.A. Promotrice Ind. Ag. - Milano	Forlimpopoli	2407	400/500	9956/1260	22/350	2
Soc. Agricola Ind. Produzione It. di Cellulosa - Milano	Torre Zuino	2788	1750/2000	5643/1260	38/400	5
Soc. Agricola Ind. Produzione It. di Cellulosa - Milano	Torre Zuino	2789	1750/2000	5643/1260	38/400	5
Soc. Agricola Ind. Produzione It. di Cellulosa - Milano	Torre Zuino	2790	1750/2000	5643/1260	38/400	5
Snia Viscosa - Milano	Cesano Maderno	2791	2000/2400	5635/1260	39,5/400	4,5
Snia Viscosa - Milano	Cesano Maderno	2792	2000/2400	5635/1260	39,5/400	4,5
Soc. An. Cartiere Villa - Milano	Briosco	2793	140/170	13007/1260	34/400	2,5
Soc. Ind. Gomma Sintet. - Milano	Terni	2794	1680/1830	5603/1500	45/400	4,5
Soc. Ind. Gomma Sintet. - Milano	Terni	2795	1680/1830	5603/1500	45/400	4,5
Soc. Ind. Gomma Sintet. - Milano	Ferrara	2796	1680/1830	5584/1260	45/400	4,5
Comp. Ind. Sacc. Cissel - Roma	S. Eufemia Lamezia	2797	350	6981/2500	Turbopompa	
Comp. Ind. Sacc. Cissel - Roma	S. Eufemia Lamezia	2798	350	6981/2500	Turbopompa	

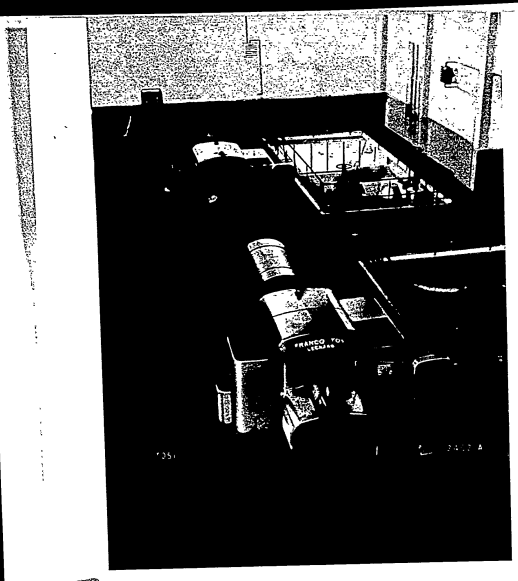
cliente	impianto	matr. n.	potenza kW	velocità giri/1'	condiz. vapore all'ammissione ate °C	condiz. vapore allo scarico ate
Eridania Zucch. Naz. Genova	Lama	3003	**500/600**	**9058/1260**	**18,5/325**	**2,5**
Soc. Tessili Artificiali	Pizzighettone	3004	**1600/2000**	**5602/1260**	**45**	**1,5**
Soc. Tessili Artificiali	Pizzighettone	3005	**2460/1260**	**4980/1260**	**45/300**	**1,5**
Snia Viscosa - Milano	Varedo	3006	**1250**	**6595/1260**	**30/380**	**4,5**
Tintoria Giovanni Crespi	Busto Arsizio	3007	**150/180**	**12987/1500**	**31/350**	**4**
Larderello - Roma	Monterotondo	3008	**3000**	**3000**	**3,75/185**	**0,08**
Larderello - Roma	Monterotondo	3009	**3000**	**3000**	**3,75/185**	**0,08**
S.A. Prod. Naz. Arrigoni - Cesena	Sesto Fiorentino	3010	**90/110**	**12987/1500**	**10/305**	**2**
S.A. Bombrini Parodi Delfino	Anagni	3011	**1200/1380**	**6585/1350**	**33/375**	**6**
S.A. Bombrini Parodi Delfino	Anagni	3012	**1200/1380**	**6585/1350**	**33/375**	**6**
Viag - Milano	Tarquinia Azoto	3013	**235**	**6903/2850**	**Turboventilat.**	
Manifattura Tosi - Busto Arsizio	Castellanza	3014	**400/500**	**9987/1500**	**20/375**	**3,5**
Eridania Zucch. Naz. Genova	Cologna Veneta	3461	**800/960**	**7794/1260**	**18,5/325**	**2,5**
Soc. Agric. Volturno - Napoli	Capua	3462	**690/730**	**9038/1500**	**20/325**	**2**
Soc. Arenella - Padova	Palermo	3463	**830/960**	**7837/1500**	**28/300**	**6**
Soc. An. Latteria Soresinese	Soresina	3464	**220/250**	**12966/1260**	**28/375**	**5**
Soc. An. Latteria Soresinese	Soresina	3465	**30**	**3200**	**Turbopompa**	
Soc. An. Latteria Soresinese	Soresina	3466	**52**	**3400**	**Turbopompa**	
Montecatini - Milano per ACNA	Cesano Maderno	3471	**1200/1500**	**6533/1500**	**35/425**	**6**
Cartiera Fedrigoni	Verona	3472	**600/675**	**9011/1260**	**35/375**	**2**
Cartiera Fedrigoni	Verona	3473	**33**	**3500**	**Turbopompa**	
Soc. An. Faesite - Padova	Faè di Longarone	3474	**1000/1180**	**5643/1260**	**45/400**	**9**
Soc. An. Faesite - Padova	Faè di Longarone	3475	**85**	**3200**	**Turbopompa**	
Soc. An. Faesite - Padova	Faè di Longarone	3476	**85**	**3200**	**Turbopompa**	
Soc. Gen. Zuccherifici - Padova	Spinetta Marengo	3477	**1050/1200**	**5595/1260**	**17/280**	**2,5**
Soc. Gas	Napoli	3478	**150/180**	**7024/2900**	**14/280**	**3**
S.A. Prod. Al. Arrigoni - Trieste	Cesena	3479	**450/500**	**10012/1500**	**29/375**	**5**
Motores Marelli	Argentina	3481	**31**	**3150**	**Turbopompa**	
Soc. Fibre Vulcanizzate - Milano	Precotto	3482	**110**	**14876/1260**	**32/375**	**3**
Concerie Alta Italia	Castellamonte	3484	**48**	**3600**	**Turbopompa**	
Soc. Elettrochimica del Toce	Villadossola	3485	**668/875**	**7788/3000**	**38/400**	**4,5**
Soc. An. Carlo de Sigis	Motta S. Damiano	3486	**45**	**14876/1260**	**11/300**	**3**
Cima Giovanni Cartiera di	Gravedona	3489	**20**	**3500**	**Turbopompa**	
Acetificio Coari	Casteggio	3490	**70/85**	**14985/1260**	**23/350**	**3,5**
Concerie Alta Italia	Castellamonte	3491	**500 560**	**9118/1500**	**37/430**	**2,5**
Sigg. G. e S. Vaccarino - Giammoro	Venetico	3493	**1200/1500**	**6533/1500**	**32/375**	**6**



Blading particular on counterpressure turbine rotor.

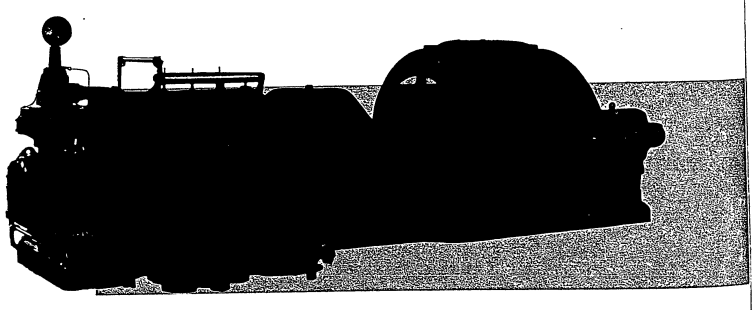
Monocylindrical counterpressure turbine with reduction gear - 1000 HP - 9000/1500 rpm. - 1930.





Two counterpressure turbines with direct coupling - 4200 KW - 3000 rpm
(RAFFINERIA CONDOR - Rho - 1952)

Counterpressure turbine with reduction gear-2650 KW - 5348/1500 rpm - 1938.

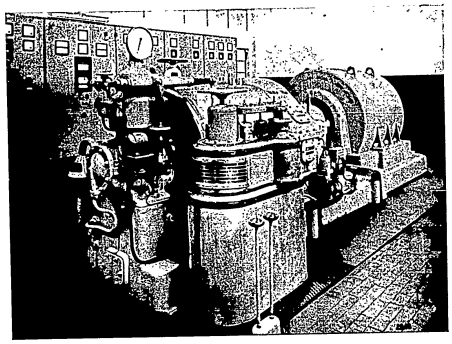


cliente	impianto	matr. n.	potenza kW	velocità giri/1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Sigg. G. e S. Vaccarino - Giammoro	Venetico	3494	195	3360	Turbopompa	
Motores Marelli	Argentina	3496	210	3000	10/300	2
Cotonificio P. Bellora	Gallarate	3498	1700	5649/1500	31/450	3
Motores Marelli per Papelera	Argentina	3499	2850/3650	3000	32/400	3
Motores Marelli per Fontan	Argentina	3500	310/400	10971/1500	30/380	2,5
Tintoria Subalpina	Como	3483	45	14876/1260	11/325	3
Motores Marelli	Argentina	3501	180/210	13223/1500	15/300	3
Soc. An. Distillerie Agricole	Tresigallo	3502	650/750	9040/1260	20/325	3
Soc. An. Ledoga	Garessio	3503	160/190	10310/1000	9,5/320	2
Zuccherificio Bonora	Ferrara	3504	1750/2200	5629/1260	35/425	3
Ind. Lombarda Pelli al Cromo	Lambrate	3509	380/440	9914/1260	32/375	2,5
Lanificio di Gavardo - Brescia	Bostone	3488	500/590	9127/1260	32/375	2
Lanificio F.lli Bona - Torino	Carignano	3507	390/490	9987/1500	32/400	4
Magnoni e Tedeschi	Cafasse Torinese	3508	610/700	9036/1500	31/375	4
Zuccherificio Bonora	Ferrara	3505	148	2900	Turbopompa	
Lancia e C.	Torino	3510	1000/1100	7837/1500	31/400	2
La Fibra Vulcanizz. e Cartiere Prealpine - Milano		3514	300/350	10568/1260	32/400	3
Soc. Bergamasca Ind. Chimica	Seriate	3512	830/1450	7441/1500	46/465	10
Soc. Bergamasca Ind. Chimica	Seriate	3513	148	3300	Turbopompa	
Lancia	Torino	3511	48	3200	Turbopompa	
Cartiera di Ormea	Genova	3515	240/275	13045/1500	33/415	3,5
Cartiera di Ormea	Genova	3516	240/275	13045/1500	33/415	3,5
Cartiera di Ormea	Genova	3517	100/120	15042/1500	33/415	3,5
Soc. An. Carlo Erba	Milano	3518	200/250	11105/1260	37/350	5
Soc. An. Carlo Erba	Milano	3519	200/250	11105/1260	37/350	5
Soc. An. Carlo Erba	Milano	3520	70	2900	Turbopompa	
Cartiera Fedrigoni	Verona	3521	78	3700	Turbopompa	
Soc. An. F.lli Testori	Novate Milanese	3525	115/150	11108/1260	23/350	1
Cotonificio Pozzi	Busto Arsizio	3526	330/410	10971/1500	31/375	2,5
Vizzola	Castellanza	3528	260	3100	Turbopompa	
Vizzola	Castellanza	3529	260	3100	Turbopompa	
De Angeli Frua	Saronno	3532	800/1000	7933/1500	46/425	2,5
Soc. delle Cartiere Meridionali	Isola Liri	3539	55	3100	Turbopompa	
Soc. An. Cartiere Burgo - Torino	Folla	3540	600	10097/1500	30/390	2
C.E.D.E.	Mar del Plata	3537	265	3520	Turbopompa	

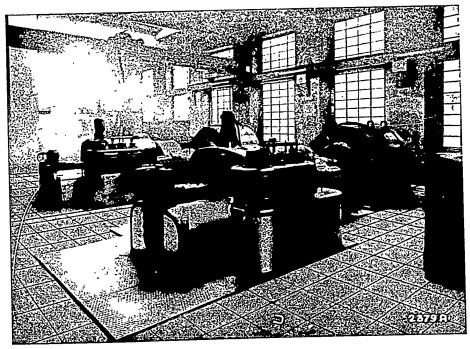
Cliente	Impianto	matr. n.	potenza kW	velocità giri/1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
C.E.D.E.	Mar del Plata	3538	265	3520	Turbopompa	
Soc. Monteponi - Torino	Porto Vesme	3541	230	3400	Turbopompa	
Cartiera del Varone	Riva di Trento	3542	1000/1250	7830/1260	32/375	2
Soc. It. Rappresentanze Industr. - Soc. Adamas Avenida	Milano per Buenos Aires	3543	110/115	13387/1500	14/350	2,5
Saccarifera Lombarda - Milano	Bondeno	3544	800/1000	7794/1260	18/380	3
Stadtwerke	Klagenfurt	3545	760/950	7220/1500	35/425	12
C.G.E. per Papelera del Sur	Madrid	3558	450/550	9920/1500	23/325	3
Consorzio Ind. Alimentación	Coronda	3559	100/120	15041/1500	14/325	3
De Angeli Frua	Saronno	3560	134	3450	Turbopompa	
Zucch. Raffineria Pontelongo	Bottrighe	3771	2400/3000	5020/1500	20/360	3
Zucch. Raffineria Pontelongo	Bottrighe	3772	128	2900	Turbopompa	
Zucch. Raffineria Pontelongo	Bottrighe	3773	128	2900	Turbopompa	
Zucch. Raffineria Pontelongo	Bottrighe	3774	112	2900	Turbopompa	
Lanificio Marzotto	Valdagno	3775	2300/2800	4981/1260	32/380	3
Lanificio Marzotto	Manerbio	3776	1400/1650	5786/1260	31/400	2,5
Natronzellstoff und Papierfabrik	Frantschach	3781	67	3500/1450	Turbopompa	
Natronzellstoff und Papierfabrik	Frantschach	3782	134	2950	Turbopompa	
Snia Viscosa - Milano	Varedo	3783	3750/4650	3000	44/450	3,5
Snia Viscosa - Milano	Varedo	3784	3750/4650	3000	44/450	3,5
Soc. It. Fibre Tessili Artificiali	Chatillon	3785	1450	7469/1500	32/375	2
Reysol - S.A. Comercial Financiera Ind. Agropecuaria Maritt.	Buenos Aires	3786	1600/2000	6529/1500	35/350	3
Reysol - S.A. Comercial Financiera Ind. Agropecuaria Maritt.	Buenos Aires	3787	84	2900	Turbopompa	
Saccarifera Parmense - Parma	Fontanellato	3788	82	2900	Turbopompa	
Soc. Veneta Ind. Zucch. Padova	Este	3789	95	3500	Turbopompa	
Soc. Romana di Elettricità	Roma	3791	245	3530	Turbopompa	
Transport Engineering Co.	Edfu	3795	122	2900	Turbopompa	
Soc. Ind. Textil Croci e C.	Buenos Aires	3796	230/290	13223/1500	32/375	4
Soc. Eridania - Genova	Massalombarda	3798	800/1000	7849/1500	23/350	3
Soc. p. Az. Vizzola - Milano	Castellanza	3800	260	3100	Turbopompa	
Az. Comunale Elettr. ed Acque	Roma	3801	145	3530	Turbopompa	
Stabilim. Duca Visconti di Modrone - Milano	Vaprio d'Adda	3802	42	2940	Turbopompa	
Soc. It. Lavor. Ocre	Torino	3803	95/120	14909/1500	32/375	2,5
Aquila S.p.A. Tec. Raffiner. Olii Minerali	Trieste	3804	800/1000	6510/1500	39/420	10

Cliente	Impianto	matr. n.	potenza kW	velocità giri/1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Aquila S.p.A. Tec. Raffiner. Olii Minerali	Trieste	3805	800/1000	6510/1500	39/420	10
Aquila S.p.A. Tec. Raffiner. Olii Minerali	Trieste	3806	185	3340	Turbopompa	
Italcementi - Bergamo	Villa di Serio	3811	168	3250	Turbopompa	
Italcementi - Bergamo	Villa di Serio	3815	168	3250	Turbopompa	
Italcementi - Bergamo	Monopoli	3813	55	2900	Turbopompa	
Cartiera Rossi - Vicenza	Arsiero	3829	230/280	12810/1500	27/375	2
Soc. Romana di Elettricità	Roma	3816	245	3530	Turbopompa	
Soc. Romana di Elettricità	Roma	3817	245	3530	Turbopompa	
Soc. Termoel. Veneta - Venezia	Marghera	3819	634	7050/2900	Turbopompa	
Soc. Eridania - Genova	Classe	3812	1200/1500	5694/1500	118/350	3
Soc. Eridania - Genova	Lama	3822	900/1065	7744/1260	18,5/350	3
Soc. Eridania - Genova	Parma	3823	900/1065	7744/1260	18,5/350	3
Soc. Eridania - Genova	Massalombarda	3824	800/1000	7849/1500	23/350	3
Soc. Eridania - Genova	S Biagio	3825	1000/1200	7723/1500	18/320	3
Arland - Papier und Zellstoffabrik.	Graz - Andritz	3828	510	7641/3000	36/400	1,5
Soc. Gen. Cons. Alimentari Cirio	Mondragone	3830	150	3000	10/260	2
Soc. Veneta Ind. Zucch. Padova	Casei Gerola	3832	2000	5649/1500	32/390	3
S.p.A. Az. Tecn. Ind. Raffineria Olii « Aquila »	Trieste	3833	800/1000	6510/1500	39/420	10
Entreprise Commerciale d'Etat Metalimport	Adree (Bulgaria)	3837	105	3391/1450	Turbopompa	
S.p.A. Concerie It. Riunite	Torino	3838	960/1250	7814/1250	39/425	3
Eridania Zucch. Naz. Genova	Ferrara	3839	960/1200	7933/1500	18,5/350	3
Eridania Zucch. Naz. Genova	S. Michele al Tagliam	3840	720/900	7813/1500	23/350	3
Zuccherifici e Raffineria Padova	Pontelongo	3841	180	2650/3100	Turbopompa	
S.N.I.A.F.A. - Buenos Aires	Platanos	3846	140	3350	Turbopompa	
Fibra Vulcan. e Cart. Prealpine Milano	Intra	3847	180/230	13223/1500	32/375	2,5
S.p.A. Piombo e Zinco - Roma	Nossa	3850	490/625	9987/1500	32/400	3
Cartiera di Germagnano	Torino	3853	336/420	9920/1500	19/300	2
Soc. Sarda - Cagliari	S. Caterina	3854	215	3400	Turbopompa	
Snia Viscosa	Pavia	3855	2060/2640	5023/1500	45/475	3,5
Eridania Zucch. Naz. - Genova	Genova	3857	1300/1600	5638/1500	23/360	3
Eridania Zucch. Naz. - Genova	Ficarolo	3858	1300/1600	5638/1500	23/360	3
Soc. Agricola Carboidrati It. - Milano per Zuccherificio di	Battipaglia	3859	680/850	4513/1350	18/350	2

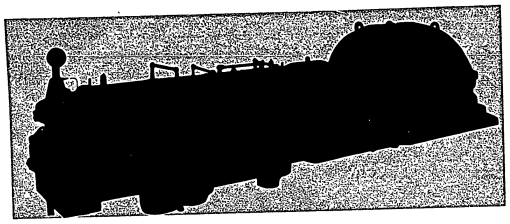
cliente	impianto	matr. n.	potenza kW	velocità giri/1'	condiz. vapore all'ammissione ate °C	condiz. vapore allo scarico ate
Termoelektro - Belgrado	Banovici	3861	125	3474/970	Turbopompa	
Zuccherificio di	Sermide	3862	2800/3080	4959/1500	32/380	2,5
Zuccherificio di	Sermide	3863	160	3500	Turbopompa	
Cartiera Martino	Piedimonte D'Alife	3864	47/55	21517/3000	13,5/300	4
Soc. Condor - Milano	Rho	3865	3500/4200	3000	48/410	11,3
Soc. Condor - Milano	Rho	3866	3500/4200	3000	48/410	11,3
S.T.A.N.I.C. - Milano	Livorno	3867	2600/3500	4959/1500	36/430	8
S.T.A.N.I.C. - Milano	Livorno	3868	2600/3500	4959/1500	36/430	8
Soc. Agr. Italo-Somala - Genova	in Somalia	3869	500/600	9920/1500	23/325	2
Eridania Zucch. Naz. Genova	Pontelagoscuro	3870	300/350	10865/1500	18,5/325	3
Soc. An. Cartiere Burgo - Torino	Corsico	3871	2900/3650	5070/1500	35/420	2,5
Soc. Gener. Zuccherif. Padova	Spinetta Marengo	3872	110	3250	Turbopompa	
Soc. Ind. Comm. Agricolt. Lauis	Piacenza	3874	1000/1200	7836/1260	12/220	1,8
S.p.A. Cartiera Paolo Pigna	Alzano Lombardo	3876	440/510	9920/1500	32/410	2,5
Istituto Poligrafico Stato	Foggia	3877	1700	5612/1500	31/400	3,5
S.p.A. Il Gas Integrale	Roma	3878	144	6980/3000	Turbopompa	
Soc. Ind. Chimiche - Milano	Porto Marghera	3880	133	2950	Turbopompa	
Snia Viscosa - Milano	in Messico	3884	285	3550	Turbopompa	
Amminis. dell'Elettr. e Tramwais	Damas	3889	192	3400	Turbopompa	
S.p.A. Stoppani - Milano	Cogoleto	3890	210/260	12810/1500	32/380	2
Soc. Montecatini - Milano	Settimo Torinese	3891	1380/1700	5649/1500	48/410	5,5
Snia Viscosa - Milano	Sud Africa	3892	3000/3800	5070/1500	44/450	5
Snia Viscosa - Milano	Sud Africa	3893	3000/3800	5070/1500	44/450	5
Rasiom	Augusta	3894	1000/1100	7762/1500	38/425	10
Ospedale Civile di Udine	Udine	3896	100/120	4909/1500	17/300	1
Eridania Zucch. Naz. - Genova	Codigoro	3897	1300/1600	5649/1500	19/380	3
Eridania Zucch. Naz. - Genova	Mezzano	3898	1300/1600	5638/1500	23/360	3
Eridania Zucch. Naz. - Genova	Forlì	3899	1600	5705/1500	17/320	3
Eridania Zucch. Naz. - Genova	Sarmato	3900	1300/1600	5649/1500	19/340	3
Soc. Saccarifera Lomb. - Milano	Polesella	4000	2500/3000	4959/1500	32/375	3
Soc. Saccarifera Lomb. - Milano	Polesella	4001	2500/3000	4959/1500	32/375	3
Soc. Saccarifera Lomb. - Milano	Molinella	4002	2500/3000	4959/1500	32/375	3
Soc. Saccarifera Lomb. - Milano	Molinella	4003	2500/3000	4959/1500	32/375	3
S.p.A. Lepetit Antibiotici - Milano	Torre Annunziata	4004	300/340	5075/1500	13/300	0,5
Rasiom - Milano	Augusta	4005	108	3120	Turbopompa	
Soc. An. Tanneries de France	Strasbourg	4006	1250/1400	7849/1500	42/430	3,5
Manifattura Mazzonis	Torre Pellice	4007	740/900	6612/1500	12/250	1,7



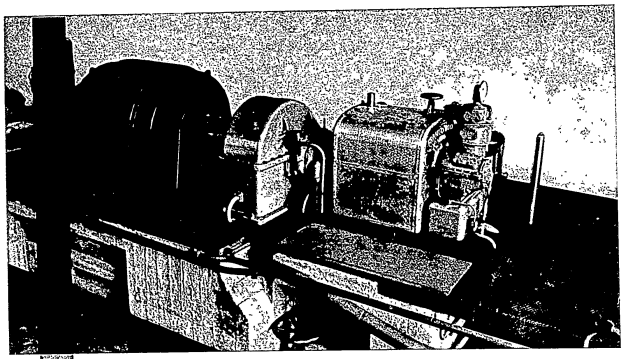
Counterpressure turbine with reduction gear-1250 KW - 7850/1500 rpm. (CONCERIE ITALIANE RIUNITE - Turin - 1951).



Two counterpressure turbines with reduction gear - 1600 KW - 5600/1500 rpm. (SOCIETA' ERIDANIA - Ficarolo Plant - 1952).



Bicylindrical extraction and counterpressure turbine with reduction gear - 2400 KW - 5700/1500 rpm. (ANIC - Bari - 1937).

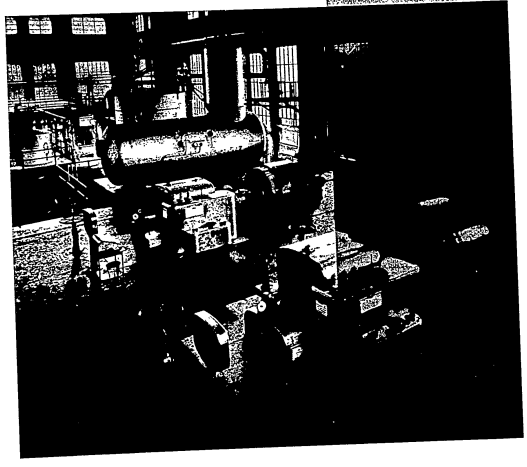


1100 KW counterpressure turbine - 7762/1500 rpm (RAFFINERIA RASIOM - Augusta - 1953).

cliente	impianto	matr. n.	potenza kW	velocità giri 1'	condiz. vapore all'ammissione ate C	condiz. vapore allo scarico ate
Snia Viscosa - Milano	in Messico	4010	3000/3750	4989/1800	45/450	3,5
Snia Viscosa - Milano	in Messico	4011	3000/3750	4989/1800	45/450	3,5
Eridania Zucch. Naz. - Genova	Classe	4012	1200/1500	5694/1500	18/350	3
Soc. Italiana per il Gas - Torino	Roma	4013	295	6000	Turboestratt.	
Soc. Veneta Ind. Zuc. - Padova	Este	4018	3000	4959/1500	32/360	3,5
Soc. Lombarda Petroli - Monza	Villasanta	4019	330/375	9987/1500	33/390	10
Soc. Italo-Olandese Enka	Palestro	4020	360/430	9920/1500	21/350	3
Soc. Veneta Ind. Zuc. - Padova	Este	4021	170	3000/3400	Turbopompa	
Italcementi - Bergamo	Villa di Serio	4027	320	3500	Turbopompa	
Soc. An. Petroli Ital.	Falconara	4028	176	3500	Turbopompa	
Aquila Raff. Olii Minerali	Trieste	4030	22	2580	Turbopompa	
Ind. Saccarifera Parmense	Fontanellato	4031	118	3400	Turbopompa	
Italcementi - Bergamo	Monopoli	4032	76	3050	Turbopompa	
Comp. Tec. Ind. Petroli - Roma	Napoli	4033	192	2900	Turbopompa	
Comp. Tec. Ind. Petroli - Roma	Napoli	4034	192	2900	Turbopompa	
Soc. Rhodiatoce	Novara	4036	41	2900	Turbopompa	
Raffineria Olii Lubrificanti	Viguzzolo	4038	420/520	9987/1500	29/390	5
Soc. Italiana per il Gas - Torino	Roma	4040	370	7000	Turbopompa	
Cartiera di Marzabotto	Bologna	4043	200/250	13000/1500	33/400	1,5
Soc. Gen. Zuccher. - Padova	Spinetta Marengo	4044	3000	4959/1500	32/360	3,5
S.p.A. Zuccherificio di	Cecina	4045	1000/1200	5033/1500	25/385	3
S.p.A. Zuccherificio di	Cecina	4046	1000/1200	5033/1500	25/385	3
S.p.A. Zuccherificio di	Cecina	4047	74	3500	Turbopompa	
Soc. Gen. Zuccherif. - Padova	Spinetta Marengo	4048	148	3400	Turbopompa	
S.p.A. Raff. Siciliane Olii Miner.	Augusta	4049	1740/2000	5649/1500	39/425	11
Zuccherif. Raffineria di	Pontelongo	4052	2400/3000	5079/1500	20/320	3
Fibra Vulcan. e Cart. Prealpine	Milano	4053	500/600	9987/1500	32/375	2,7
S.A.D.A.M. - Bologna	Zuccherif. di Jesi	4054	650/800	5014/1500	14/250	3
Soc. Veneta Ind. Zuc. Padova	Casei Gerola	4055	148	3400	Turbopompa	
Soc. An. Distillerie Agricole	Tresigallo	4056	1250/1500	5647/1500	20/325	3
Saccarifera Lombarda - Milano	Jolanda di Savoia	4058	3000	4959/1500	32/375	3
Saccarifera Lombarda - Milano	Jolanda di Savoia	4059	3000	4959/1500	32/375	3
Zuccher. Raffineria di	Pontelongo	4060	100	3200	Turbopompa	
Distilleria di	Cavarzere	4061	400/500	9920/1500	32/360	3
Soc. Veneta Ind. Zuccheri	Casei Gerola	4062	3000	5031/1500	32/360	3
Direccion de Electricidad y Mecanica - Buenos Aires	Bahia Blanca	4065	370	8000/3700	Turbopompa	

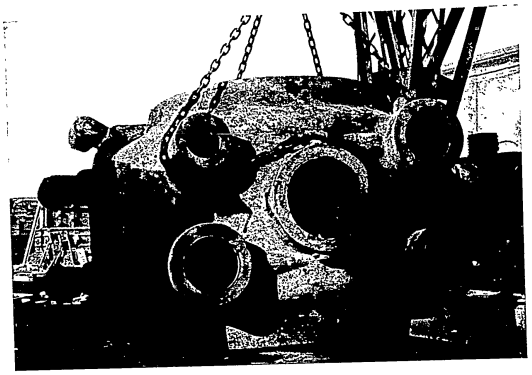
cliente	impianto	matr. n.°	potenza kW	velocità giri/1'	condiz. all'ammissione ate C	vapore allo scar. ate
Direccion de Electricidad y Mecanica - Buenos Aires	Bahia Blanca	4066	370	8000/3700	Turbopompa	
Ospedale Civile di	Udine	4068	120/140	14909/1500	17/300	1
Soc. Ind. It. dei Petroli - Genova	La Spezia	4069	1100	7800/1500	34/400	12
Fabbr. Riun. Amido Glucosio Destrina	Castelmassa	4071	111	2900	Turbopompa	
Distilleria di	Cavarzere	4072	2400/3000	5079/1500	21/360	3
S.T.O.I. Ind. Petrolifera	Firenze	4073	560/700	7800/1500	38/410	10
Officine Meccaniche	Brescia	4074	300	3430	Turbopompa	
Soc. Ind. Agric. du	Niari	4079	500/600	10000/1500	22/310	1
Soc. Ind. Agric. du	Niari	4080	1000/1250	7800/1500	22/310	1
Pirelli	Milano	4082	240	3700	Turbopompa	—
Pirelli	Milano	4083	140	3000	Turbopompa	—
Purfina	Bolzaneto	4084	500	10000/1500	36/380	11
Italgas	Roma	4085	140	7000/3000	Turboventil.	—
Cartiera Subiaco	Subiaco	4088	650	10000/1500	34/410	2,5
A.T.I.	Pompei	4089	230	13000/1500	25/385	2,5
Nuove Reggiane	Racconigi	4090	2000	3550/1500	22/370	3,5
Nuove Reggiane	Racconigi	4091	2000	3550/1500	22/370	3,5
S.A.D.A.M.	Jesi	4092	800	5000/1500	14/250	3
I.R.O.M.	Porto Marghera	4096	1900	5600/1500	42/410	15
S.A.D.A.M.	Montecosaro	4098	800	5000/1000	22/350	3
I.S.S.A.	S. Agata Mugello	4099	800	5000/1500	23/345	3
Cartiera Cini	Firenze	4100	300	5000/1500	40/400	3,5
I.N.F.R.A.	Genova	4101	1100	7800/1500	45/410	10
S.A.I.S.	Villabruzzi	4105	600	10000/1500	23/325	2
Cartiera del Maglio	Bologna	4106	200	13000/1500	25/380	2,5
Condor	Rho	4107	370	4000/1000	Turbopompa	—
Rhodiatoce	Novara	4108	110	3500	Turbopompa	—
Vetrocoke	Porto Marghera	4118	1540	5600/1500	43/425	10

Two 3500 KW counterpressure turbines - 4959/1500 rpm (STANIC - Leghorn - 1952)

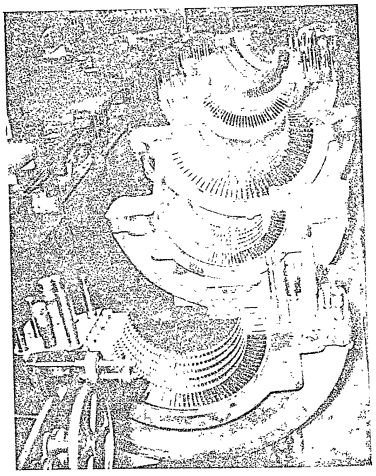


70.000 kW TURBOGENERATOR

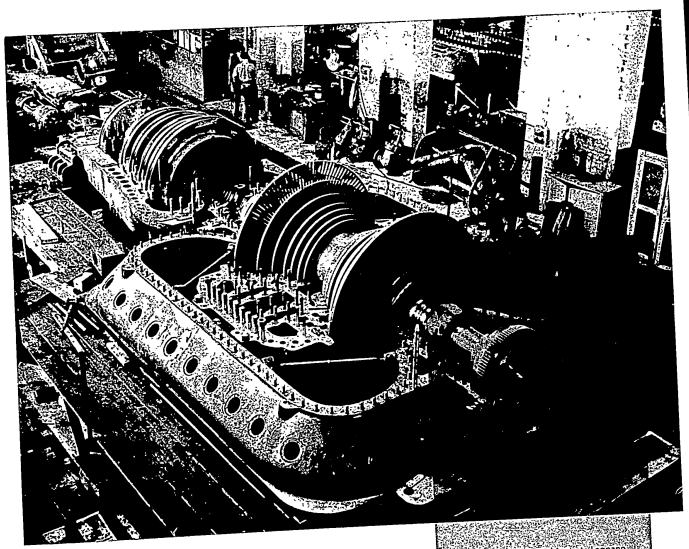
FOR SOCIETÀ TERMOELETTRICA VENETA PORTO MARGHERA STATION



Lower half of inside casing for Low Pressure cylinder



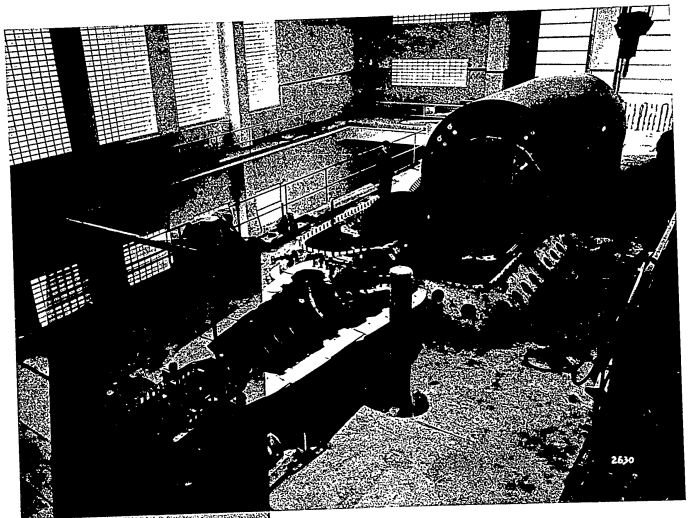
Bladed rings for High Pressure Body



Erection of the turbine at Legnano

70.000 kW

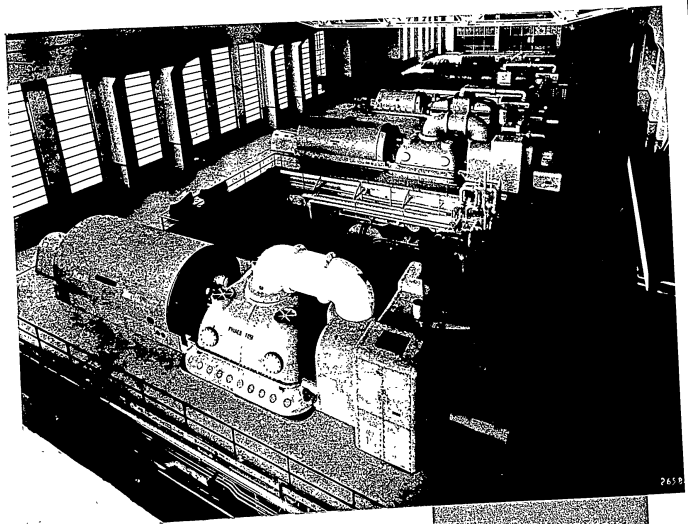
FOR SOCIETÀ TERMOELETTRICA VENETA



Erection of the turbine at Porto Marghera

TURBOGENERATOR

PORTO MARGHERA STATION



The unit ready for operation

Franco Tosi

S. p. A. LEGNANO

Produzione attuale:

Centrali termiche complete
Motori Diesel
Ventilatori, pompe, compressori centrifughi e assiali
Macchinari principali e ausiliari per bordo
Cementifici completi
Turbine idrauliche, valvole, paratoie, condotte forzate
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Direzione centrale: Legnano, Corso Italia 27, tel. 47.690 - telegrammi - Tosi - Legnano

Ufficio di Roma: Roma, Via Vittorio Veneto 89, tel. 462.884 e 480.227
telegrammi: **Francotosi** - Roma

Ufficio impianti idroelettrici: Milano, Via G. B. Sammartini 5, tel 600.021 e 600.022

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Padova - Via Tessaro 2 - tel. 27.741
telegrammi: Francotosi - Padova.

Napoli - Via Fiorentini 76 - tel. 21.530
telegrammi: Francotosi - Napoli

Torino - Dott. Ing. Guido Cavallo - Via XX Settembre 17 - tel 43 960
telegrammi: Cavallo - tel. 43 960.

Uffici commerciali all'estero:

Parigi - B.C.T.R.I 6, Boulevard des Capucines - Paris (5°)
telefono Opera 57.93 - telegrammi. Cirelectric - Paris.

New York - A. Mattelni - New York 6, N.Y. - 114 Liberty Street
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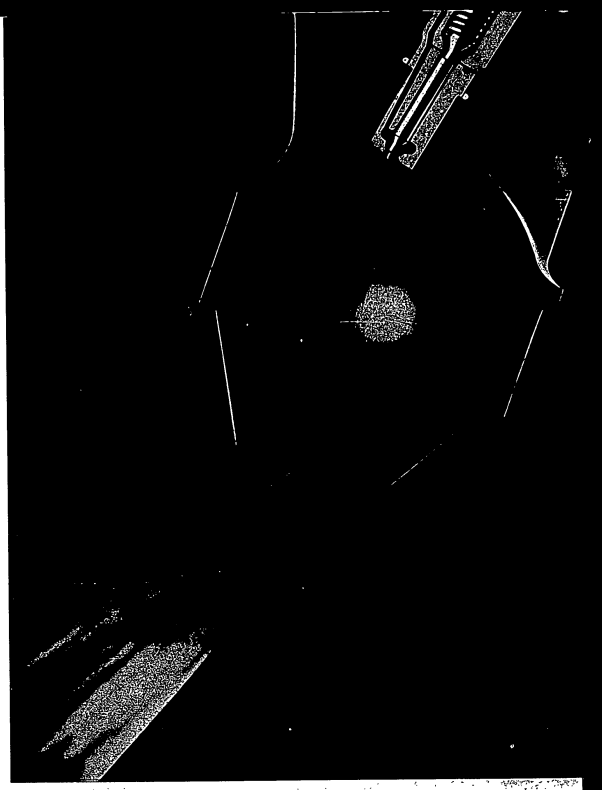
STAB. POL G. COLOMBI S.P.A. - MILANO

FRANCO TOSI S. p. a. Legnano



HEAVY OIL DIESEL ENGINES

with Ricardo Comet III turbolence chamber

Circ. 104 - 1956

DIESEL ENGINES type Q 10 V

cylinder diameter 220 mms.
piston stroke 270 mms.
four stroke, with cylinders in V arrangement
aspirated and pressure charged
rpm 750 ÷ 1000

ENGINE CHARACTERISTICS

DESIGNATION	Q 10 V		Q 10 V		Q 10 V		Q 10 V		Q 10 V		Q 10 V	
	4	4 S	6	6 S	8	8 S	10	10 S	12	12 S	16	16 S
HP at 750 rpm	190	300	285	450	380	600	475	750	570	900	760	1200
HP at 1000 rpm	240	360	360	540	480	720	600	900	720	1080	960	1440
N° of cylinders	4		6		8		10		12		16	
Weight of engine in tons (metric)	3,3	3,6	4,4	4,8	5,5	5,9	6,6	7,1	7,7	8,3	9,9	10,5

DIESEL ENGINES type Q 12 T

cylinder diameter 220 mms.
piston stroke 320 mms.
four stroke, cylinders in line
aspirated and pressure charged
rpm 600 ÷ 750

ENGINE CHARACTERISTICS

DESIGNATION	Q 12 T		Q 12 T		Q 12 T		Q 12 T		Q 12 T		Q 12 T	
	3	3 S	4	4 S	5	5 S	6	6 S	7	7 S	8	8 S
HP at 600 rpm	135	210	180	280	225	350	270	420	315	490	360	560
HP at 750 rpm	165	240	220	320	275	400	330	480	385	560	440	640
N° of cylinders	3		4		5		6		7		8	
Weight of engine in tons (metric)	3,7	4,2	4,5	4,9	5,3	5,7	6	6,4	6,8	7,5	7,6	8,5

These engines may be operated with fuel oil having a specific weight of 0,92 ÷ 0,96 Kgs/litre.

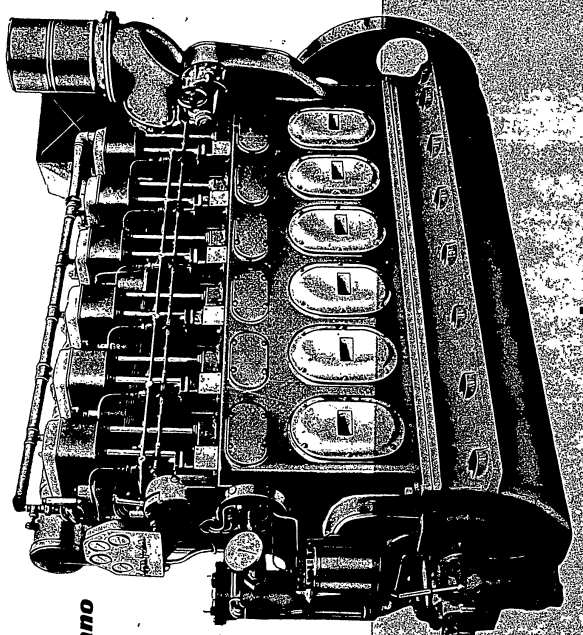
present production of

S. p. A.

Legnano - Corso Italia, 27 - Tel. 47-690
Cables: Tosi-Legnano

- Diesel engines for power stations and industrial plants
- Diesel engines for ship propulsion
- Diesel Engines for marine auxiliary service
- Gas turbines
- Boilers for stationary and marine use
- Condensing, back-pressure or extraction turbines
- Geared turbines for ship propulsion
- Auxiliary equipment for steam power plants and marine applications
- Turbo-fans for forced draft boiler
- Turbo-pumps, blowers, centrifugal and axial compressors
- Water turbines type Pelton, Francis and Kaplan
- Pumps of large size for hydroelectric storage schemes
- Valves for hydroelectric installations, sluices, pressure conduits
- Equipment for reclamation and irrigation, centrifugal and propeller pumps
- Equipment for cement works
- Steel, cast-iron and alloy castings

STAB. POL. G. COLOMBI S.P.A. - MILANO



FRANCO TOSI legnano

Diesel Engines
Steam Boilers and Turbines
Gas Turbines
Hydraulic Turbines - Valves and Penstocks
Pumps - Equipment for Cement Works
Blowers - Compressors
Forgings and Castings

Diesel Engines Type Tosi F.D.S.

Four-stroke Engine:

Diesel cycle . . | Plunger pistons
Vertical disposition | Direct injection

It may be designed both naturally aspirated and pressure charged.

Cylinder bore	220		mm. (8.66")
Piston stroke . .	320		mm. (12.60")
Speed	600	750	r.p.m.
Mean piston speed	6.4	8	m/s
	(252	315	in/sec.)
B.H.P. rating of aspirated engine	50	60	BHP/cyl.
B.H.P. rating of pressure charged engine	85	100	BHP/cyl.
b.m.e.p. of aspirated engine .	6.15	5.92	Kg./sq.cm.
	(87.5	84.1	lb/sq.in.)
b m.e.p. of pressure charged engine	10.5	9.85	Kg./sq.cm.
	(149	140	lb/sq.in.)

Model designation	Tosi Q. 12 T. 4		Tosi Q. 12 T. 5		Tosi Q. 12 T. 6		Tosi Q. 12 T. 7		Tosi Q. 12 T. 8	
Speed RPM . .	600	750	600	750	600	750	600	750	600	750
B.H P rating asp. engine . . .	200	240	250	300	300	360	350	420	400	480
B. H P. rating press. charged engine . . .	340	400	425	500	510	600	600	700	680	800
Number of cylinders . . .	4		5		6		7		8	

These ratings apply to normal ambient conditions in accordance with British Standards n. 649 of 1949, i. e.:

— altitude = 159 m. (522 ft.) a.s.l.
— atmospheric temperature = 29.4° C (85° F)
— humidity = 50% at 29.4° C temperature.

The ratings listed above are those obtained by using Gas-oil fuel. In case it is desired to use Diesel oil, the engine output will be sligthly lower and will be specified each time by the manufacturer

DESCRIPTION

Bedplate

of cast-iron It is machined for the main bearings It acts as a sump for the lubricating oil and carries the lubricating and fuel oil pump.

Frame

is of cast-iron. It is bolted to the bedplate and carries the housings for the cylinder liners. It is provided with large inspection doors

Liners

are of special alloy cast-iron and built in the cylinders They are accurately honed to provide an extra finish of the internal surface

Pistons

are of light alloy and designed according to the latest principles

Connecting rods

are die forged in high-tensile steel

Cylinder heads

are of special cast-iron and cast individually. They are secured to the frame by means of steel studs. They carry the seats for two suction valves and two exhaust valves. Large inspection doors permit cleaning of the cooling water chamber

Crankshaft

is of high-tensile carbon steel. It carries the bores for the circulation of lubricating oil It is provided with a flange on connection side of engine

Camshaft

consists of a sturdy forged shaft with cams. The shaft is introduced into the engine at one end and owing to a special feature embodied in the design the space required for dismantling is reduced to the minimum.

An extension shaft

flanged at one end for connection to the crankshaft and a bearing are normally included in the supply

Flywheel

is designed to suit each individual requirement based on the calculation of the torsional critical speed of the entire revolving mass, as well as on the degree of irregularity desired by the customer.

Speed governor

is of the centrifugal type and acts on the racks of the injection pumps
A manually-operated speed-changer permits an adjustment of 10% more or less of the operating speed of the engine compared with the normal operating speed
Where the particular service requires it, a device for control from the instrument panel through electric motor is provided

Fuel injection.

A rotary pump actuated directly by the engine and fed by gravity from the day tank supplies fuel to the injection pumps Fuel injection is by Bosch pumps (one per cylinder) and Bosch injectors

Lubrication

The gear type pump actuated by the engine takes oil from the sump in the crankcase and delivers it under pressure to the cooler, the crankshaft and the distribution gear. The cylinders are lubricated by splash from the crankcase.

Starting

is by compressed air furnished by a tank charged at 30-35 Kg/sq.cm. (428-500 lb/sq.in) through a charging valve located on one cylinder head. The tank is furnished as outfit to the engine A spare electrically-operated or engine-operated compressor is supplied on demand

Cooling

is effected by water circulation. Adeguate flanges are provided for the inlet and discharge of the cooling water.

Pipings

Standard equipment includes the following pipings:

— fuel pipings, mounted directly on the engine;
— lubricating oil piping which draws oil from the crankcase and takes it to the cooler and engine;
— cooling water pipings, in addition to those mounted on the engine, 4 meters of feed piping and 4 meters of discharge piping;
— compressed air piping, from the charging valve to the tank and from this to the starting system of the engine.

Silencer

An exhaust gas silincer is supplied for the aspirated engines. In the pressure charged engines the turbine acts as a silencer.

Turbocharger

The pressure charging system consists normally of a turbine operated by the engine exhaust gases under the Büchi system, and of a blower arranged on the same axis of the turbine, which supplies the compressed air for the engine.

Coolers

A lubricating oil surface type cooler is fitted on each engine.
In some particular cases on pressure charged engines, the compressed air is cooled by means of an adequate cooler.
In these cases it is necessary to have water at approximately 25° C (77° F) or less at a rate of 10 lt (2 20 gal.) per effective horsepower and per hour

Filters

Fuel - Each engine is provided with an efficient filter made by a specialized manufacturer.
Lubricating oil - An apparatus for the total filtration of the lubricating oil is fitted on each engine.
Air - Where the service requires it, an air filter is provided.
Lubricating oil purifying equipment - Each engine is normally supplied with a lubricating oil conditioner connected parallel with the main oil system.

Measuring instruments

include gauges and thermometers for measuring the pressures and temperatures of the circulating liquids, as well as a tachometer.

The following ACCESSORIES and SPARES are furnished with the engine:

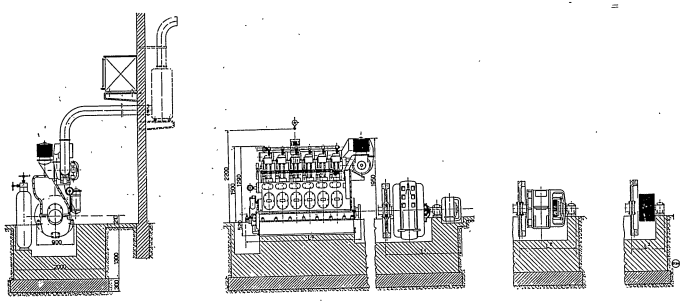
— foundation screws
— a set of standard wrenches and all special wrenches
— eyebolts
— a hand-operated pump for testing injectors
— a thermometer and a gauge
— a stock of spare parts including: a set of valves for one cylinder head, a set of rings for one piston, a plunger with barrel for injection pump with delivery valve and spring, a needle with nozzle for atomizer, a set of gaskets for use in the engine, a pipe for oil cooler, spares for the turbocharger.

The following accessories will be furnished on demand: the pipings required for the installation, day tanks, channeled plate for covering underground passages, guards, etc.

WEIGHTS AND VOLUMES

A = Naturally aspirated
S = Pressure charged

Number of cyl.	4		5		6		7		8	
	A	S	A	S	A	S	A	S	A	S
Weight of eng. (dry) with acc. excl flywheel T	4.5	4.9	5.3	5.7	6	6.4	6.8	7.3	7.6	8.5
Weight of heaviest piece T.	1.1	1.3	1.3	1.5	1.5	1.8	1.7	2.2	1.9	2.4
Shipping volume (by sea) cu.mt.	14	14	15	15	16	16	17	17	18	18
cu.yd.	18 35	18.35	19.65	19.65	20.95	20.95	22 25	22.25	23.55	23 55
Capacity of maintenance crane T.	1 5	1.5	1.5	2	2	2	2	2.5	2.5	2.7



CONSUMPTION OF FUEL

ENGINE TYPE		LOAD		
		4/4	3/4	1/2
Naturally aspirated	gr/BHP. hr	160	165	170
	lbs/BHP. hr	0 353	0.364	0 375
Pressure charged	gr/BHP. hr	155	155	160
	lbs/BHP hr	0.342	0.342	0.353

CONSUMPTION OF LUBRICATING OIL

(Referred to engine full rating)

Naturally aspirated 2 5 gr/BHP. hr (0.005 lbs/BHP. hr)
Pressure charged 2.0 gr/BHP hr (0 0044 lbs/BHP hr)
Allowances on above consumptions 5%

OVERALL DIMENSIONS OF ENGINES

ENGINE TYPE		L^0	L^1	L^2	L^3
Q 12 T 4 (S) .	mm.	2150	1600	1100	850
	in	84	63	43 3	33.5
Q 12 T 5 (S) . .	mm.	2480	1700	1200	1000
	in	97	67	47.2	39.4
Q 12 T 6 (S) . . .	mm.	2810	1800	1300	1150
	in	110	70.8	51.2	45 3
Q 12 T 7 (S) . .	mm.	3140	1900	1400	1300
	in	123	74.8	55.1	51.2
Q 12 T 8 (S) .	mm.	3470	2000	1500	1450
	in.	136	78 8	59	57 1

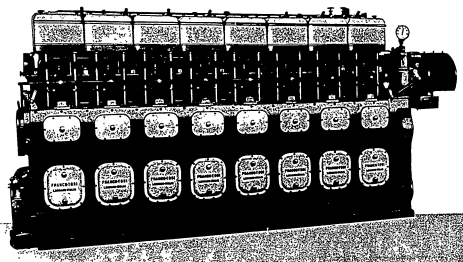
Circ. 113 - 1957.

STAB. POL. O. COLOMBI S.P.A. - MILANO

TOSI

legnano

Diesel Engines
Steam Boilers and Turbines
Gas Turbines
Hydraulic Turbines and High Pressure Conduits
Pumps - Equipment for Cement Works
Blower - Compressors
Forgings and Castings



Diesel Engines Type TOSI Q 34 T. | Q 34 T.S.

Four-stroke Engine:

Diesel cycle — Plunger pistons
Vertical disposition — Direct injection

It may be designed both naturally aspirated and pressure charged.

Cylinder bore	=	310 mm. (12,2")
Piston stroke	=	450 mm (17,7")
Speed	=	428 - 450 r.p.m
Mean piston speed	=	6,4 - 6,7 m/sec.
B.H.P. rating of aspirated engine	=	100 - 104 BMP/cyl
B.H.P. rating of pressure charged engine	=	170 - 178 BHP/cyl.
Full load b.m.e.p.	=	6,16 - 6,16 Kg/sq.cm. (87,6 - 87 lb/sq in.) (aspirated
Full load b.m.e p	=	10,5 - 10,5 Kg/sq.cm. (142,9 - 142 lb/sq in.) (pressure charged

Model designation	Tosi Q 34 T 4	T 4 S	Tosi Q 34 T 5	T 5 S	Tosi Q 34 T 6	T 6 S	Tosi Q 34 T 7	T 7 S	Tosi Q 34 T 8	T 8 S
Number of cylinders	4		5		6		7		8	
BHP rating at 428 r.p.m	400	680	500	850	595	1015	695	1185	795	1355
BHP rating at 450 r.p.m	420	715	525	895	625	1070	730	1250	835	1425

These ratings apply to normal ambient conditions in accordance with British Standards n 649 of 1949, i. e.:

altitude	=	159 m (522 ft.) a s.l.
atmospheric temperature	=	29,4° C (85° F)
humidity	=	50 % at 29,4° C temperature.

This engine may be run on Diesel oil

DESCRIPTION

Bedplate

of cast-iron is machined for the main bearings and carries the lubricating and fuel oil pump.

Frame

is of cast-iron It is secured to the bedplate by means of tierods and carries the housings for the cylinder liners. It is provided with large inspection doors.

Liners

are of special alloy cast-iron and built in the cylinders. They are accurately honed to provide an extra finish of the internal surface.

Pistons

are of special light alloy and designed according to the latest principles

Connecting rods

are die-forged in high-tensile steel.

Cylinder heads

are of special cast-iron and cast individually. They are secured to the frame by steel studs. They carry the seats for two suction valves and two exhaust valves. Large inspection doors permit cleaning of the cooling water chamber.

Crankshaft

is of high-tensile carbon steel. It carries the bores for the circulation of lubricating oil. It is provided with a flange on connection side of engine.

Camshaft

consists of a sturdy forged shaft with cams for admission, exhaust, injection and starting

An extension shaft,

flanged at one end for connection to the crankshaft, and a bearing are supplied on demand.

Flywheel

is designed on the basis of the calculation of the torsional critical speed of the entire revolving mass, to suit each individual requirement, as well as on the degree of irregularity desired by the customer.

Speed governor

is of the centrifugal water-operated type and acts on the racks of the injection pumps. A manually-operated speed-changer permits an adjustment of 10 % more or less of the operating speed of the engine compared with the normal operating speed
Where the particular service requires it, a device for control from the instrument panel through electric motor is provided.

Fuel injection

A rotary pump actuated directly by the engine and fed by gravity from the day tank supplies fuel to the injection pumps. Fuel injection is by Bosch type pumps (one per cylinder) and injectors of the same type

Lubrication

The gear type pump actuated by the engine takes oil from the sump in the crankcase and delivers it under pressure to the cooler and the crankshaft The lubrication of the distribution gear and the cooling of the atomizers are effected by means of an oil circuit separate from that described previously.

Starting

is by compressed air furnished by a tank charged at 50 Kg/sq.cm (711 lb/sq in.) through an electrically-operated compressor normally supplied with the engine The tank is furnished as outfit to the engine A spare engine-operated compressor is supplied on demand.

Cooling

is effected by water circulation Adequate flanges are provided for the inlet and discharge of the cooling water.

Pipings

Standard equipment includes the following pipings:
— fuel pipings, mounted directly on the engine;
— lubricating oil piping which draws oil from the crankcase and takes it to the cooler and engine;
— cooling water pipings; in addition to those mounted on the engine, 4 meters of feed piping and 4 meters of discharge piping;
— compressed air piping, from the charging valve to the tank and from this to the starting system of the engine.

Silencer

An exhaust gas silencer is supplied for the aspirated engines In the pressure charged engines the turbine acts as a silencer

Turbocharger

The pressure charging system consists normally of a turbine operated by the engine exhaust gases under the Büchi system, and of a blower arranged on the same axis of the turbine, which supplies the compressed air for the engine.

Coolers

A lubricating oil surface type cooler is fitted on each engine
In some particular cases on pressure charged engines, the compressed air is cooled by means of an adequate cooler
In these cases it is necessary to have water at approximately 25° C (77° F) or less at a rate of 10 lt. (2,20 gal.) per effective horsepower and per hour

Filters

Fuel - Each engine is provided with an efficient filter made by a specialized manufacturer

Lubricating oil - An apparatus for the total filtration of the lubricating oil is fitted on each engine

Air - Where the service requires it, an air filter is provided

Lubricating oil purifying equipment - Each engine is normally supplied with a lubricating oil conditioner connected parallel with the main oil system

Measuring instruments

include gauges and thermometers for measuring the pressures and temperatures of the circulating liquids, as well as a tachometer.

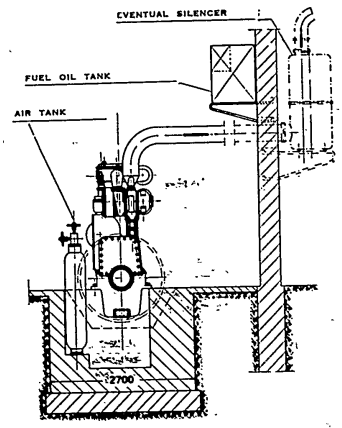
The following ACCESSORIES and SPARES are furnished with the engine:
— foundation screws
— a set of standard wrenches and all special wrenches
— eyebolts
— a hand-operated pump for testing injectors
— a thermometer and a gauge
— a stock of spare parts including: a set of valves for one engine cylinder, a set of rings for one piston, a piston with guide for injection pump with discharge valve and spring, a pin with guide for atomizer, a set of gaskets for use in the engine, a pipe for oil cooler, spares for the turbocharger.

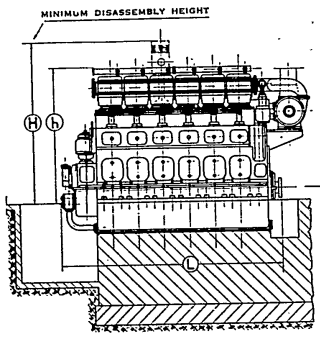
The following accessories will be furnished on demand: the pipings required for the installation, day tanks, channeled plate for covering underground passages, guards, etc.

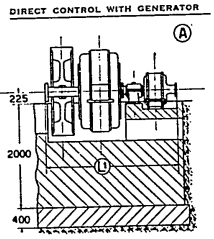
WEIGHTS AND VOLUMES

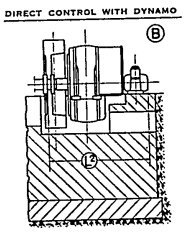
A = Naturally aspirated
S = Pressure charged

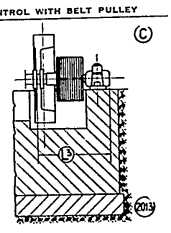
Number of cyl.	4		5		6		7		8	
	A	S	A	S	A	S	A	S	A	S
Weight of eng (dry) with acc excl flywheel T.	12,5	13,5	15	16	17,5	18,5	20	21	22,5	23,5
Weight of heaviest piece T.	3,80	3,80	4,60	4,60	5,40	5,40	6,20	6,20	7,00	7,00
Shipping volume (by sea) cu.m	34	35	36	37	38	39	41	42	44	45
cu yd.	44	46	47	48	49	51	53	54	57	58
Capacity of maintenance crane T	5	5	5	5	6	6	7	7	7	7











Consumption of Fuel in gr/HP.hr and 1bs/BHP.hr

ENGINE	LOAD		
	4/4	3/4	1/2
Naturally aspirated	165 0,364	170 0,374	180 0,396
Pressure charged	160 0,353	160 0,353	170 0,374

Consumption of lubricating oil

referred to engine full rating

Naturally aspirated 2,5 (0,005)
Pressure charged 2 (0,0044)

Allowances on above consumptions: 5 %

OVERALL DIMENSIONS OF ENGINES

		Q 34 T4	Q 34 T5	Q 34 T6	Q 34 T7	Q 34 T8
Length	L mm.	3190	3690	4190	4690	5190
	in.	125	145	164	184	203
»	L+L1 mm.	5790	6390	6890	7590	8190
	in.	227	252	272	290	321
»	L+L2 mm.	5390	5990	6490	7090	7690
	in.	211	235	254	278	307
»	L+L3 mm.	5190	5790	6290	6890	7490
	in.	203	227	246	271	294
Height H.	mm.	3045	3045	3045	3045	3045
	in.	119	119	119	119	119
Diameter of flywheel	mm.	1700	1700	1700	1700	1700
	in.	66	66	66	66	66
Height h	mm.	2550	2550	2550	2550	2550
	in.	100	100	100	100	100

STAB. POL. G. COLOMBI S.P A. - MILANO

CIRC. 87 - 1955

società costruzioni elettrotermiche industriali - novara

scei

novara | società costruzioni elettrotermiche industriali

scei

Da circa trenta anni la SCEI è attivamente operante nel settore dei forni industriali ove ha ottenuto considerevoli affermazioni anche in campo internazionale.

Accordi con case estere hanno consentito alla SCEI di completare le proprie esperienze estendendole alla soluzione dei molteplici problemi proposti ogni giorno dalle nuove esigenze dell'industria moderna.

La produzione della SCEI comprende:

- Forni elettrici od a combustione per l'industria meccanica e metallurgica;
- Forni elettrici od a combustione per l'industria della ceramica;
- Forni elettrici od a combustione per l'industria del vetro;
- Forni elettrici od a combustione per essiccamenti, per cottura vernici e per l'industria chimica;
- Impianti elettrici;
- Stampaggio lamiere.

forni per l'industria
meccanica
e metallurgica

scei

FORNI PER L'INDUSTRIA MECCANICA E METALLURGICA

FORNI DI SERIE (elettrici)

Serie LB per laboratorio, sino a 1250° C.
Serie SC per trattamenti termici, sino a 1250° C.
Serie HD per trattamenti termici, sino a 1250° C.
Serie MR per trattamenti speciali, sino a 1400° C.
Serie BS per trattamento in bagni di sali, sino a 1000° C.
Serie BSA ad elettrodi immersi, sino a 1400° C.
Serie CA per fusione alluminio, sino a 750° C.
Serie GR per ricottura in bianco, sino a 950° C.

FORNI FUORI SERIE (elettrici od a combustione)

Forni per fusioni metalli
Forni per riscaldo metalli
Forni per trattamenti termici degli acciai normali e speciali
Forni per malleabilizzazione della ghisa
Forni per trattamenti termici dell'Al. e sue leghe
Forni per trattamenti termici del Cu. e sue leghe
Generatori di atmosfera
Elettroessiccatori di gas
Forni per smaltare
Forni per essiccamento
Riscaldatori per liquidi
Forni speciali a richiesta

La SCEI costruisce i suoi impianti per funzionamento elettrico od a combustione, eccezione fatta per quasi tutti i tipi di Serie.

La SCEI avvalendosi pure delle licenze concesse da Case straniere ha assunto una posizione di primo piano nella costruzione di forni speciali (quali ad es., gli impianti per malleabilizzazione gassosa della ghisa, per trattamenti termici in atmosfera controllata, generatori di atmosfera, etc.)

Di qui la possibilità di risolvere ogni problema con le soluzioni più moderne.

FURNACES FOR THE ENGINEERING AND METALLURGICAL INDUSTRY

STANDARD ELECTRIC FURNACES

LB Type for laboratories. Max. temperature 1250° C.
SC Type for heat treating. Max. temperature 1250° C.
HD Tipe for heat treating. Max temperature 1250° C.
MR Tipe for special treating Max. temperature 1400° C.
BS Type for treating in salt solutions. Max. temperature 1000° C.
BSA Type with immersed electrodes. Max. temperature 1400° C.
CA Type for alumnium melting. Max. temperature 750° C.
GR Type for bright annealing. Max. temparature 950° C.

CUSTOM BUILT FURNACES (electric or fired operation)

Furnaces for metal melting
Furnaces for metal heating
Furnaces for heat treating of aluminium and its alloys
Furnaces for heat treating of copper and its alloys
Furnaces for heat treating of normal and special steels
Furnaces for cast malleable iron annealing
Almosphere generators
Gas electro - dryers
Furnaces for enamelling
Furnaces for drying
Liquid heaters
Special furnaces on request

SCEI plants are manufactured for electric or combustion operation, except for mass produced models. Thanks also to the licenses acquired from foreign firms, SCEI has become widely known as manufactures of special furnaces (such as, for example, plants for whiteheart malleable gaseous annealing, for heat treating under controlled atmosphere, atmosphere generators, etc.) SCEI is therefore in a position to find the most up - to - date solution to any problem arising in its field of activity.

HORNOS PARA LA INDUSTRIA MECANICA Y METALURGICA

HORNOS ELABORADOS EN SERIE (electricos)

Serie LB para laboratorio, hasta 1250° C.
Serie SC para tratamiento termico, hasta 1250° C.
Serie HD para tratamiento termico, asta 1250° C.
Serie MR para tratamiento especiales, hasha 1400° C.
Serie BS en solución de sales, asta 1000° C.
Serie BSA con electrodos sumergidos, hasta 1400° C.
Serie CA para fusión de aluminio, hasta 750° C.
Serie GR para recochura en blanco, hasta 950° C.

HORNOS ELABORADOS BAJO ORDENACION (electricos o a combustión)

Hornos para la fusion de metales
Hornos para calentamiento de metales
Hornos para tratamiento termico de los aceros normales y especiales
Hornos para la manleabilización de hierro de fundición
Hornos para el tratamiento termico del Al, y sus aleaciones
Hornos para tratamientos termicos del CU y sus aleaciones
Generadores de atmosfera
Electrosecaderos de gases
Hornos para esmaller
Hornos para la desecación
Calentadores para liquidos
Hornos especiales bajo ordenación

La SCEI construye sus grupos para el funcionamiento electrico o a combustión, haciendo excepción para los tipo de serie.

La SCEI sirviendose tambien de las concesiones de la Industrias estranjeras ha adquirido una posición de primer plano para la construcción de hornos especiales (como los grupos para la manleabilización con gases del hierro de fundición, para tratamientos termicos en atmosfera controlada, generatores de atmosfera, etc.).

De acqui estriba la posibilidad de risolver todo problema con las soluciones más modernas.

A 1

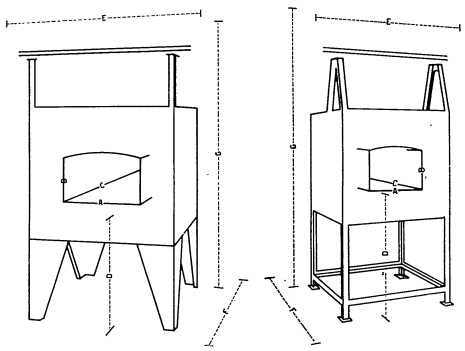
scei

forni elettrici per trattamenti termici

serie HD per temperature sino a 1000° C

Tipo	Dimensioni interne A	B	C	D	Dimensioni di ingombro E	F	G	Peso del forno escluse suole inox kg. ca	Potenza kw
HD 9 b	500	310	900	900	1500	2150	1800	1437	20
HD 12 b	500	310	1200	900	1500	2150	2100	1647	28
HD 9 c	600	410	900	900	1700	2250	1800	1663	28
HD 12 c	600	410	1200	900	1700	2250	2100	1974	35
HD 15 c	600	410	1500	900	1700	2250	2400	2308	40
HD 12 d	750	410	1200	900	1900	2250	2100	2217	40
HD 15 d	750	410	1500	900	1900	2250	2400	2505	45
HD 18 d	750	410	1800	900	1900	2250	2700	2937	50
HD 15 e	900	510	1500	900	2200	2450	2450	3050	55
HD 18 e	900	510	1800	900	2200	2450	2750	3490	65
HD 21 e	900	510	2100	900	2200	2450	3050	3950	70

a richiesta forniamo la serie HD sino a 1250° C



serie SC per temperature sino a 1000° C

Tipo	Dimensioni interne A	B	C	D	Dimensioni di ingombro E	F	G	Peso kg. ca	Potenza kw.
SC 45 a	200	150	450	950	900	1100	2150	400	5
SC 50 b	270	200	500	950	970	1150	2200	500	7
SC 65 b	270	200	650	950	970	1300	2200	600	9
SC 50 c	320	150	500	950	1020	1150	2150	500	7
SC 65 c	320	150	650	950	1020	1300	2150	600	9
SC 75 d	430	200	750	950	1130	1410	2200	800	14

a richiesta forniamo la serie SC sino a 1250° C

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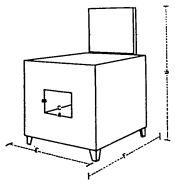
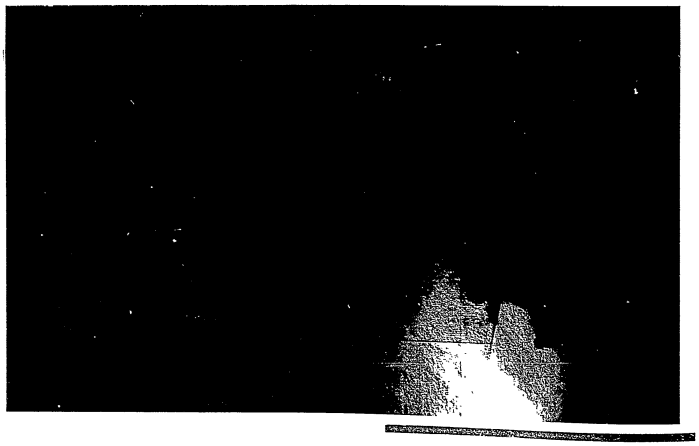
serie LB per temperature sino a 1000° C

Tipo	Dimensioni interne A	B	C	Dimensioni di ingombro E	F	G	Peso kg ca	Potenza kw.
LB 20	105	75	200	370	580	660	40	1
LB 30	135	105	300	415	690	695	75	2,3
LB 35	195	135	350	500	745	765	90	3,5

a richiesta forniamo la serie LB sino a 1250° C

tipo LB

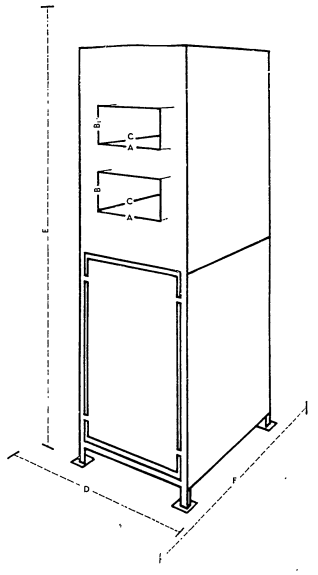




scei

forni elettrici per trattamenti acciai speciali

serie MR per temperatura sino a 1400° C



Tipo	Potenza kw.	A	B	B_1	C	D	E	F	Peso kg. ca
MR 2	7,5	180	95	110	250	1000	1950	800	450
MR 3	18	280	120	160	400	1150	2200	1150	800
MR 4	23	330	150	160	500	1200	2300	1300	1050

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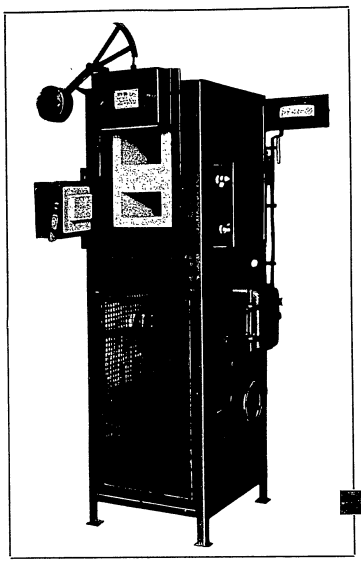
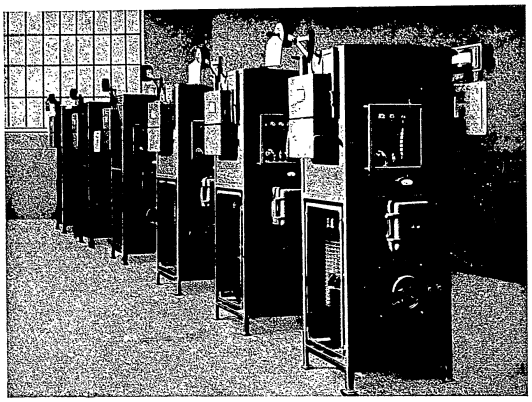


forno tipo MR 3

serie di forni tipo MR 3



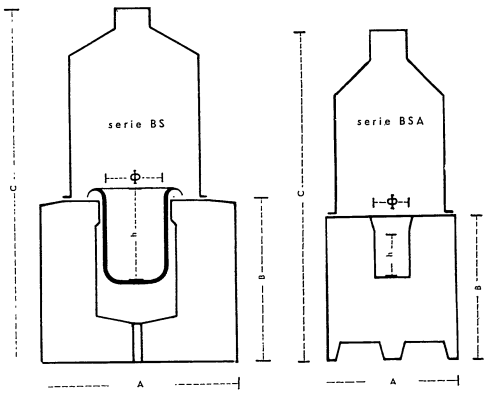
scei

forni elettrici a crogiolo

per trattamenti termici in bagno di sali

serie BS per temperature sino a 1000° C a crogiolo metallico

Dimensioni utili crogiolo Ø	h	Capacità litri	Potenza kw.	Dimensioni ingombro A	B	C	Peso totale escluso crog. kg ca
180	300	7	12	1130	780	1600	500
220	450	17	16	1130	880	1700	550
290	550	34	20	1200	880	1700	600
350	500	45	24	1300	880	1700	760
350	800	75	36	1300	1120	2000	850



serie BSA per temperature sino a 1400° C ad elettrodi immersi

Tipo	Dimensioni utili crogiolo Ø	h	Capacità litri	Potenza kw.	Dimensioni ingombro A	B	C	Peso totale kg ca
12/20	120	200	3,75	20	950	900	1900	450
20/25	200	250	10	28	1000	900	1900	600
20/35	200	350	14,50	35	1050	900	1900	700
35/50	350	500	50	80	1200	950	2150	1250

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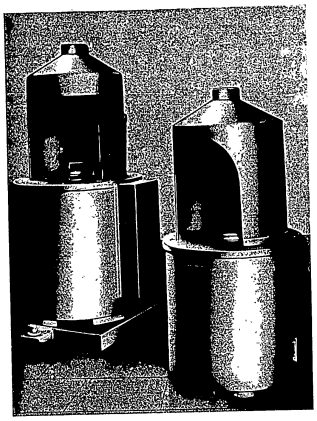
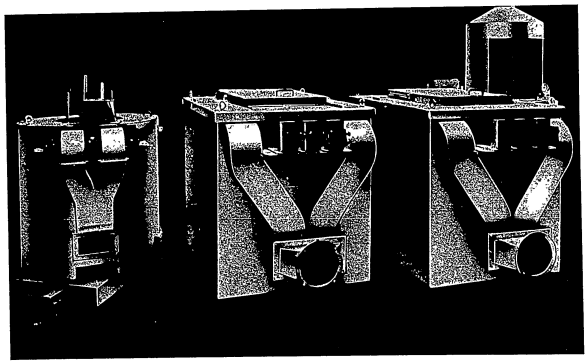


Forni per trattamenti termici in bagno di sali

Salt bath furnace

Hornos para procesos térmicos en baños de sales



A 4

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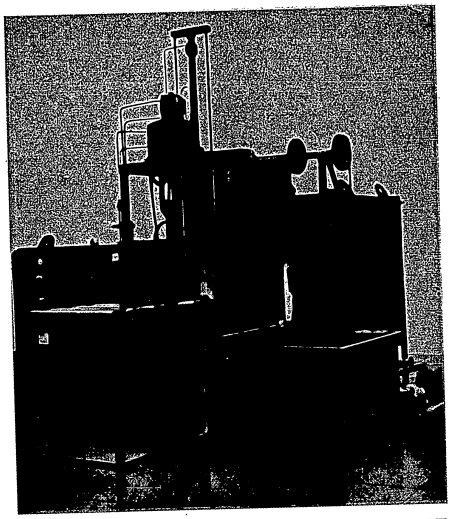
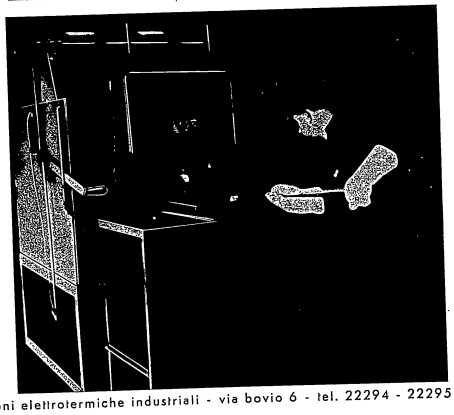


Impianto di tempera con riscaldo in atmosfera controllata

Controlled atmosphere tempering furnace

Instalación de temple con caldeo en atmosfera controlada



Forno per trattamenti termici serie HD con tenuta a cortina di fiamma

HD series flame-screened heat treatment furnace

Horno para procesos térmicos serie HD con cierre con cortina para lima

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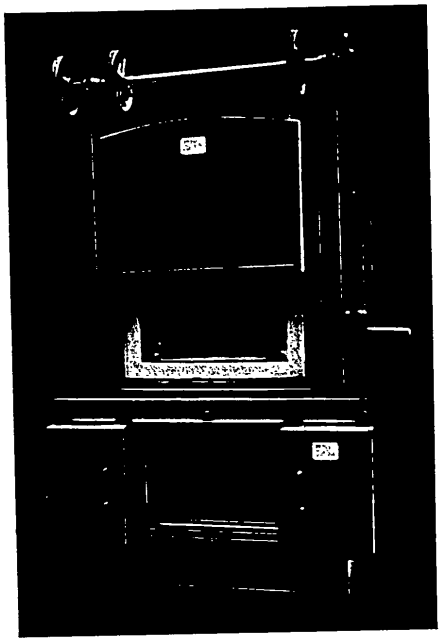
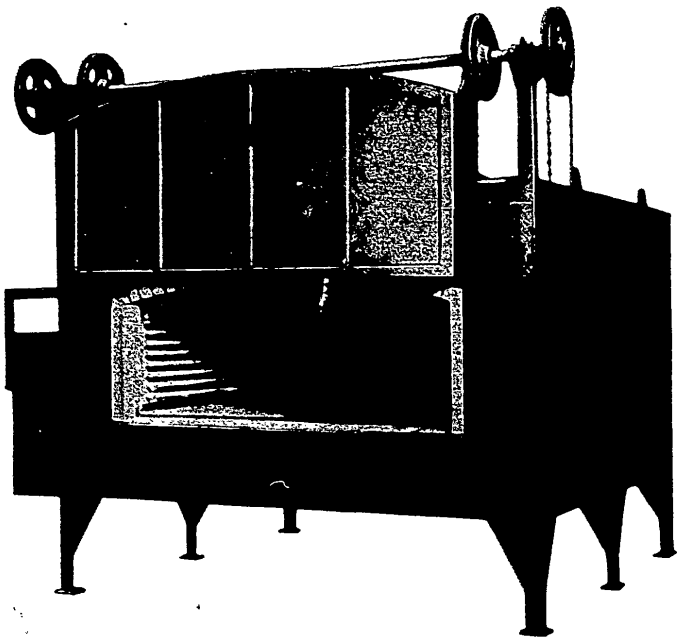
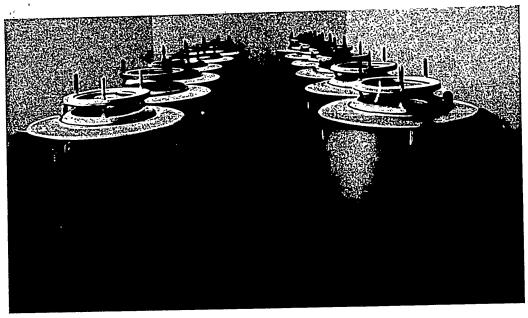


Forni serie HD speciale per trattamenti termici
Special HD series heat treatment furnaces
Hornos serie HD especial para procesos térmicos

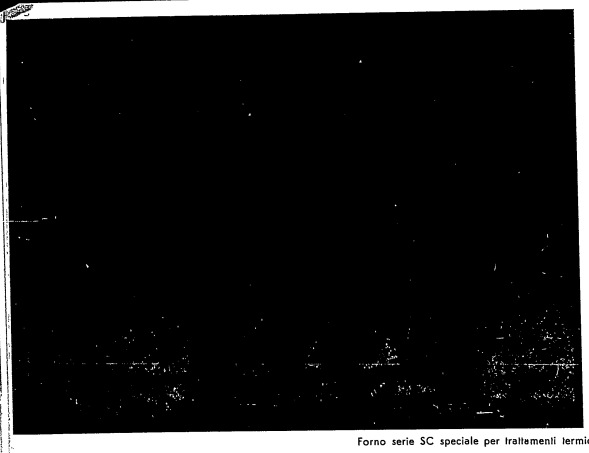




Forni in bagno di sali per ricottura bocca corpi cilindrici cavi

Salt bath annealing furnace for hollow cylinder mouths

Hornos en baños de sales para recocido boca cuerpos cilindricos huecos



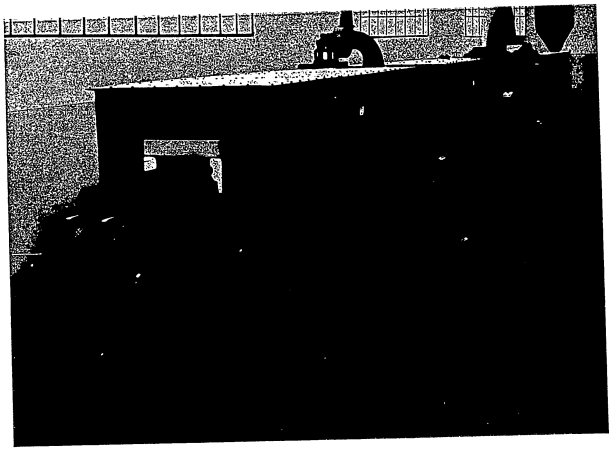
Forno serie SC speciale per trattamenti termici

Special SC series heat treatment furnace

Horno serie SC especial para procesos térmicos

A 6

scei



Impianto continuo con trasportatore a catena per tempera e normalizzazione particolari in acciaio

Continuous tempering and normalising plant with chain conveyor, for steel parts

Instalación continua con transportador de cadena para temple y normalizaciòn detalles de acero

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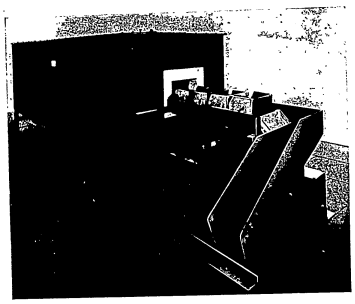
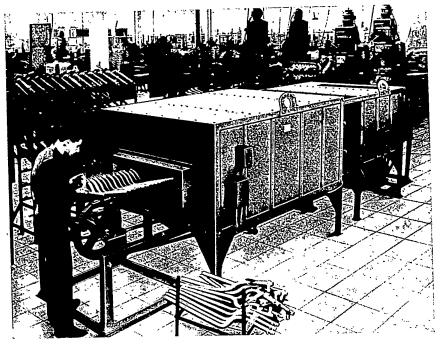
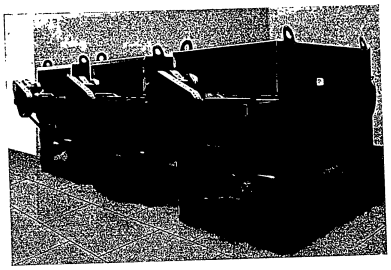


Forno per tempera forgiati acciaio (particolare scarico)
Tempering furnace for forged steel (detail of discharge)
Horno para temple forjados-acero (detalle descarga)

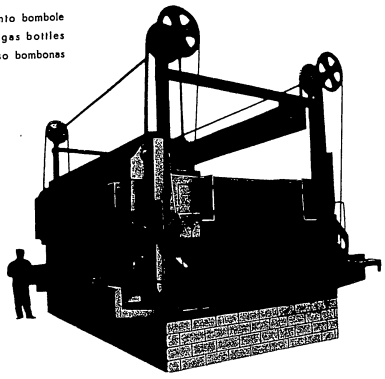


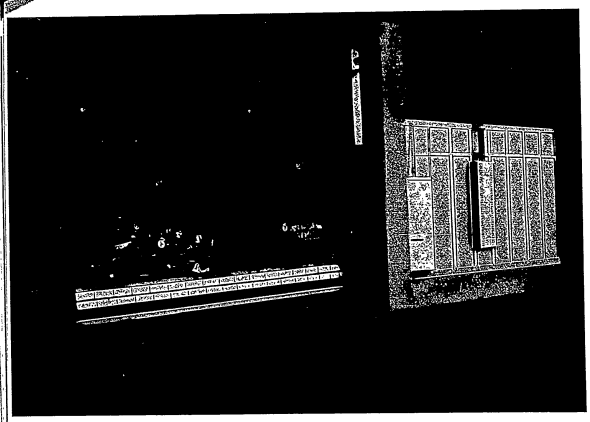
Forno elettrico continuo a tappeto per trattamento sterzi
Electric continuous furnace; belt conveyor type, for steerings treating
Horno electrico continuo a tablero, para partes de motorscooters



Forni per ricottura bossoli con avanzamento della carica a coclea
Worm feed annealing fornace for shell cases
Hornos para recocido vainas con avance de la carga por cóclea

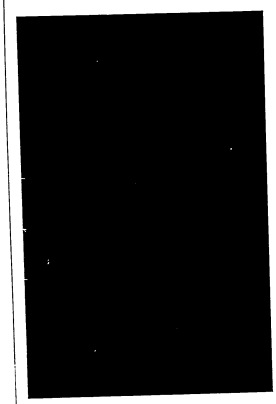
Forno elettrico per trattamento bombole
Electric furnace for treating gas bottles
Horno eléctrico para proceso bombonas



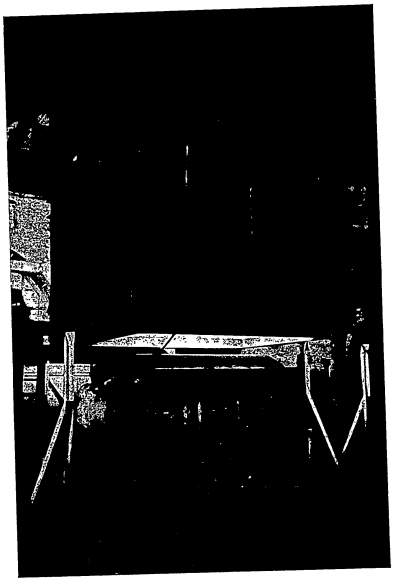


Forno elettrico a carrello per ricottura getti di ghisa
Electric bogie hearth annealing furnace for iron castings
Horno eléctrico por carrito para recocido piezas de fundición

A 9



Gruppo generatore di gas neutro per forni elettrici a campana per ricottura lamiere
Atmosphere generator for electric bell type furnaces for sheets treatment
Grupo generator de gas neutro para hornos electricos a campana para recocido chapas



Forno elettrico a campana per ricottura lamiere
Bell type electric furnace for sheets treating
Horno electrico a campana para recocido chapas

scei

scei

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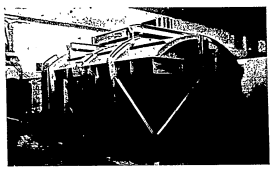
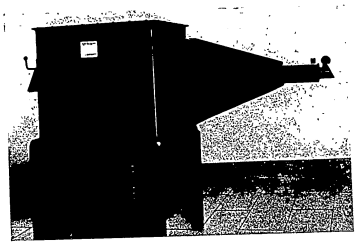


Impianto di forni elettrici a campana per trattamento lamiere in atmosfera speciale

Assembly of bell type electric furnaces for sheets treating in controlled atmosphere

Instalacion de hornos electricos a campana para recocido chapas planchas en atmosfera special

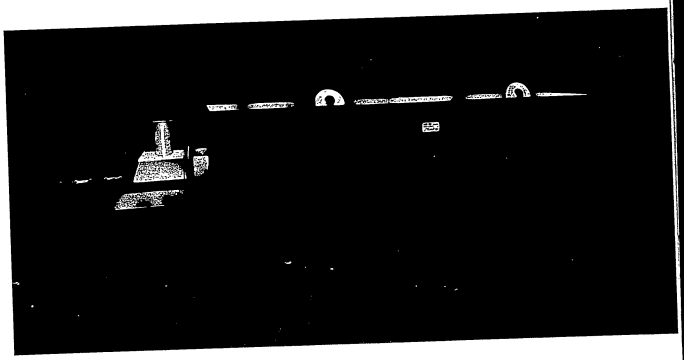
scei



Forno elettrico per brasatura sino a 1150 °C

Electric brazing furnace for temperatures up to 1150 °C

Horno eléctrico para proceso de soldatura hasta 1150 °C



Forno elettrico per brasatura particolari in alluminio

Electric brazing furnace for aluminium parts

Horno eléctrico para proceso de soldatura detalles de aluminio

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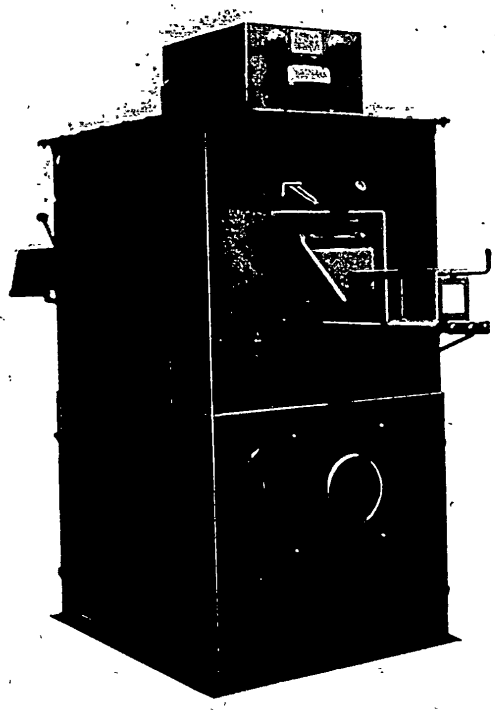
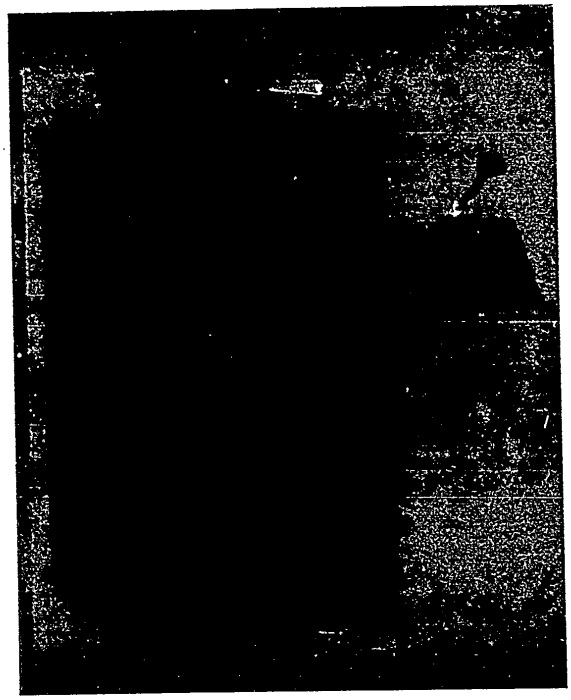


Forno elettrico continuo a passaggio per brasatura dischi di volframio

Electric continuous furnace for brazing volframic discs

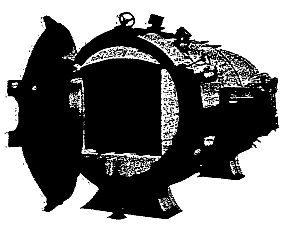
Horno electrico continuo con conducto para el abrasamiento de los discos de volframio



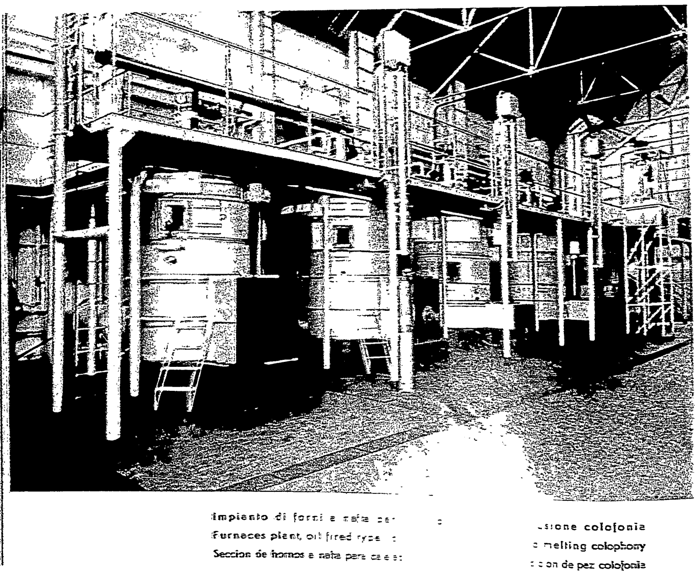
Forno elettrico continuo a passaggio per brasatura dischi di volframio

Electric continuous furnace for brazing volframic discs

Horno electrico continuo con conducto para soldatura discos de volframio



Forno elettrico per trattamenti nel vuoto
Electric furnace for treatments in vacuum
Horno electrico para tratamientos en el vacio

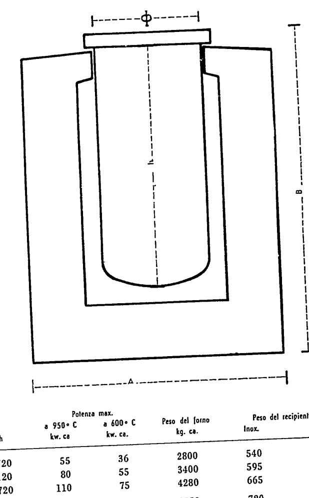


Impianto di forni a nafta per [illegible] fusione colofonia
Furnaces plant, oil fired type [illegible] melting colophony
Seccion de hornos a nafta para [illegible] fusion de pez colofonia

forni elettrici per ricottura in bianco

Tipo	Dimensioni utili Ø	h	Potenza max. a 950° C kw ca.	Potenza max. a 600° C kw. ca.	Peso del forno kg ca.	Peso del recipiente Inox.	Peso del recipiente Fe.
GR 30/70	300	720	20	14	1250	115	135
GR 30/110	300	1120	30	21	1580	125	155
GR 50/70	500	720	35	24	2100	310	360
GR 50/110	500	1120	50	34	2400	330	381
GR 50/170	500	1720	70	48	2950	370	—
GR 60/70	600	720	40	28	2300	360	410
GR 60/110	600	1120	55	36	2650	390	450
GR 60/170	600	1720	80	55	3250	430	—
GR 70/70	700	720	50	34	2500	460	530
GR 70/110	700	1120	70	47	3100	495	575
GR 70/170	700	1720	100	67	3750	555	—

tipo Gruenewald



Tipo	Dimensioni utili Ø	h	Potenza max. a 950° C kw. ca	Potenza max. a 600° C kw. ca.	Peso del forno kg. ca.	Peso del recipiente Inox.	Peso del recipiente Fe.
GR 80/70	800	720	55	36	2800	540	580
GR 80/110	800	1120	80	55	3400	595	645
GR 80/170	800	1720	110	75	4280	665	—
GR 90/70	900	720	65	44	3250	720	840
GR 90/110	900	1120	90	60	3880	795	915
GR 90/170	900	1720	125	84	4750	930	—
GR 110/70	1100	720	70	47	3700	900	1070
GR 110/110	1100	1120	100	67	4550	1005	1170
GR 110/170	1100	1720	150	100	5650	1150	—
GR 130/70	1300	720	100	67	4200	1370	1570
GR 130/110	1390	1120	140	94	5080	1600	1800
GR 130/140	1300	1420	170	114	5600	1780	—
GR 130/170	1300	1720	200	135	6150	1900	—

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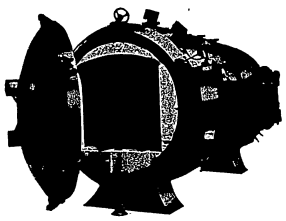


Forno elettrico per trattamenti nel vuoto
Electric furnace for treatments in vacuum
Horno electrico para tratamientos en el vacio

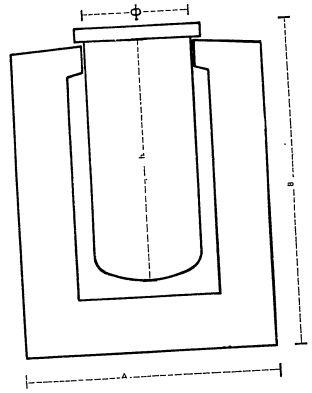
Impianto di forni a nafta per riscaldo autoclavi e fusione colofonia
Furnaces plant, oil fired type, for heating autoclaves and melting colophony
Seccion de hornos a nafta para calefacción autoclaves y para fundición de pez colofonia

scei

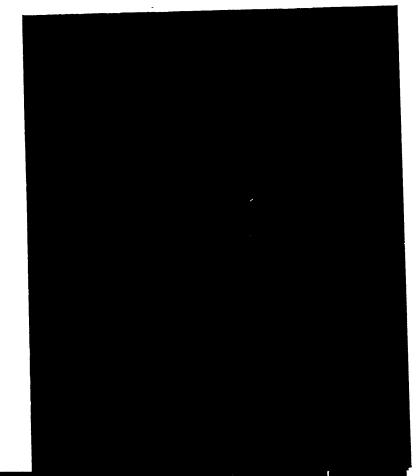
forni elettrici per ricottura in bianco

Tipo	Dimensioni utili Ø	Dimensioni utili h	Potenza max. a 950° C kw. ca.	Potenza max. a 600° C kw. ca.	Peso del forno kg. ca.	Peso del recipiente Inox.	Peso del recipiente Fe.
GR 30/70	300	720	20	14	1250	115	135
GR 30/110	300	1120	30	21	1580	125	155
GR 50/70	500	720	35	24	2100	310	360
GR 50/110	500	1120	50	34	2400	330	381
GR 50/170	500	1720	70	48	2950	370	—
GR 60/70	600	720	40	28	2300	360	410
GR 60/110	600	1120	55	36	2650	390	450
GR 60/170	600	1720	80	55	3250	430	—
GR 70/70	700	720	50	34	2500	460	530
GR 70/110	700	1120	70	47	3100	495	575
GR 70/170	700	1720	100	67	3750	555	—

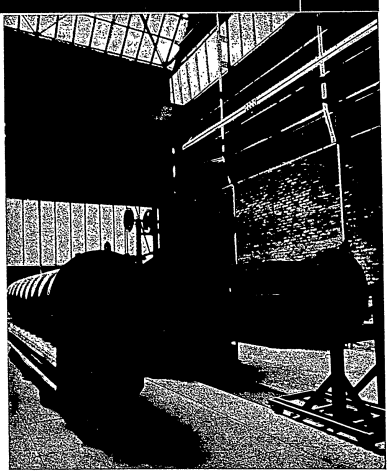
tipo Gruenewald



Tipo	Dimensioni utili Ø	Dimensioni utili h	Potenza max. a 950° C kw. ca.	Potenza max. a 600° C kw. ca.	Peso del forno kg. ca	Peso del recipiente Inox.	Peso del recipiente Fe.
GR 80/70	800	720	55	36	2800	540	580
GR 80/110	800	1120	80	52	3400	595	645
GR 80/170	800	1720	110	75	4280	665	—
GR 90/70	900	720	65	44	3250	720	840
GR 90/110	900	1120	90	60	3880	795	915
GR 90/170	900	1720	125	84	4750	930	—
GR 110/70	1100	720	70	47	3700	900	1070
GR 110/110	1100	1120	100	67	4550	1005	1170
GR 110/170	1100	1720	150	100	5650	1150	—
GR 130/70	1300	720	100	67	4200	1370	1570
GR 130/110	1390	1120	140	94	5080	1600	1800
GR 130/140	1300	1420	170	114	5600	1780	—
GR 130/170	1300	1720	200	135	6150	1900	—

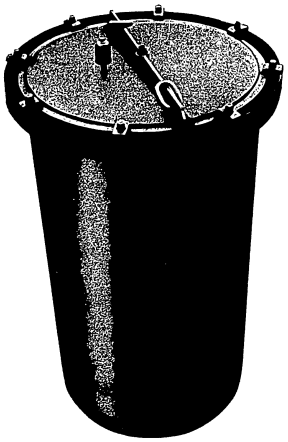


impianto Gruenewald a pozzo



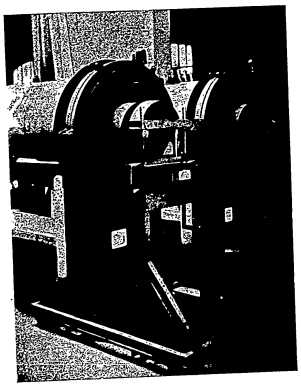
impianto Gruenewald a carro

scei



Recipiente tipo Gruenewald
Gruenewald type container
Recipiente tipo Gruenewald

Impianto con recipienti tipo Gruenewald, per ricottura in bianco
Bright annealing plant, with Gruenewald type containers
Instalacion para recochura en blanco, con calderas tipo Gruenewald



Forno tipo Gruenewald su carro; particolare dei recipienti
Gruenewald type furnace on car; containers detail
Horno de tipo Gruenewald montado sobre carro; vista parcial des recipientes

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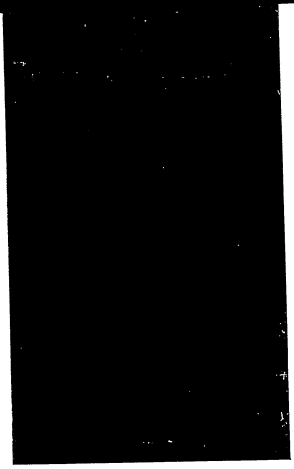


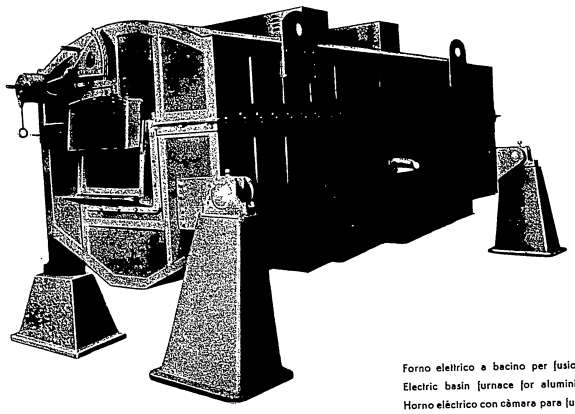
Forno serie CA tipo fisso
Fixed type CA series furnace
Horno serie CA tipo fijo

Forno serie CA tipo rovesciabile
Tylting type CA series furnace
Horno serie CA tipo móvil

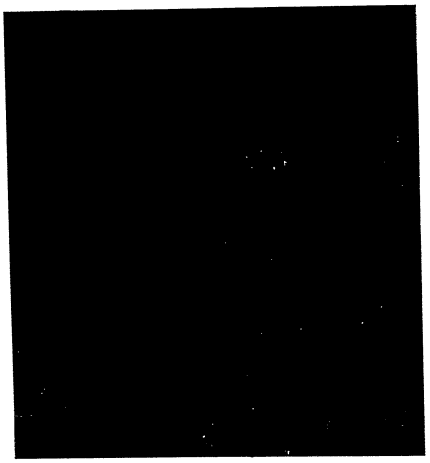
scei

Forno elettrico a bacino per fusione di alluminio e sue leghe
Bowl electric furnace for melting aluminium and aluminium alloys
Horno electrico a cuenca para la fundicion de aluminio y sus aleaciones

scei



Forno elettrico a bacino per fusione alluminio
Electric basin furnace for aluminium smelting
Horno eléctrico con cámara para fusión aluminio



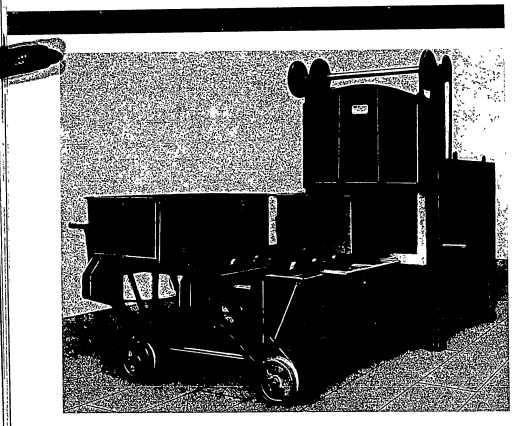
Forno elettrico a bacino per riposo alluminio fuso
Electric basin furnace for setting cast aluminium
Horno eléctrico con cámara para descanso aluminio fundido

Forni a ciclone tipo a pozzo per trattamenti termici alluminio
Cyclone pit furnace for aluminium heat treatment
Hornos de ciclón tipo con pozo para procesos térmicos aluminio

Forno elettrico a circolazione forzata di aria per trattamento foglie di molle a balestra

Forced air convection electric furnace for leaf springs heat treating

Horno electrico a convección forzada de aire para el tratamiento de hojas de muelles a ballesta

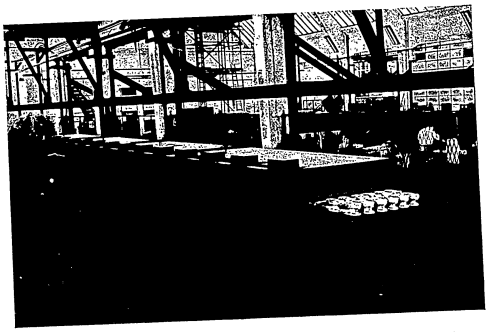


Forno elettrico a circolazione forzata di aria per trattamenti termici

Electric furnace with forced air circulation for heat treating

Horno electrico con convección forzada de aire para tratamientos termicos

scei



Forno elettrico continuo a tappeto trasportatore per trattamento parti di motore in leghe leggere

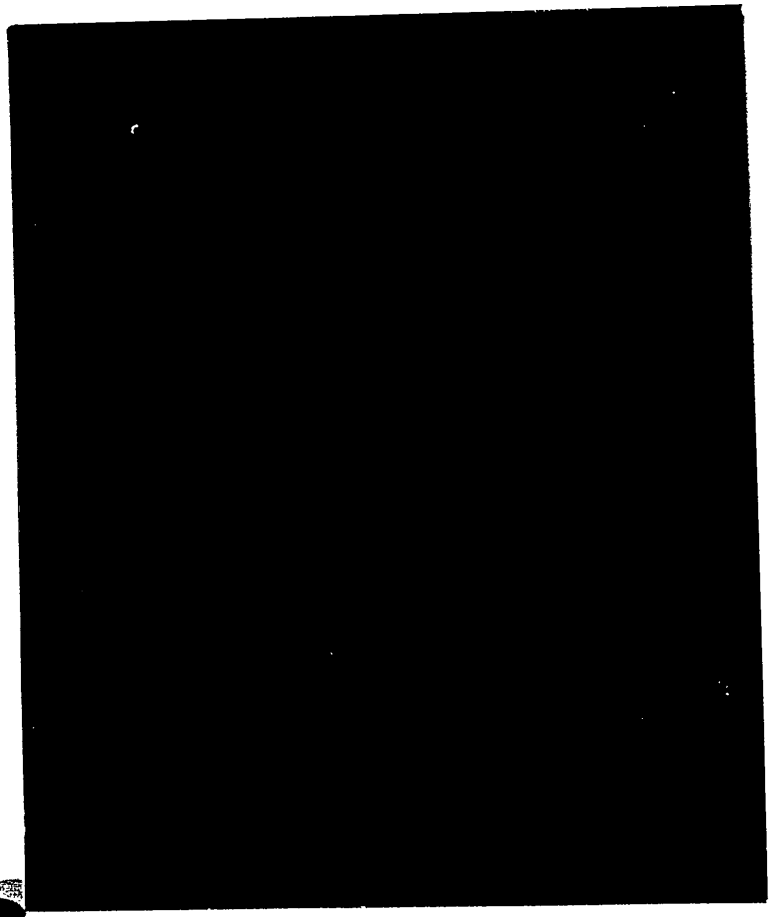
Continuous electric furnace, belt conveyor sistem, for heat treating motor pieces, alluminium alloys

Horno electrico continuo a tablero transportador, para tratamiento termico de partes de motor en aleaciones livianas

Forno elettrico per invecchiamento recipienti estrusi, in leghe leggere

Electric furnace for ageing of aluminium alloys extruded containers

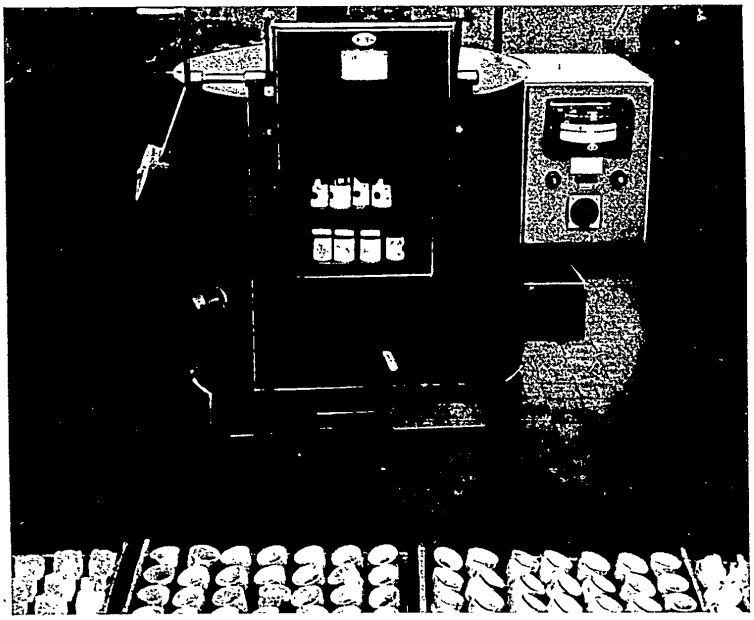
Horno electrico para envejecimiento envases extrusos, en aleaciones livianas



Forno elettrico per riscaldo placche di alluminio; a due porte

Electric furnace for heat treating of aluminium plates; two doors

Horno electrico para planchas en aluminio; a dos puertas

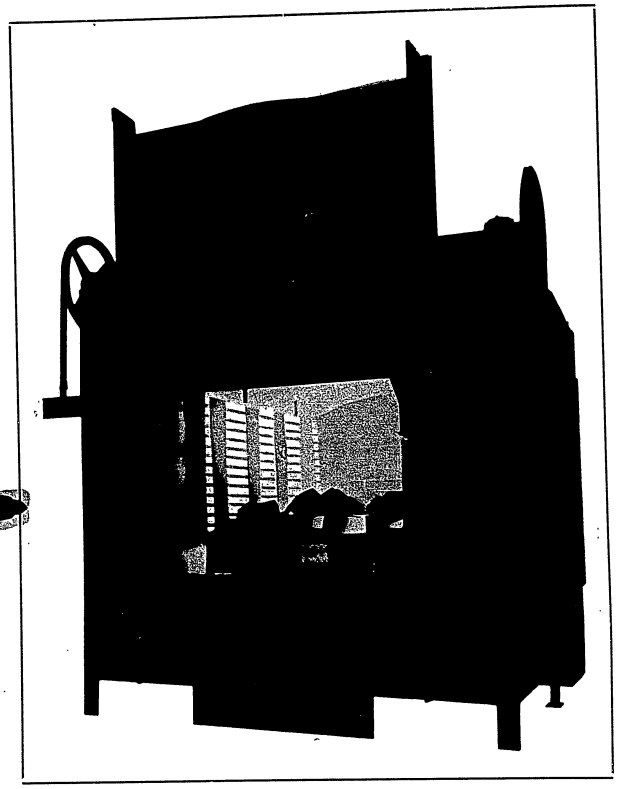


Forno elettrico rotativo per trattamento pistoni

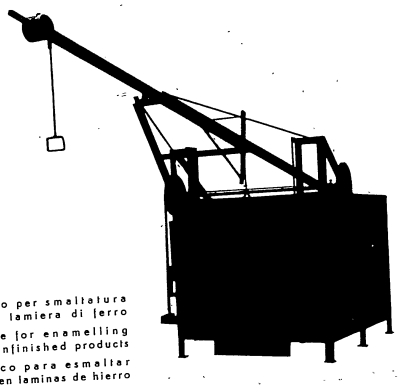
Rotating electric furnace for pistons heat treating

Horno electrico rotativo para tratamiento pistones

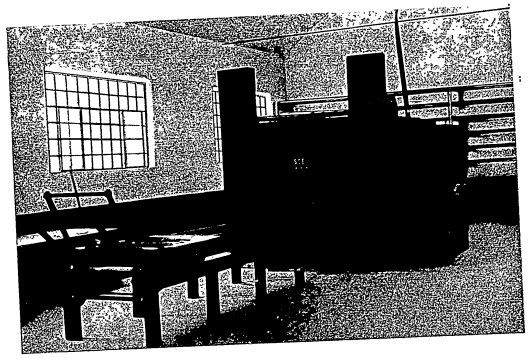
scei



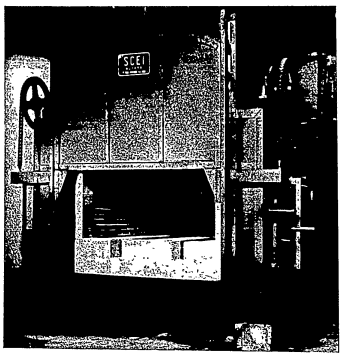
Forno elettrico per smaltatura pezzi in ghisa
Electric furnace for iron enamelling
Horno electrico para esmaltar hierro de fundicion



Forno elettrico per smaltatura semilavorati in lamiera di ferro
Electric furnace for enamelling of steel sheets unfinished products
Horno electrico para esmaltar semielaborados en laminas de hierro



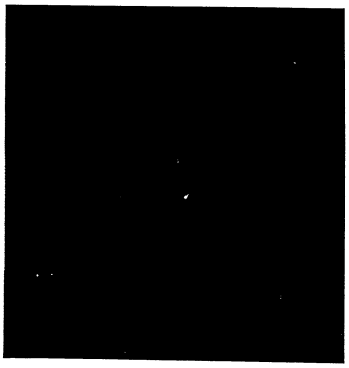
Forno elettrico per smaltatura semilavorati in lamiera di ferro
Electric furnace for enamelling of steel sheet unfinished products
Horno electrico para esmaltar simielaborados en laminas de hierro



Forno elettrico per smaltatura semilavorati in lamiera di ferro

Electric furnace for enamelling of steel sheet unfinished products

Horno electrico para esmaltar semielaborados en laminas de hierro

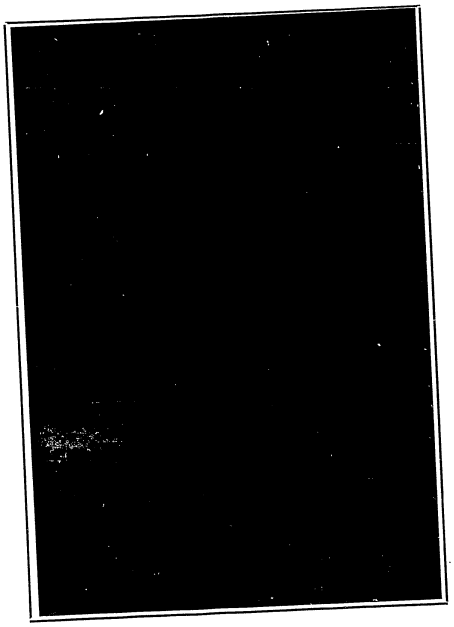


Forno elettrico per smaltatura ghisa

Electric furnace for iron enamelling

Horno electrico para esmaltar hierro de fundicion

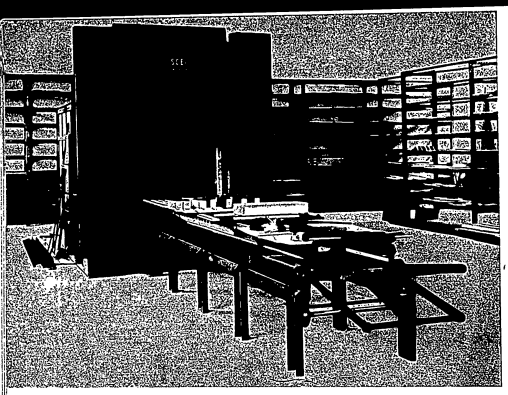
scei



Forno elettrico per smaltatura piccoli pezzi artistici

Electric furnace for enamelling of small artistic wares

Horno electrico para esmaltar pequeñas piezas artisticas

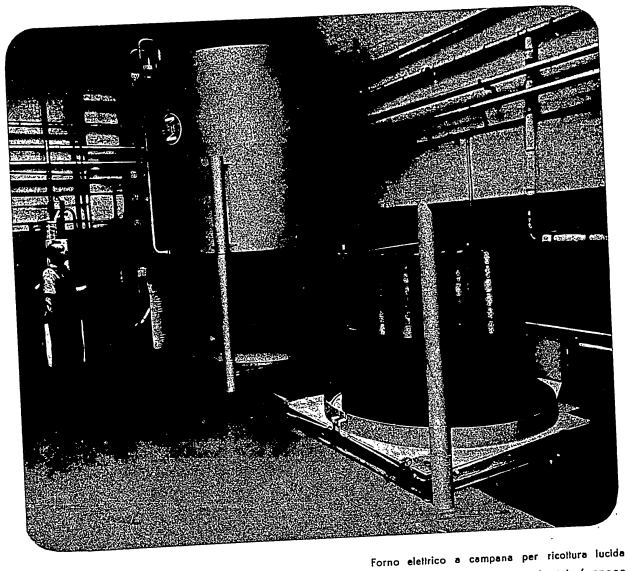


Forno elettrico per smaltatura parti di fornelli domestici in lamiera di ferro
Electric furnace for enamelling of domestic stoves parts of steel sheets
Horno electrico para esmaltar piezas para hornillos domesticos en plancha

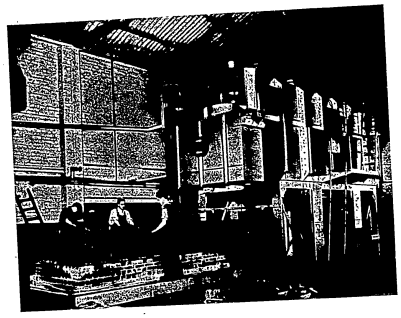
Forno elettrico per smaltatura ghisa
Electric furnace for enamelling iron
Horno electrico para esmaltar hierro de fundicion

scei

Costruzione, per l'Italia, di impianti su licenza Birlec L.td - Birmingham (England)



Forno elettrico a campana per ricottura lucida
Bright annealing bell type electric furnace
Horno electrico a campana para recochura brillante
(LIC. BIRLEC)

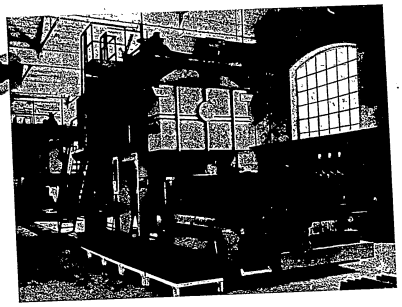


Forno elettrico a suola mobile per malleabilizzazione gassosa della ghisa a cuor bianco

Elevator type electric furnace for the gaseous malleabilizing of whiteheart malleable iron castings

Horno electrico con planta mobile para manleabilizacòn, por medio de gas, de hierro de fundicion "alma blanca,,

(LIC. BIRLEC)



Forno elettrico a suola mobile per malleabilizzazione gassosa della ghisa a cuor bianco

Elevator type electric furnace for the gaseous malleabilizing of whiteheart malleable iron castings

Horno electrico con planta mobile para manleabilizaciòn, por medio de gas, de hierro de fundicion "alma blanca,

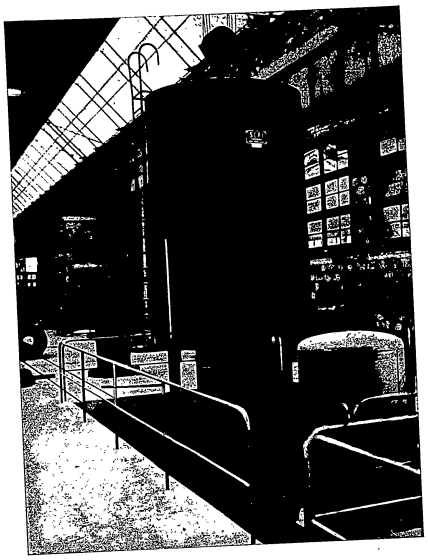
(LIC. BIRLEC)

Reparto forni elettrici per malleabilizzazione gassosa della ghisa

Electric furnaces department for gaseous malleabilizing

Seccion de hornos electricos para manleabilizaciòn de hierro de fundicion

(LIC. BIRLEC)

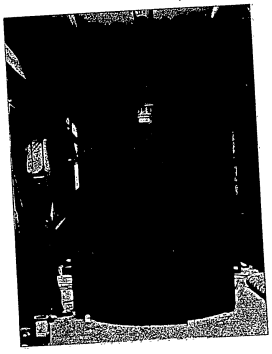


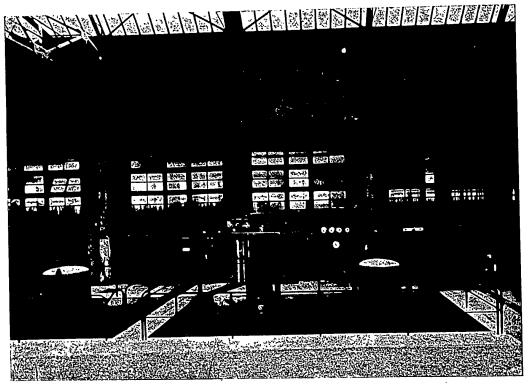
Forno elettrico a campana per ricottura nastro acciaio in atmosfera controllata

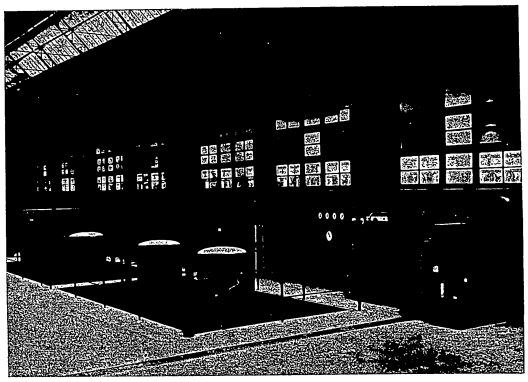
Electric bell type furnace for steel strap annealing in controlled atmosphere

Horno electrico a campana para tratamiento cinta de acero en atmosfera controlada

(LIC. BIRLEC)

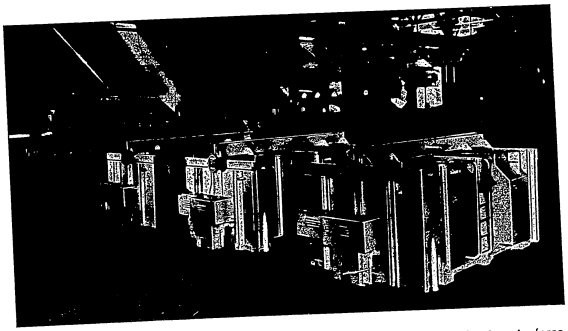






Impianto per ricottura lucida nastro acciaio, completo di generatore di atmosfera e di lectrodryer
Strap steel bright annealing plant with atmosphere generator and lectrodryer
Instalacion para recochura brillante cinta de acero, completa de generador de atmosfera y lectrodryer
(LIC. BIRLEC)

Forno elettrico continuo con trasportatore a maglie per la ricottura lucida di lamiere in rame
Electric continuous mesh belt conveyor furnace for annealing copper sheets
Horno electrico continuo con transportador a red de acero, para la recochura brillante de laminas de cobre
(LIC. BIRLEC)



Forni elettrici intermittenti per ricottura lucida lamiere in ferro
Electric batch type bright annealing furnaces for steel sheets
Hornos intermitentes para recochura brillante de laminas de hierro
(LIC. BIRLEC)

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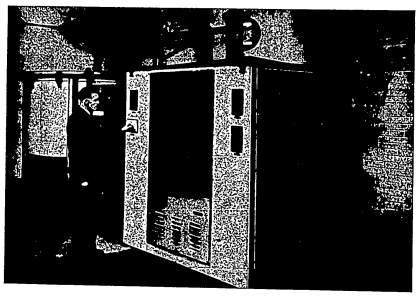
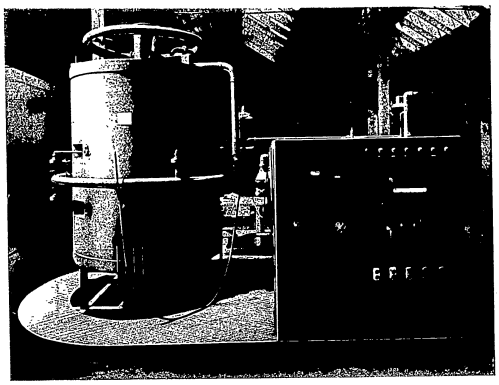
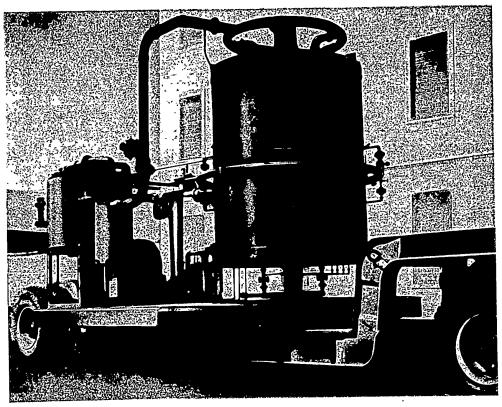


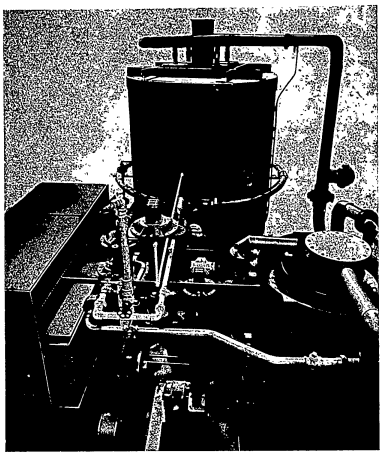
Generatore di atmosfera endotermica da 84 mc. ora
3000 c. f. h. endothermic atmosphere generator
Generador de atmosfera endotermica, productor de 84 mc/h
(LIC. BIRLEC)

Forno a pozzo per cementazione gassosa, con riscaldamento a tubi radianti a combustione di gas, carica in estrazione
Gas fired, radiant tubes gas carburizing furnace; charge unloading
Horno de pozo para cementacion con gas, calentacion por medio de tubos radiantes, a combustion; descarga de material
(LIC. BIRLEC)





Generatore di atmosfera endotermica da 115 mc. ora
115 mc. hour endothermic atmosphere generator
Generador de atmosfera endotermica, productor de 115 mc. hora
(LIC. BIRLEC)

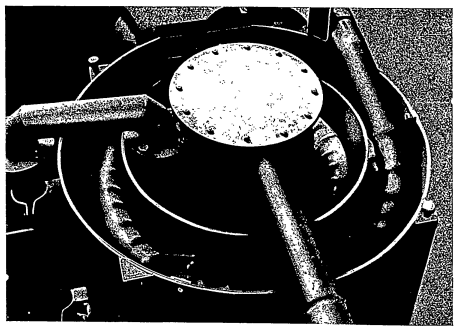


Generatore endotermico da 115 mc. ora; interno con raffreddatore

115 mc. hour endotermic atmosphere generator; internal part with cooling

Generador de atmosfera endotermica para 115 mc. hora; interior con refrigerante

(LIC. BIRLEC)

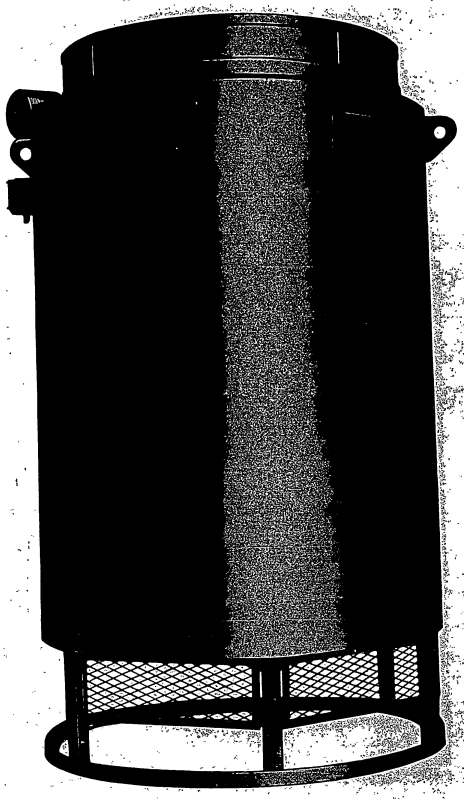


Particolare della serpentina del raffreddatore

Cooling coil detail

Perticular de las serpentines en el refrigerante

scei

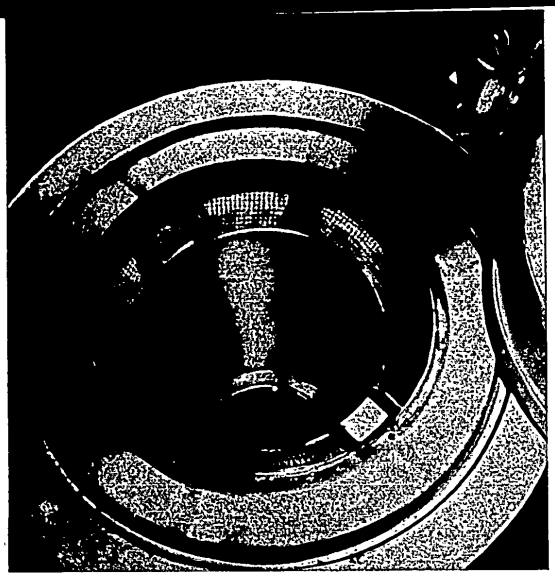


Forno a ventilazione per rinvenimento dopo cementazione

Ventilation furnace for normalising after casehardening

Horno con ventilaciòn para revirado después de la cementanciòn

(LIC. BIRLEC)

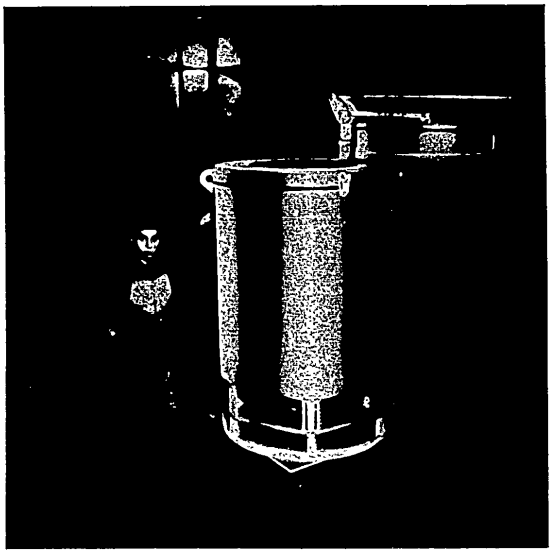


Forno a ventilazione per rinvenimento dopo cementazione

Ventilation furnace for normalising after casehardening

Horno con ventilaciòn para revirado después de la cementaciòn

(LIC. BIRLEC)

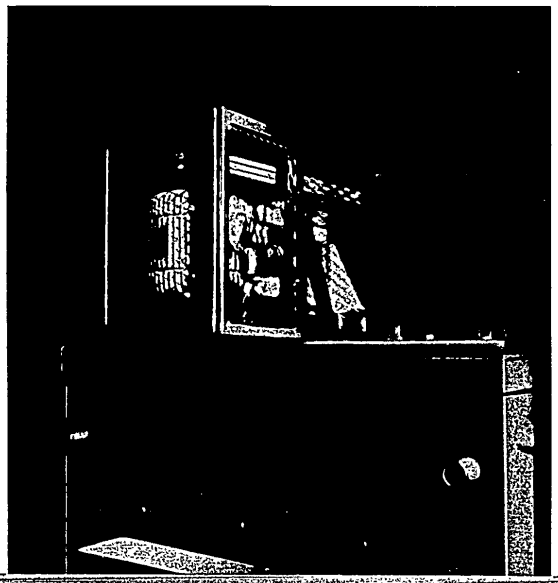


Forno preriscaldo per tempera martensitica

Preheating furnace for martensitic tempering

Horno precaldeo para temple martensitico

(LIC. BIRLEC)



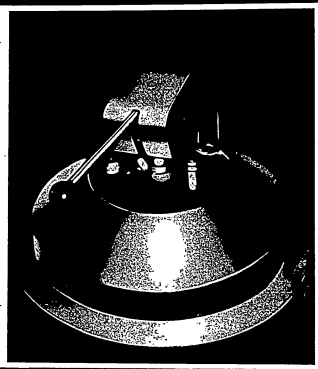
Vasca per tempera martensitica

Martensitic quenching bath

Càmara para temple martensitico

(LIC. BIRLEC)

scei

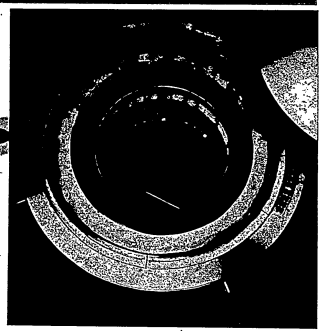


Particolari forno per cementazione gassosa o nitrurazione
Porta di chiusura

Details of gaseous casehardening or nitrading furnace - door

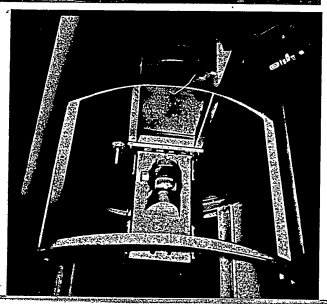
Detalles horno para cementación gaseosa o nitruración
Puerta de cierre

(LIC. BIRLEC)



Bocca di carico
Charing hole
Boca de carga

(LIC. BIRLEC)

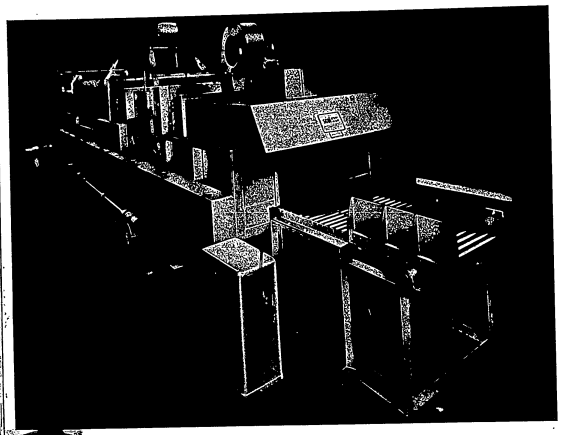


Gruppo ventilante
Ventilation unit
Grupo de ventilación

(LIC. BIRLEC)

Forni continui a tappeto per tempera e rinvenimento pezzi forgiati
Continuous band hardening and drawing furnace for forged parts
Hornos continuos de cinta para temple y revirado piezas forjadas

(LIC. BIRLEC)

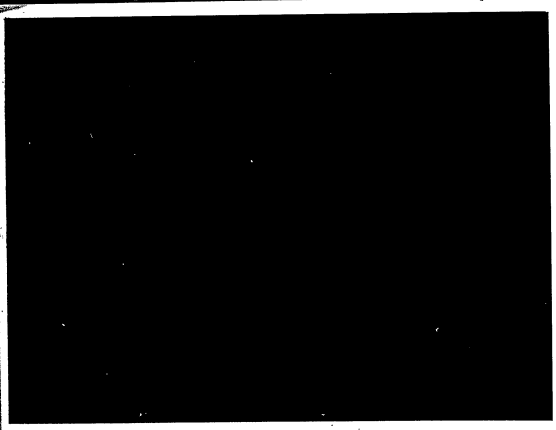


Forno continuo a rulli per normalizzazione acciai

Continuous roller furnace for normalising steels

Horno continuo de rodillos para normalizaciòn aceros

(LIC. BIRLEC)



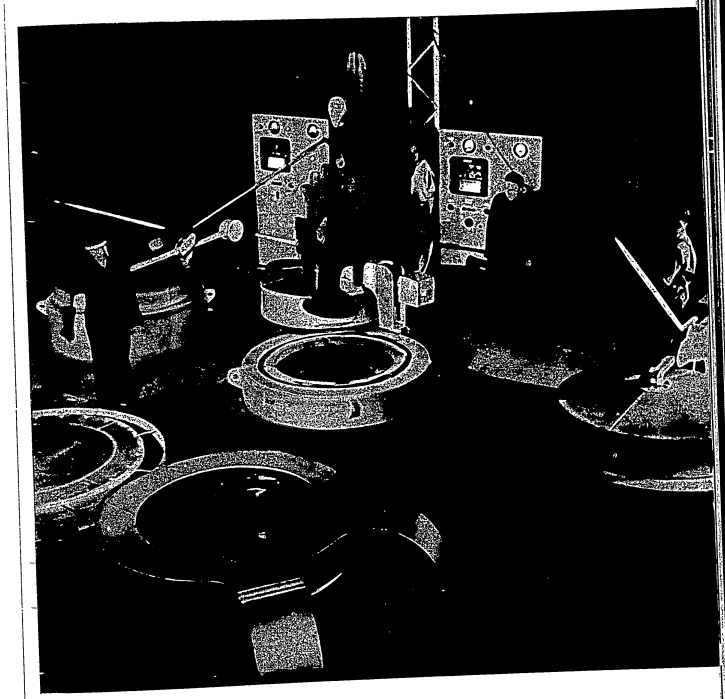
Forno continuo a rulli per normalizzazione acciai

Continuous roller furnace for normalising steels

Horno continuo de rodillos para normalizaciòn aceros

(LIC. BIRLEC)

scei

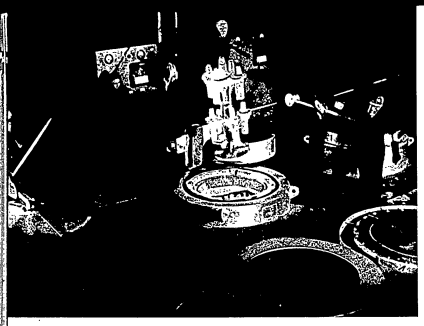


Forno a pozzo per riscaldo tempera di semilavorati e vasca di spegnimento in olio

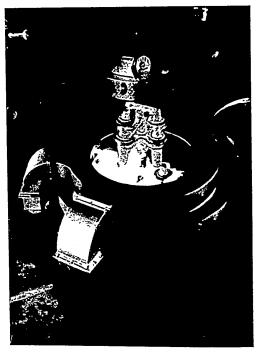
Pit type furnace for hardening with oil quench tank

Horno con pozo para calefaccion temple de semielaborados y camara para apagamiento en aceite

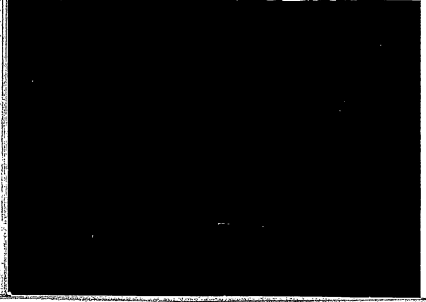
(LIC. BIRLEC)



Forno di tempera a pozzo
Pit type furnace for hardening
Horno para temple con pozo
(LIC. BIRLEC)

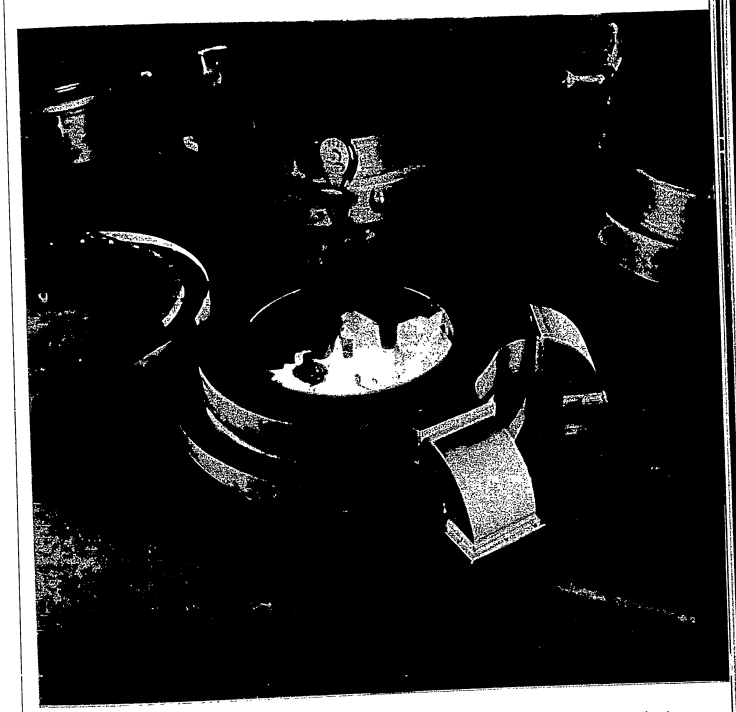


Vasca di tempera in olio per detto
Oil quench tank for above
Camara para temple en aceite por dicho horno
(LIC. BIRLEC)



Forno continuo a rulli per normalizzazione
Continuous roller hearth furnace for normalizing
Horno continuo de rodillos para normalizaiócn
(LIC. BIRLEC)

scei



Vasca di tempera in olio con tubazioni per aspirazione fumi
Oil quench tank with fumes suction system
Camara para temple en aceite con tuberias para aspiracion de los humos
(LIC. BIRLEC)

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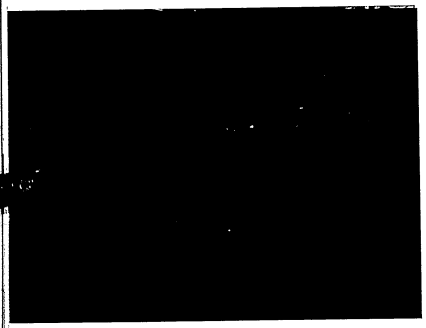


Impianto continuo automatico su doppia linea, per tempera o per ricottura isotermica di semilavorati in acciaio

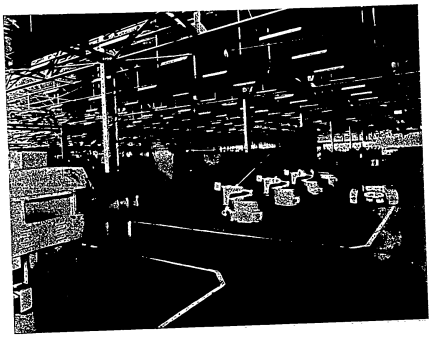
Continuous automatic plant in two lines, for hardening or isothermic annealing

Instalación continua automática sobre doble linea para temple o para recochura isoterma semielaborados de acero

(LIC. BIRLEC)

A 3

scei



Batteria di forni a pozzo per normalizzazione e tempera

Battery of pit type furnace for normalizing and hardening

Bateria de hornos con pozo para normalización y temple

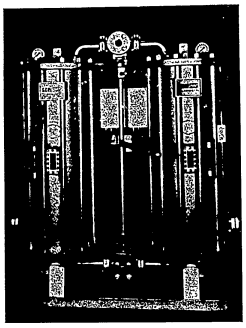
(LIC. BIRLEC)

Batteria di forni a pozzo per cementazione gassosa

Battery of gas carburising pit type furnaces

Bateria de hornos con pozo para cementación gaseosa

(LIC. BIRLEC)

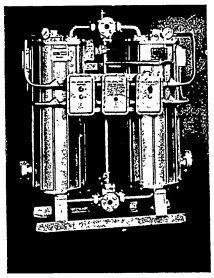


Essiccatore per aria compressa a 20 Ate
- comando manuale - costruzione stagna

Compressed air dryer to operate at 20 Atm
- manual control - fully sealed construction

Secadero para aire comprimido de 20 Atm
- mande de mano - construcción estanca

(LICENZA BIRLEC)

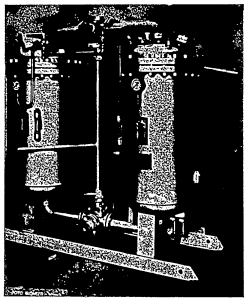


Essiccatore per gas idrogeno compresso a 10 Ate
- comando manuale - costruzione antideflagrante

Hydrogen gas Dryer for 10 Atm operation
- manual control - explosion-proof design

Secadero para gas hidrógeno comprimido a 10 Atm
- mando de mano - construcción antideflagrante

(LICENZA BIRLEC)



Essiccatore per aria compressa a 20 Ate
- comando manuale - costruzione stagna

Compressed air dryer for 20 Atm operation
- manual control - fully sealed construction

Secadero para aire comprimido de 20 Atm
- mando de mano - construcción estanca

(LICENZA BIRLEC)

scei

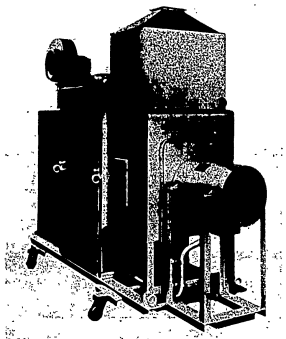
A 41

Condizionatore d'aria: aria trattata 25.400 Nmc/h - acqua assorbita a 20 °C: 203 Kg/h - Riattivazione elettrica o a vapore

Air dehumidifier: air processed 25.400 Nmc/h - water absorbed at 20 °C: 203 Kg/h - Electric or steam reactivation

Dehumedecedor de aire: aire tratado 25.400 Nmc/h - agua absorbida a 20 °C: 203 Kg/h - Reactivación eléctrica o por vapor

(LICENZA BIRLEC)

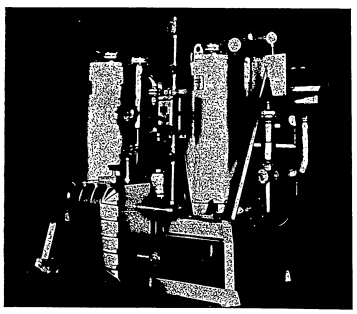


Deumidificatore di aria, per condizionamento ambiente - funzionamento automatico

Air dehumidifier - fully automatic

Dehumedecedor de aire, para acondicionamiento ambiente - funcionamiento automático

(LICENZA BIRLEC)

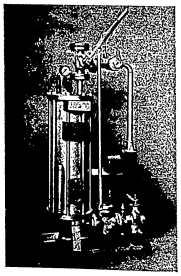


Essiccatore per gas idrogeno 7 Ate - comando manuale - costruzione normale

Hydrogen dryer - 7 Atm - manual control - standard construction

Secadero para gas hidrógeno - 7 Atm - mando de mano - construcción normal

(LICENZA BIRLEC)



Essiccatore per aria a bassa pressione - comando automatico - costruzione antideflagrante

Low pressure air dryer - automatic control - explosion-proof design

Secadero para aire a baja presión - mando automático - construcción antideflagrante

(LICENZA BIRLEC)

forni per l'industria della ceramica

scei

FORNI PER L'INDUSTRIA DELLA CERAMICA

FORNI INTERMITTENTI DI SERIE

Serie CR, sino a 1000° C, funzionamento elettrico.
Serie CRS, sino a 1280° C, funzionamento elettrico (con suola fissa o mobile).
Serie CRG per laboratorio, sino a 1400° C, funzionamento elettrico.
Serie CRM e, sino a 1300° C, funzionamento a gas metano (brevettato).
Serie CRF, sino a 1400° C, funzionamento a nafta (brevettato).

FORNI CONTINUI

Forni a passaggio, sino a 1200° C, funzionamento elettrico od a combustione.
Forni a galleria con suola mobile a carrello, sino a 1400° C, funzionamento elettrico od a combustione.
Forni a suola rotante, sino a 1200° C, funzionamento elettrico od a combustione.
Essiccatoi elettrici od a combustione.

I forni intermittenti SCEI sono adatti per modeste produzioni e risolvono tutti i problemi di cottura interessanti i Maestri d'Arte, le Scuole ceramiche, gli Artigiani, etc.

I forni continui SCEI consentono invece di soddisfare tutte le esigenze delle medie e grandi produzioni.

Le prestazioni offerte dai forni SCEI per ceramiche si estendono dalla cottura delle maioliche e terraglie a quella delle porcellane.

FURNACES FOR THE CERAMIC INDUSTRY

STANDARD BATCH TYPE FURNACES

CR type. Max. temperature 1000° C. Electric operation.
CRS type. Max. temperature 1250° C. Electric operation.
CRM e type. Max. temperature 1400° C. Gas operation (patented).

CONTINUOUS TYPE FURNACES

Sliding plates type furnaces. Electric or combustion operation.
Car type tunnel furnaces. Electric or combustion operation.
Rotating hearth furnaces. Electric or combustion operation.
Electric or combustion dryers.

SCEI intermittent furnaces are suitable for small scale production and enable artists, ceramic schools, craftsmen, etc. to solve all their firing problems.

On the other hand, SCEI continuous furnaces meet all the requirements for medium and large scale production.

The performance of SCEI furnaces for ceramic products includes the firing of majolica, earthenware and porcelains.

HORNOS PARA LA INDUSTRIA DE CERAMICAS

HORNOS INTERMITENTES ELABORADOS EN SERIE

Serie CR, hasta 1000° C, funcionamiento electrico.
Serie CRS, hasta 1250° C, funcionamiento electrico.
Serie CRM e, hasta 1400° C, funcionamiento a gas (patentado).

HORNOS CONTINUOS

Hornos con pasaje, funcionamiento electrico e a combustión.
Hornos con tunel, con planta mobil a vagonetas, funcionamiento electrico o a combustión.
Hornos con planta giratoria, funcionamiento electrico o a combustión.
Secaderos electricos o a combustión.

Los hornos intermitents SCEI están construidos particularmente para pequeñas produciones y resuelven los problemas de cochura que interesan los Profesores des Artes, las Escuelas Ceramicas, los Artesanes, ect.

Los hornos continuos SCEI permiten de satisfacer todas las exigencias de las medies y grandes producciones.

Las prestaciones ofrecidas por los hornos SCEI para ceramicas van desde la cochura de mayolicas y lozas a la de las porcelanas.

B 1

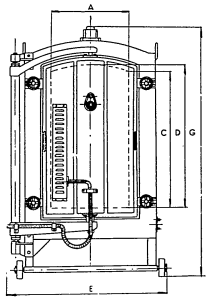
scei

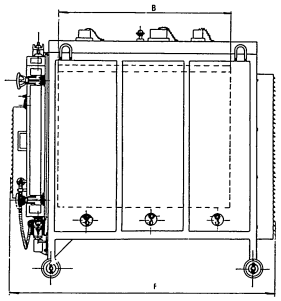
forni elettrici per cottura ceramica

serie CR per temperature sino a 1000° C

sui forni CR sono installati resistori metallici in piastre chiuse

Tipo	Dimensioni A	B	C	D	E	F	G	Capacità di muffola mc	Potenza kw	Peso kg. ca
CR 9	350	560	500	480	960	1300	1440	0,096	8	550
CR 16	360	730	600	620	970	1500	1560	0,16	10,5	750
CR 25	450	850	610	635	1120	1650	1660	0,24	14	950
CR 50	570	1150	730	775	1240	1950	1800	0,19	22	1450
CR 75	680	1150	1000	1060	1350	1950	2000	0,80	30	1800
CR 100	680	1350	1120	1180	1350	2150	2120	1,05	37	2200
CR 120	680	1350	1240	1300	1350	2150	2230	1,16	43	2400
CR 200	800	1800	1320	1420	1510	2600	2290	2,00	70	3200
CR 225	880	1800	1320	1425	1590	2600	2290	2,17	80	3400
CR 300	880	2200	1580	1685	1590	3000	2560	3,14	95	4300





serie CRS per temperature sino a 1280° C

sui forni CRS sono installati resistori metallici in piastre aperte

Tipo	Dimensioni interne A	B	C	D	Capacità di muffola mc	Temperatura massima 1000° C Dimensioni di ingombro E	F	G	Peso kg. ca	Potenza kw.	Temperatura massima 1150° C Dimensioni di ingombro E	F	G	Peso kg. ca	Potenza kw.	1280° C Potenza kw.
CRS 0,25	95	200	130	130	0,0024	400	640	430	60	1	500	725	530	90	1,5	1,8
CRS 2,5	280	380	240	265	0,025	730	1030	870	350	5	790	1090	930	450	6	7
CRS 10	380	500	480	515	0,100	1030	1220	1540	620	7,5	1140	1305	1660	830	8	11
CRS 18	380	740	600	635	0,180	1040	1470	1630	850	11	1150	1555	1750	1200	13	15
CRS 27	500	860	600	645	0,270	1160	1590	1640	1050	13	1270	1675	1760	1350	15,5	18
CRS 50	620	1100	720	785	0,520	1280	1860	1780	1450	21,5	1390	1945	1900	1850	26	30
CRS 75	620	1220	960	1025	0,760	1280	1970	1940	1800	29	1390	2055	2060	2250	35	40
CRS 100	630	1460	1080	1145	1,030	1280	2210	2090	2100	36	1400	2295	2210	2550	43	50
CRS 150	750	1580	1200	1285	1,500	1400	2330	2200	2700	51	1510	2415	2320	3300	61	70
CRS 200	750	1940	1320	1405	2,000	1450	2710	2280	3200	66	1560	2795	2400	3900	79	90
CRS 250	870	2060	1440	1545	2,700	1560	2820	2410	3750	80	1680	2905	2530	4600	96	110
CRS 300	870	2180	1560	1665	3,090	1560	2940	2530	4200	90	1680	3025	2650	5200	108	125

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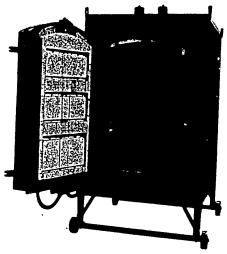
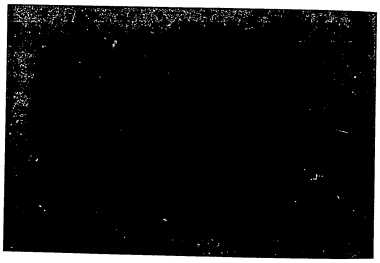


Forno elettrico intermittente serie C R

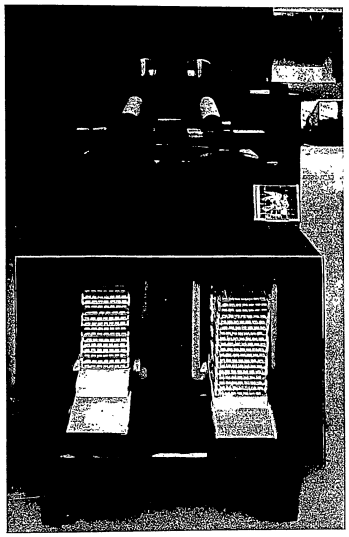


Forno elettrico intermittente serie CRS

Forno elettrico intermittente
con suola mobile a carrello

B 1 - 1

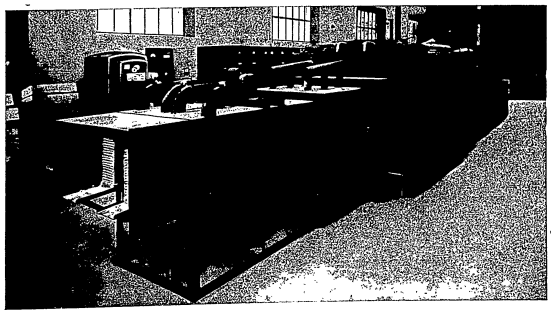
scei



Forno elettrico continuo a passaggio, bicanale, per mosaico

Double tunnel continuous electric furnace, slinding plates type, for mosaic

Horno electrico continuo, bicanal, con conducto, para mosaico



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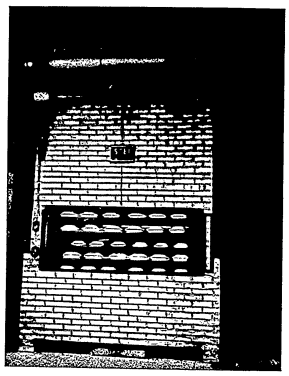
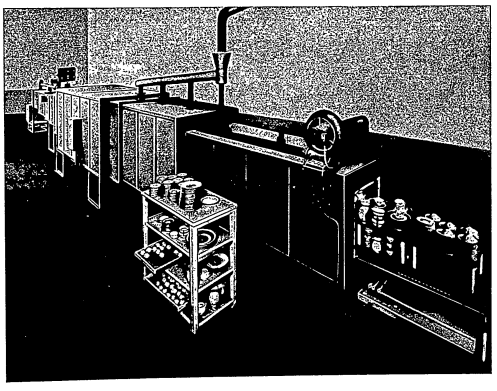
scei



Essicatoi elettrici continui per piatti
Continuous electric dryers for dishes
Secaderos electricos continuos para platos



Forni continui elettrici a passaggio, per cottura decorazione su porcellana
Continuous electric furnaces, sliding plates type, for firing decoration on china ware
Hornos electricos continuos, con conducto, para cocer decoraciones sobre porcelana

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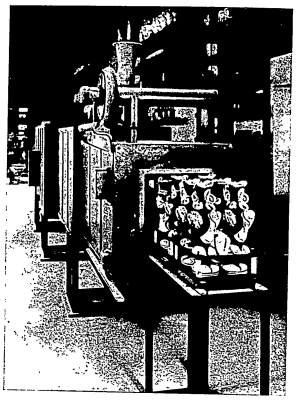
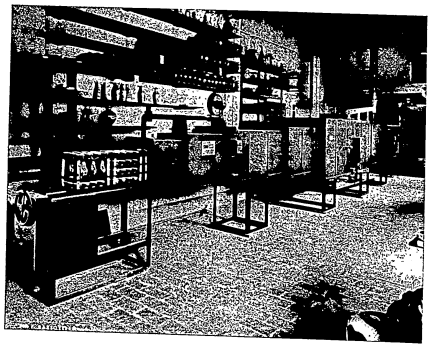
scei



Forno continuo elettrico, a passaggio, per cottura decorazione su ceramiche

Continuous electric furnace, sliding plates type, for decoration on artistic wares

Horno electrico continuo, con conducto, para cocer decoraciones sobre ceramicas



Forno elettrico continuo monocanale per cottura decorazione su porcellana

Single tunnel continuous electric furnace for firing decoration on china ware

Horno electrico continuo monocanal para cocer decoraciones sobre porcellana

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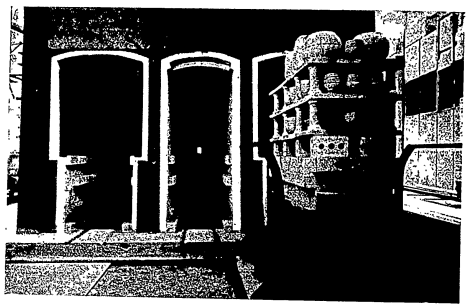
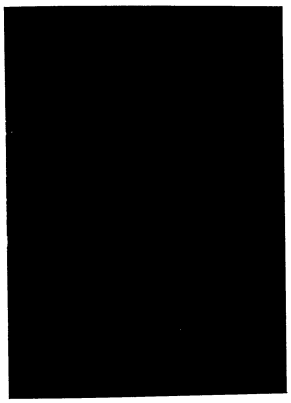


Forno elettrico continuo tricanale per cottura ceramica a 1280° C
Triple tunnel continuous electric furnace for firing ceramics at 1280° C
Horno electrico continuo tricanal para ceramicas a 1280° C

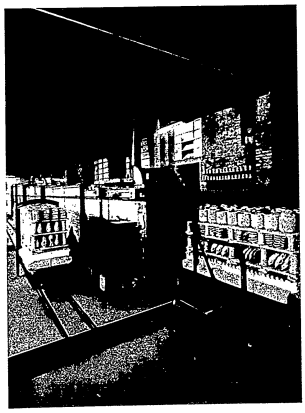
Forno elettrico continuo bicanale per cottura sanitari e stoviglierie
Double tunnel continuous electric furnace for sanitary wares and potteries
Horno electrico continuo bicanal para sanitarios y alfarerias

B 1,4

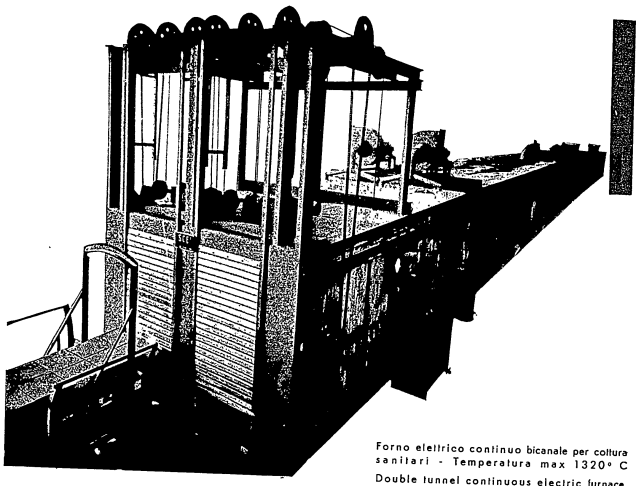
scei



Forno elettrico continuo monocanale per cottura oro su stoviglie
Single tunnel continuous electric furnace, for firing gold on potteries
Horno electrico continuo monocanal para cocer oro sobre platos y juegos



Forno elettrico continuo monocanale per cottura ceramiche artistiche
Single tunnel continuous electric furnace for artistic wares
Horno electrico continuo monocanal para cocer ceramicas artisticas



Forno elettrico continuo bicanale per cottura sanitari - Temperatura max 1320° C

Double tunnel continuous electric furnace, for sanitary wares - Temp. max 1320° C

Horno electrico continuo bicanal para sanitarios - Temp. max 1320° C

Forno elettrico continuo tricanale per cottura sanitari - Temp. 1280° C

Triple tunnel continuous electric furnace, for sanitary wares - Temp. 1280° C

Horno electrico continuo tricanal, para platos y sanitarios - Temp. 1280° C

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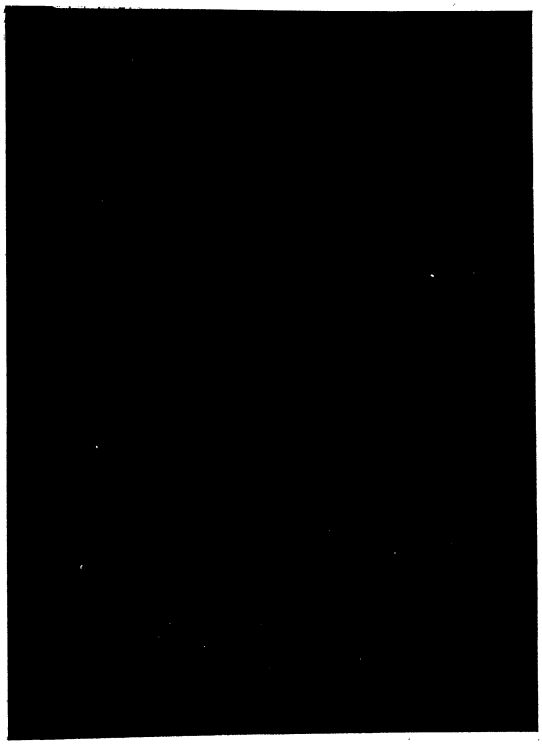

Forno elettrico continuo monocanale per cottura decorazione su ceramica

Single tunnel continuous electric furnace for firing decoration on ceramic

Horno electrico continuo monocanal para cocer decoraciones sobre ceramicas

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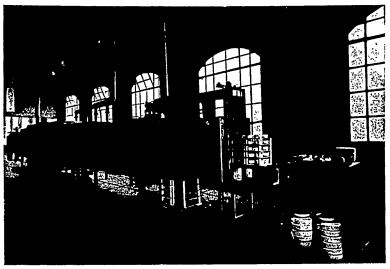


Forno continuo a metano, a passaggio, per cottura ceramiche

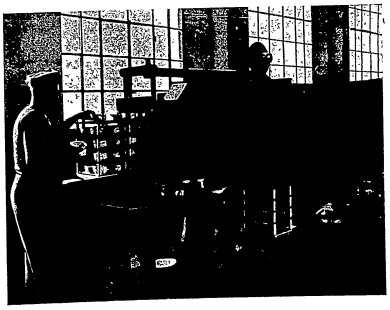
Continuous methane gas heated furnace, sliding plates type, for firing ceramic wares

Horno continuo a metano, con conducto, para ceramicas

Assieme di forni a metano, intermittente e continuo, per cottura ceramiche e porcellane

Assembly of methane gas heated furnaces, continuous and batch type, for firing ceramic wares and porcelains

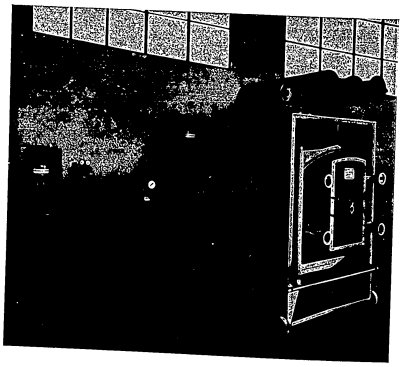
Conjunto de hornos a metano, intermitente y continuo, para cocer ceramicas y porcelanas



Forno continuo a metano, a passaggio, per cottura ceramiche

Continuous methane gas heated furnace, sliding plates type, for firing ceramic wares

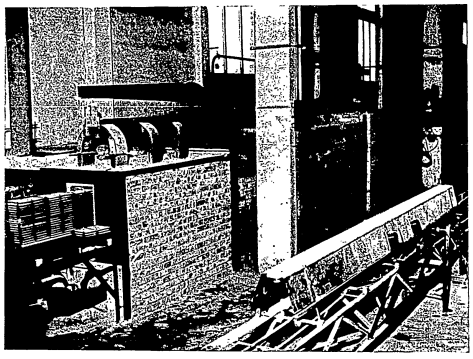
Horno continuo a metano, con conducto, para ceramicas



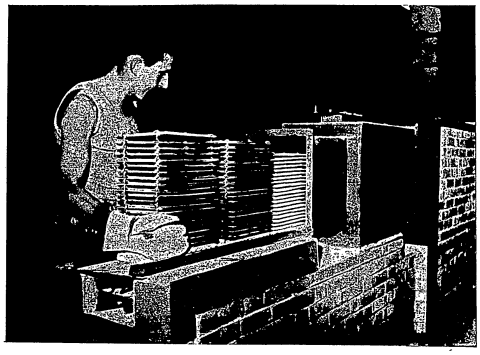
Forno intermittente a metano; temperatura 1400° C, per porcellana dura

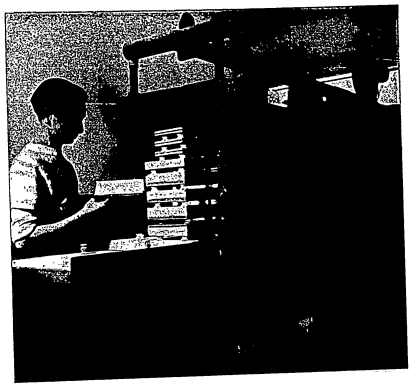
Methane gas heated furnace, batch type; temperature 1400° C, for firing porcelains

Horno intermitente de metano; temperadura 1400° C, para cocer porcelanas

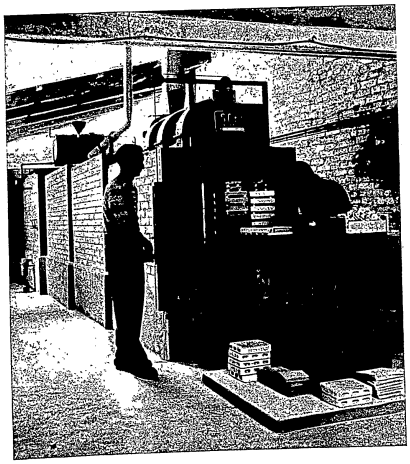


Forno continuo a metano per cottura piastrelle
Continuous methane gas furnace for firing wall tiles
Horno continuo a metano para cocer azulejos





Forno continuo a nafta per cottura piastrelle
Continuous fuel heated furnace for firing wall tiles
Horno continuo a nafta para cocer azulejos



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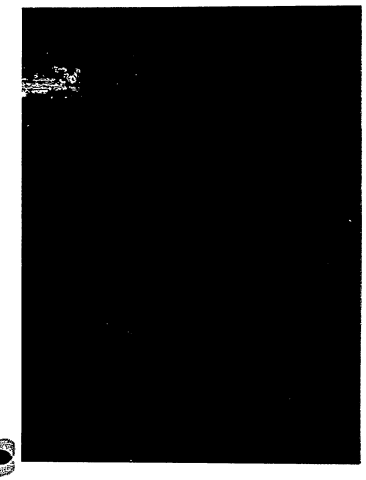
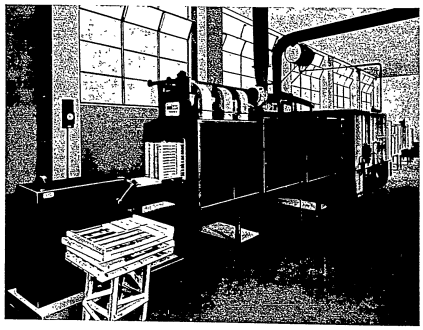


Forno continuo a passaggio, a nafta, per cottura smalto su piastrelle

Continuous fuel fired furnace, sliding plates type, for firing enamel on wall tiles

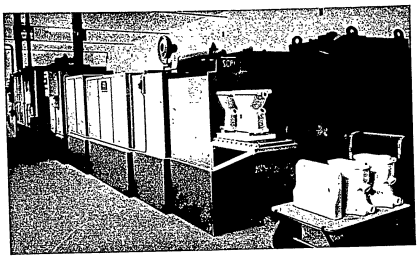
Horno continuo a nafta, con conducto, para cocer esmalte sobre azulejos



Forno continuo a passaggio, a nafta, per cottura smalto su piastrelle

Continuous fuel fired furnace, sliding plates type, for firing enamel on wall tiles

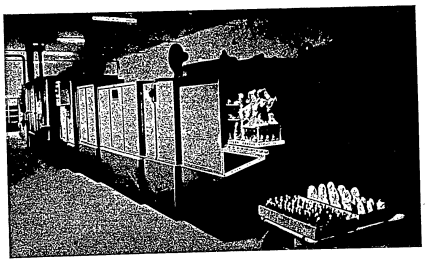
Horno continuo a nafta, con conducto, para cocer esmalte sobre azulejos



Forno continuo a nafta, a passaggio, per cottura sanitari

Continuous fuel fired furnace, sliding plates type, for sanitary wares

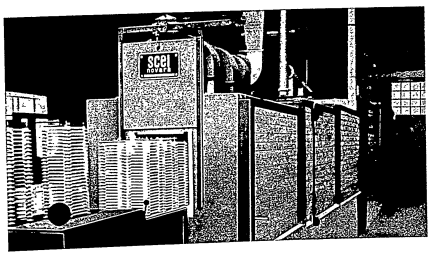
Horno continuo a nafta, con conducto, para cocer sanitarios



Forno continuo a nafta a passaggio, per cottura ceramiche artistiche

Continuous fuel fired furnace, sliding plates type, for artistic wares

Horno continuo a nafta, con conducto, para cocer ceramicas artisticas



Forno continuo a nafta, a passaggio, per cottura piastrelle da rivestimento

Continuous fuel fired furnace, sliding plates type, for wall tiles

Horno continuo a nafta, con conducto, para cocer azulejos

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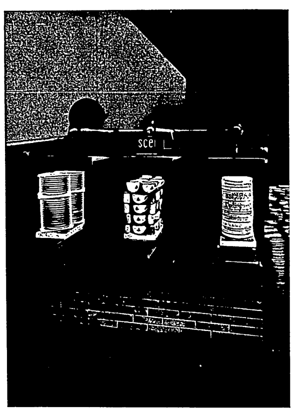
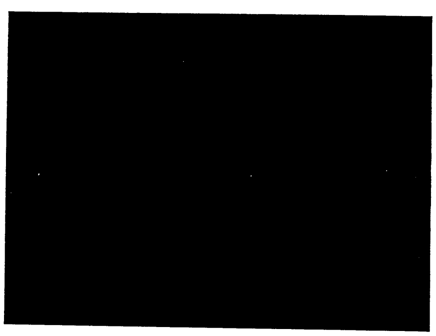


Forno continuo tricanale a passaggio, a combustione di nafta, per cottura stoviglierie

Triple tunnel continuous fueld fired furnace, sliding plates type, for firing potteries

Horno continuo tricanal a nafta, con conducto, para cocer afarerías



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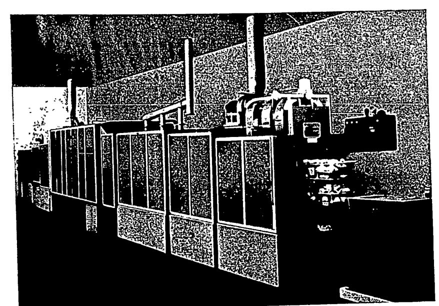
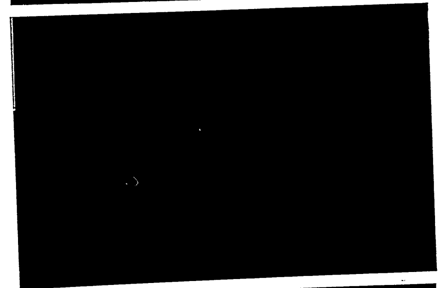


Forno continuo a nafta, a passaggio, per cottura ceramiche artistiche

Continuous fuel fired furnace, sliding plates type, for artistic wares

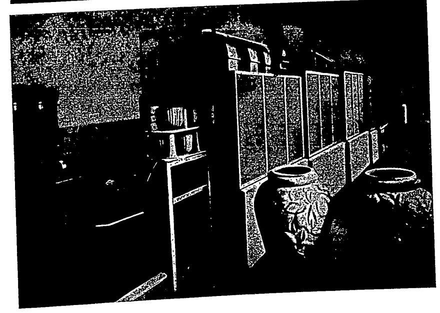
Horno continuo a nafta, con conducto, para cocer ceramicas artisticas



Forno continuo a nafta, a passaggio, per cottura ceramiche artistiche

Continuous fuel fired furnace, sliding plates type, for artistic wares

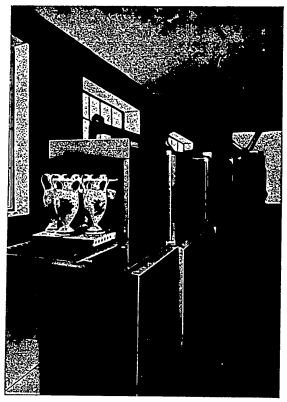
Horno continuo a nafta, con conducto, para cocer ceramicas artisticas



Forno continuo a nafta, a passaggio, per cottura ceramiche artistiche

Continuous fuel fired furnace, sliding plates type, for artistic wares

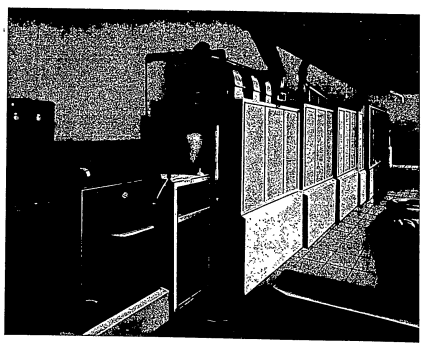
Horno continuo a nafta, con conducto, para cocer ceramicas artisticas



Forno continuo a nafta, a passaggio, per cottura decorazione su ceramica

Continuous fuel fired furnace, sliding plates type, for firing decoration on ceramic

Horno continuo a nafta, con conducto, para cocer decoraciones sobre ceramicas



Forno continuo a nafta, a passaggio, per cottura maiolica

Continuous fuel fired furnace, sliding plates type, for firing white crockery

Horno continuo a nafta, con conducto, para cocer mayólica

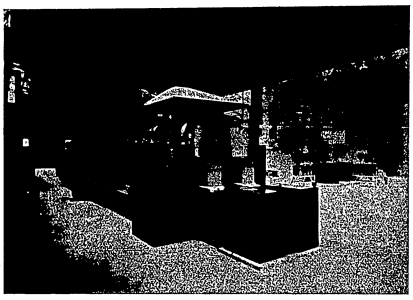
scei

Impianto a nafta per cottura piastrelle di maiolica, a biscotto ed a smaltato

Oil-fired kilns for majolica tiles bisque and enamel firing

Instalación de hornos continuos a nafta, para cocer azulejos, a bizcocho y esmaltado

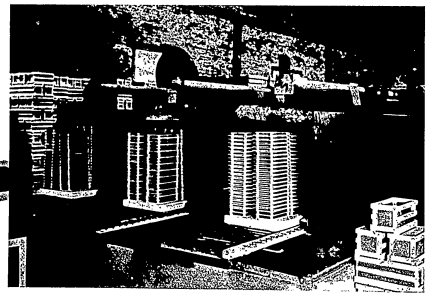
scei



Forno continuo bicanale a passaggio, a combustione di nafta, per cottura piastrelle a biscotto

Oil-fired dual tunnel kiln, pusher type, for tiles bisque firing

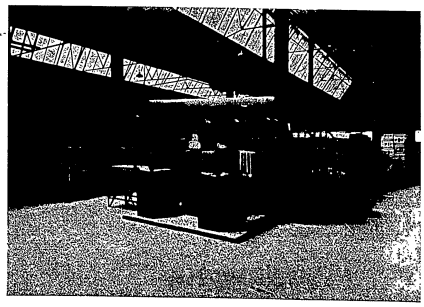
Horno continuo bicanal a nafta, con conducto, para cocer azulejos a bizcocho

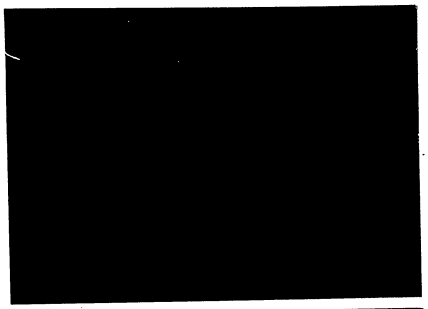


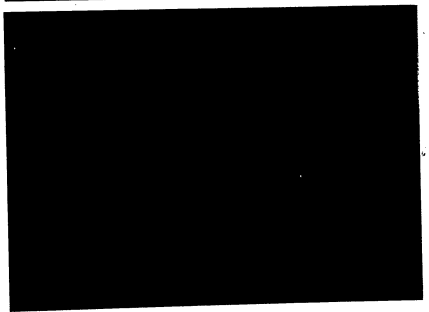
Forno continuo tricanale a passaggio, a combustione di nafta, per cottura smalto su piastrelle

Oil-fired triple tunnel kiln, pusher type, for tiles enamel firing

Horno continuo tricanal a nafta, con conducto, para cocer esmalte sobre azulejos



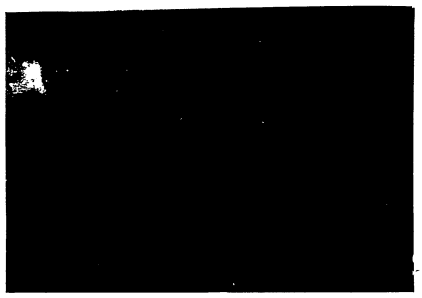




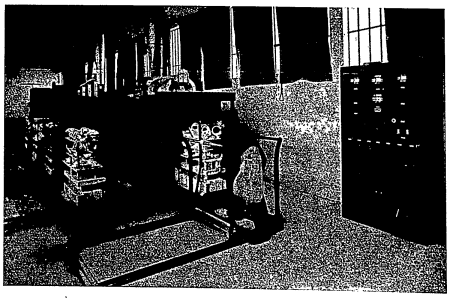
Impianto a nafta per cottura piatti a biscotto ed a verniciato

Oil-fired kiln, pusher type, for both bisque and enamel firing of dishes

Instalaciòn de hornos continuos a nafta para cocer platos a bizcocho y barnizado



Forno continuo a carrelli, a combustione di nafta, per cottura ceramiche
Continuous oil fired car type kiln for firing ceramic wares
Horno continuo a nafta para ceramicas



forni per l'industria del vetro

scei

FORNI PER L'INDUSTRIA DEL VETRO

Forni a carro per curvatura lastre di cristallo.

Forni per tempera lastre di cristallo.

Forni continui per ricottura manufatti di vetro (brevettati).

Forni intermittenti e continui per cottura di decorazioni su manufatti di vetro

Forni intermittenti e continui per trattamenti speciali.

I forni SCEI per l'industria del vetro possono essere costruiti per funzionamento elettrico, a combustione (metano, gas, gasolio, etc.) o promiscuo (elettrico-combustione).

I forni SCEI, soddisfano tutte le esigenze della piccola, media e grande produzione

Le prestazioni offerte dai forni SCEI si estendono dalla ricottura di oggetti artistici a quella di prodotti industriali nonchè alla cottura di decorazioni ed in particolare di elichetteria.

FURNACES FOR THE GLASS INDUSTRY

Furnaces for crystal sheet bending.

Furnaces for crystal sheet tempering.

Batch and continuous type furnaces for annealing glasswares.

Batch and continuous type furnaces for firing decorations on glasswares.

Batch and continuous type furnaces for special treatments.

SCEI furnaces for the glass industry can ben manufactured for electric, combustion (methane, town-gas, gasoil, etc.) or combined operation (electric and combustion)

SCEI furnaces, meet all requirements of small, medium and large scale production.

The performance of said SCEI furnaces ranges from artistic wares to industrial products annealing, and to heat treatment of decorations and of labelling in particular.

HORNOS PARA LA INDUSTRIA DEL VIDRIO

Hornos para el curvados de laminas de cristal.

Hornos para el templado de laminas de cristal.

Hornos intermitentes y continuos para la recochura de manufactos de vidrio.

Hornos intermitentes y continuos para la recochura de decoraciones sobre de manufactos de vidrio.

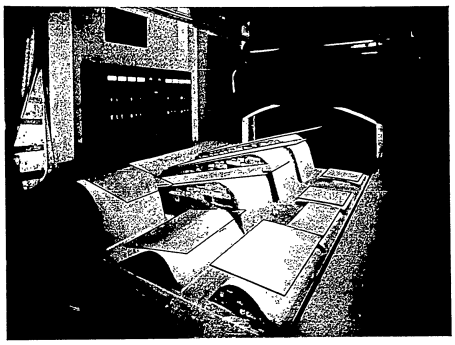
Hornos intermitentes y continuos para tratamientos especiales.

Hornos SCEI para la industria del cristal pueden ser construidos con funcionamiento electrico, a combustión (metano, gas, gasoil, etc.) o promiscuo (electrico o a combustión).

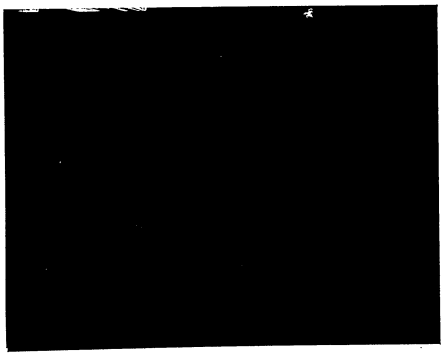
Los hornos SCEI satisfacen todas las exigencias de la pequeña, media y grande producción.

Las prestaciones ofrecidas por lo hornos SCEI van desde la recochura de los productos artisticos a la de los productos industriales y tambien a la cochura de decorados y en particular de etiquetados.

scei



Forno elettrico per curvatura lastre di cristallo; prima della curvatura
Electric furnace for bending of glass sheets; before bending
Horno electrico para el curvado laminas de cristal; antes del curvado



Forno elettrico per curvatura lastre di cristallo; dopo la curvatura
Electric furnace for bending of glass sheets; after bending
Horno electrico para el curvado laminas de cristal; despues el curvado

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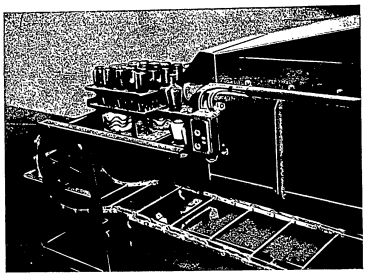


Forno continuo elettrico, a trasportatore per cottura oro su vetro

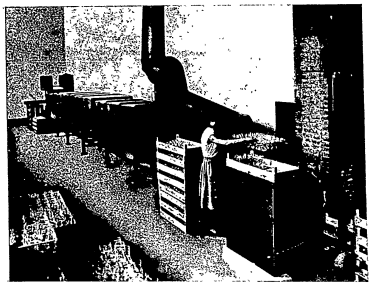
Electric continuous furnace, belt conveyor type, for gold decorating of glass wares

Horno electrico continuo a transportador para cocer decoraciones oro sobre vidrio

Forno elettrico continuo, a galoppatoio, per ricottura fialette vetro

Continuous electric furnace, walking-beam type, for glass phials annealing

Horno electrico continuo con avanzamiento oscilatorio para recocer ampollas de vidrio

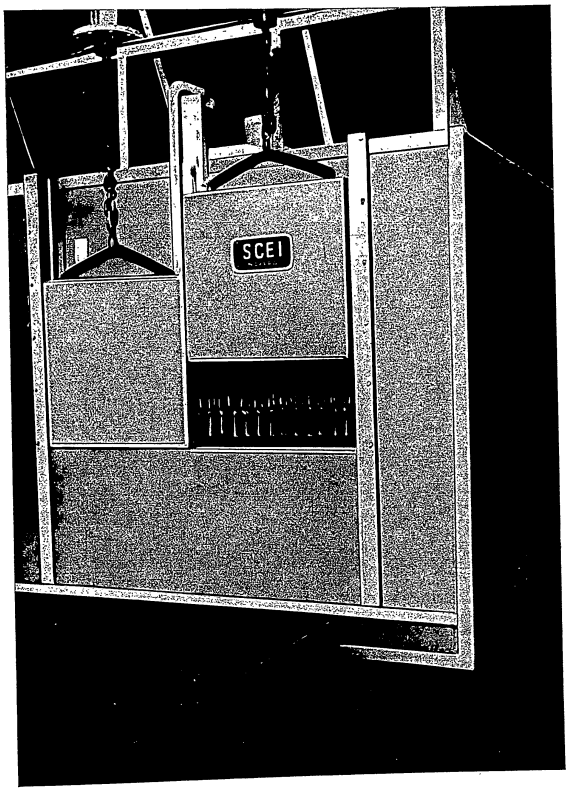


Forno elettrico continuo per cottura decorazioni su vetro

Continuous electric furnace for glass decorating

Horno electrico continuo para cocer decoraciones sobre vidrio

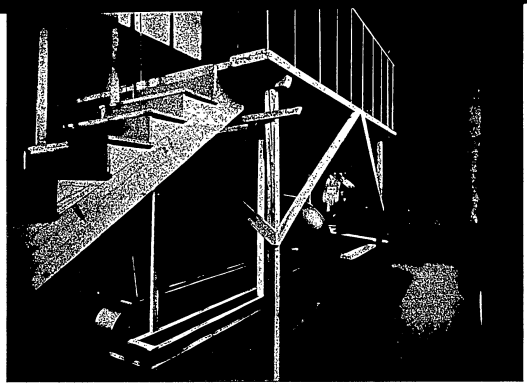
scei



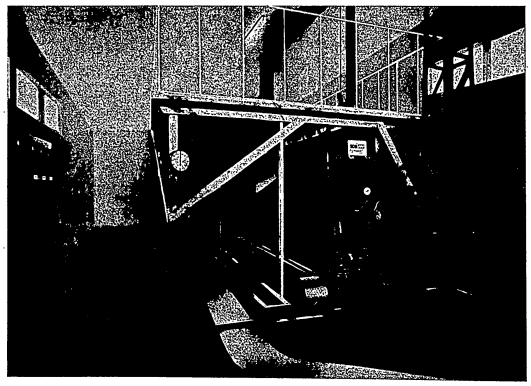
Forno continuo, elettrico ed a nafta, a tappeto trasportatore, per ricottura bottiglie

Continuous electric or gas fired furnace, with belt conveyor, for annealing bottles

Horno continuo electrico y a nafta, con tablero transportador, para recocer botellas



Impianto elettrico per tempera lastre di cristallo
Electric fired furnace for glass sheets hardening
Horno eléctrico para temple laminas de cristal



forni per essiccamenti,
per cottura vernici
per l'industria chimica

scei

FORNI PER ESSICCAMENTI, PER COTTURA VERNICI E PER L'INDUSTRIA CHIMICA

Essiccatoi
Forni per calcinazione
Forni per sublimazione
Forni per riduzione
Forni per trattamenti nel vuoto
Forni per cottura smalti, vernici, colori
Riscaldatori d'aria
Forni per colonne di reazione
Generatori di atmosfera
Elettroessiccatori di gas
Impianti per trattamenti speciali

Tutti i forni SCEI per l'industria chimica, siano essi di progettazione propria o su licenze straniere, possono essere costruiti per funzionamento elettrico od a combustione (gasolio, metano, gas, etc.).

La SCEI completa e chiude il suo quadro produttivo di forni industriali con gli impianti sopraccitati; questi, legati a trattamenti sovente assai delicati e complessi, vengono studiati caso per caso a seconda delle necessità,

FURNACES FOR DRYING, VARNISH FIRING AND FOR THE CHEMICAL INDUSTRY

Dryers
Furnaces for calcination
Furnaces for sublimation
Furnaces for reduction
Furnaces for firing enamels, varnishes and paints
Air heaters
Furnaces for reaction columns
Atmosphere conditioners
Electric gas-dryers
Plants for special treatments

All SCEI said furnaces, whether of SCEI disign or designed under foreign licenses, can be manufactured for electric or combustion operation (gasoil, methane, town gas, etc.).

The above items complete the SCEI production line of industrial furnaces. Each furnace - wich is often connected with extremely delicate and complex tereatments - is individually studied to meet the customers' requirements.

HORNOS PARA LA ESICACION DE BANICES Y PARA LA INDUSTRIA QUIMICA

Secadoros
Hornos para calcinación
Hornos para sublimación
Hornos para reducción
Hornos para tratamientos en el vacio
Hornos para la cochura de esmaltes, barnices y colores
Calentadores de aire
Hornos para columnas de reacción
Generadores de atmosfera
Electrosecadores a gases
Grupos para tratamientos especiales

Todos los hornos SCEI nombrados, sean ellos de proyecto proprio o de patente estranjera, pueden se construidos con funcionamiento electrico o a combustión (nafta, gas, metano, etc).

La SCEI completa y termina su cuadro productivo de hornos industriales con los grupos nombrados; estos que se refieren a tratamientos casi siempre delicados y complèjos, son estudiados caso por caso según de la necesidades.

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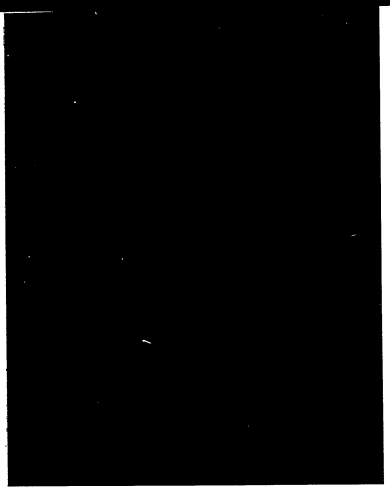
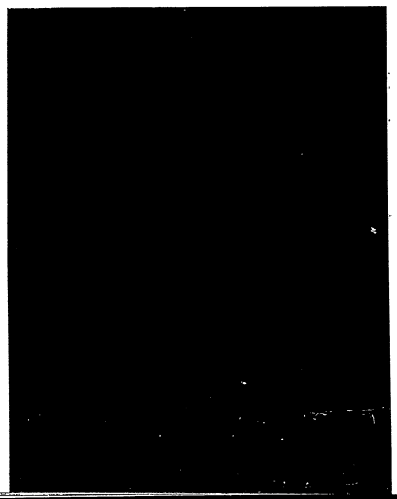


Piccolo essiccatoio elettrico a convezione naturale di aria

Little electric dryer, natural air convection type

Pequeño secadero elettrico a conveccion natural de aire

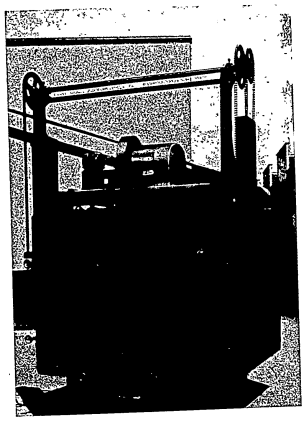


Essiccatoio elettrico per statori di motori

Electric dryer for motors' stators

Secadero electrico para estatores de motores

scei



Essiccatoio elettrico per anime di fonderia

Electric dryer for foundry cores

Secadero electrico para moldes de fundicion

Essiccatoio elettrico per anime di fonderia

Electric dryer for foundry cores

Secadero electrico para moldes de fundicion

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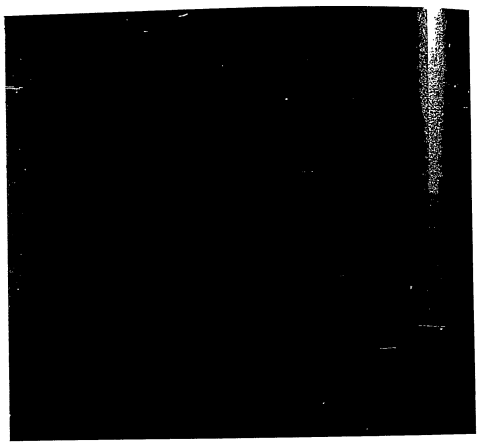
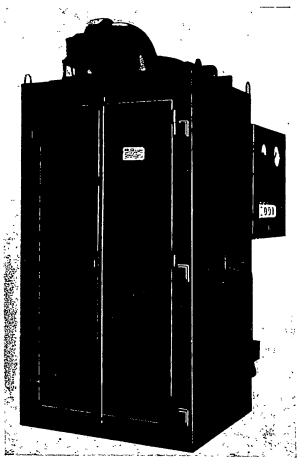
Essiccatoio elettrico a convezione forzata di aria, a cassetti

Electric dryer, forced air convection type, with compartments

Secadero electrico a conveccion forzada de aire, a cajones





Essiccatoio elettrico a circolazione forzata di aria, per pezzi in alluminio

Electric dryer, forced air circulation type, for aluminium parts

Secadero electrico a conveccion forzada de aire, para piezas en aluminio

scei

Essiccatoio elettrico continuo a tappeto per verniciatura scocche, vista generale

Continuous electric dryer, belt conveyor system, for car bodies painting, overall view

Secadero continuo, electrico, a tablero, para barnizado de bastidores, vista general

Essiccatoio elettrico continuo a tappeto, per verniciatura scocche, particolare

Continuous electric dryer, belt conveyor system, for car bodies painting, detail

Secadero continuo, electrico, a tablero, para barnizado de bastidores, particular

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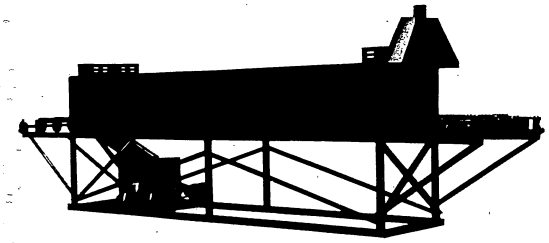
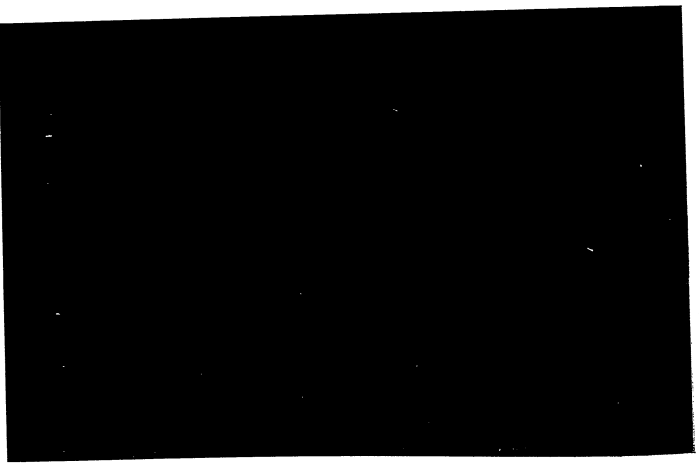
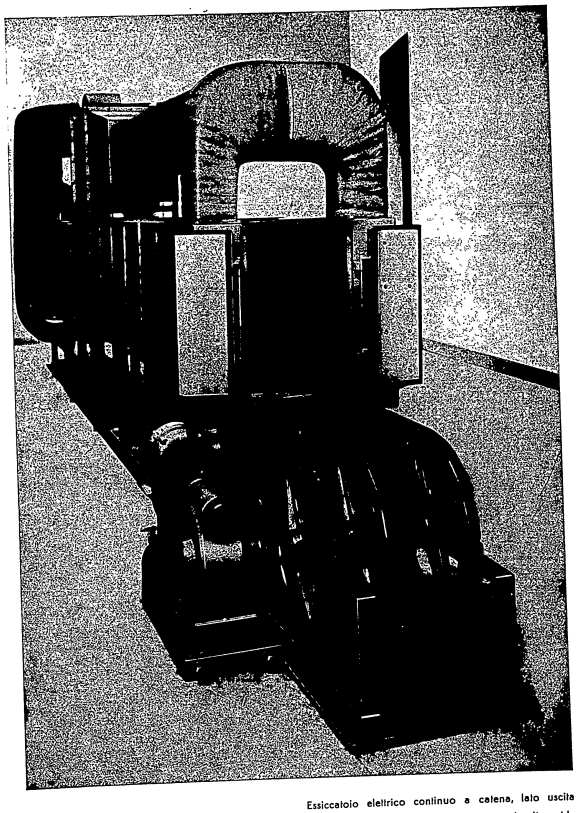


Essiccatoio elettrico continuo a catena
Continuous electric dryer, chain type
Secadero electrico continuo de cadena



Essiccatoio elettrico continuo a catena, vista generale, lato entrata
Continuous electric dryer, chain type, overall view, charging end
Secadero electrico continuo de cadena, vista general, lado entrada

scei



Essiccatoio elettrico continuo a catena, lato uscita
Continuous electric dryer, chain type, unloading side
Secadero electrico continuo de cadena, lado solida

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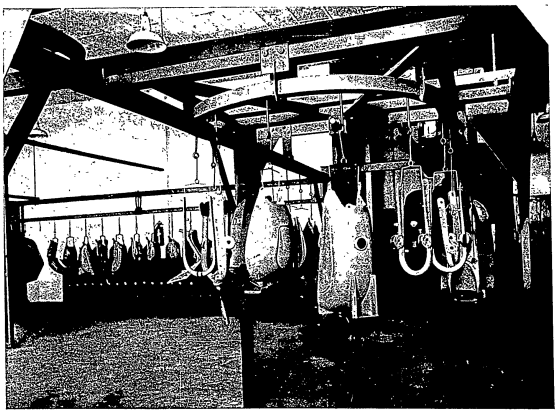
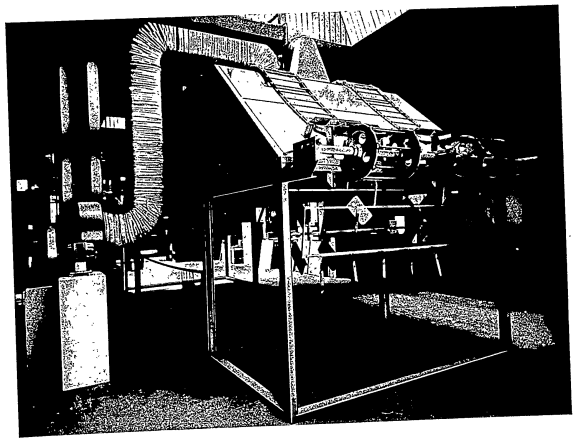


Essiccatoio elettrico continuo a trasportatore aereo, per verniciatura scocche
Continuous electric dryer, with overhead conveyor system, for carbodies painting
Secadero electrico continuo con transportador aereo, para barnizado bastidores

scei

[redacted]

Essiccatoio continuo a metano per verniciatura parti di mobili metallici
Methane gas heated dryer for varnished parts of steel furnitures
Secadero de metano para barnizado piezas de muebles metalicos



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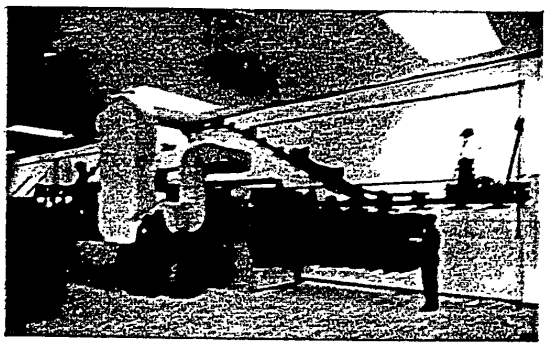

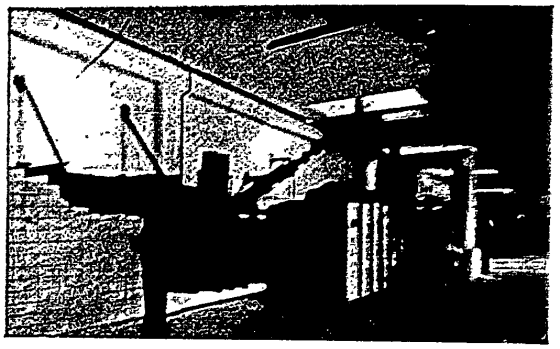

Essiccatoio a metano, tipo continuo, con trasportatore aereo, per verniciatura parti metalliche varie
Continuous methane gas dryer, overhead conveyor system, for painting various steel parts
Secadero continuo de metano con transportador aereo, para barnizado piezas metalicas diversas

Complesso di essiccatoi a metano, intermittenti e continui, in un reparto di verniciatura semilavorati metallici
Assembly of methane gas fired dryers, batch and continuous type, in painting unfinished works plant
Conjunto de secaderos de metano, intermitentes y continuos, en una instalacion para barnizado semielaborados metalicos

ARONA

MOTORI DIESEL

MOTORI DIESEL MARINI

MOTORI DIESEL INDUSTRIALI

GRUPPI ELETTROGENI

GRUPPI AUSILIARI DI BORDO

GRUPPI MOTOPOMPE

MICROTRATTORI DIESEL

ARONA FAUSTO ARONA & FIGLI

OFFICINE MECCANICHE E FONDERIE

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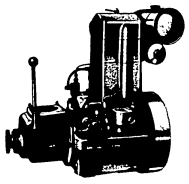
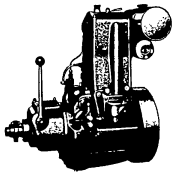
MOTORI DIESEL MARINI
DIESEL MARINE ENGINES
MOTEURS DIESEL MARINS
MOTORES DIESEL MARINOS

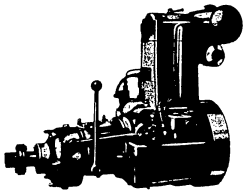
ARONA



Tipo - Type	H.P.	giri/1' - R.P.M. - tours/1' - V.P.M.
DM 5	5 - 7	1000 - 1500
LM 9	7 - 9	1000 - 1500

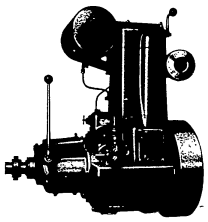
Tipo - Type	H.P.	giri/1' - R.P.M. - tours/1' - V.P.M.
DMF 5	5 - 7	1000 - 1500
LMF 9	7 - 9	1000 - 1500





Tipo - Type	H.P.	giri/1' - R.P.M. - tours/1' - V.P.M.
DMR 5	5 - 7	1000 - 1500
LMR 9	7 - 9	1000 - 1500

Tipo - Type	H.P.	giri/1' - R.P.M. - tours/1' - V.P.M.
FM 10	8 - 12	750 - 1000



MOTORI DIESEL MARINI
DIESEL MARINE ENGINES
MOTEURS DIESEL MARINS
MOTORES DIESEL MARINOS

ARONA

Tipo - Type	H.P.	giri/1' - R.P.M. - tours/1' - V.P.M.
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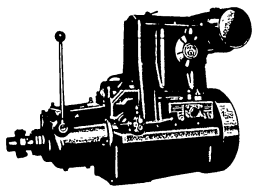
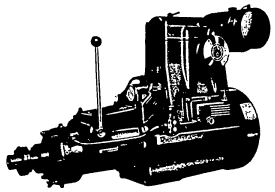
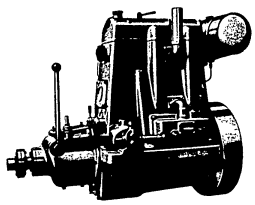
LM 18	14 - 20	1000 - 1500

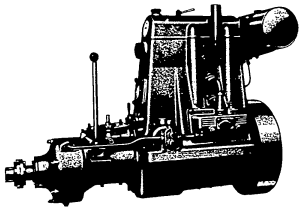




Tipo - Type	H.P.	giri/1' - R.P.M. - tours/1' - V.P.M.
DMR 12	10 - 15	1000 - 1500
LMR 18	14 - 20	1000 - 1500

Tipo - Type	H.P.	giri/1' - R.P.M. - tours/1' - V.P.M.
FM 20	16 - 24	750 - 1000
PM 28	24 - 32	800 - 1000





Tipo - Type	H.P.	giri/1' - R.P.M. - tours/1' - V.P.M.
FMR 20	16 - 24	750 - 1000
PMR 28	24 - 32	800 - 1000

MOTORI DIESEL MARINI
DIESEL MARINE ENGINES
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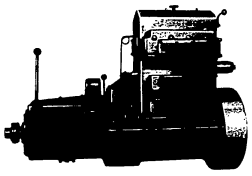
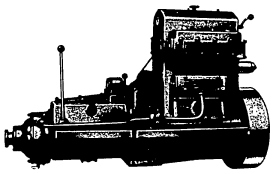
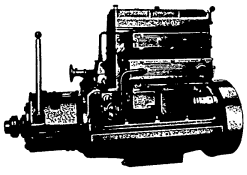
ARONA



Tipo - Type	HP	giri/1' - R.P.M. - tours/1' - V.P.M.
HM 30	30 - 35	800 - 900

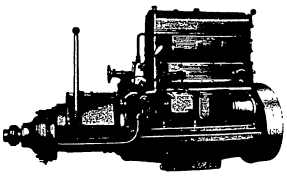
Tipo - Type	HP	giri/1' - R.P.M. - tours/1' - V.P.M.
HMR 30	30 - 35	800 - 900





Tipo - Type	HP	giri/1' - R.P.M. - tours/1' - V.P.M.
HM 50	40 - 60	600 - 900

Tipo - Type	HP	giri/1' - R.P.M. - tours/1' - V.P.M.
HMR 50	40 - 60	600 - 900



MOTORI DIESEL MARINI
DIESEL MARINE ENGINES
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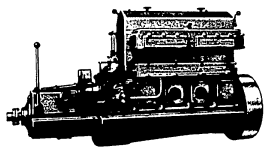
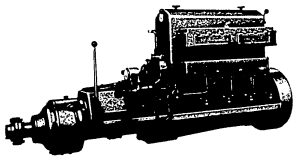
ARONA

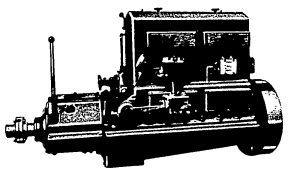
Tipo - Type	HP	giri/1' - R.P.M. - tours/1' - V.P.M.
HM 60	60 - 70	800 - 900

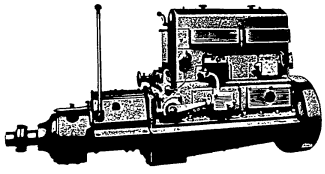




Tipo - Type	HP	giri/1' - R.P.M. - tours/1' - V.P.M.
HMR 60	60 - 70	800 - 900

Tipo - Type	HP	giri/1' - R.P.M. - tours/1' - V.P.M.
ZM 80	70 - 90	700 - 900

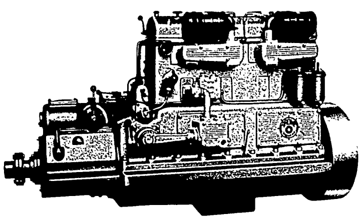




Tipo - Type	HP	giri/1' - R.P.M. - tours/1' - V.P.M.
ZMR 80	70 - 90	700 - 900

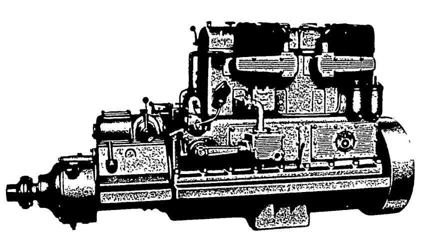
MOTORI DIESEL MARINI
DIESEL MARINE ENGINES
MOTEURS DIESEL MARINS
MOTORES DIESEL MARINOS

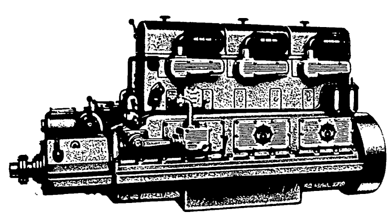
ARONA



Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
TM 120	110 - 130	750 - 900

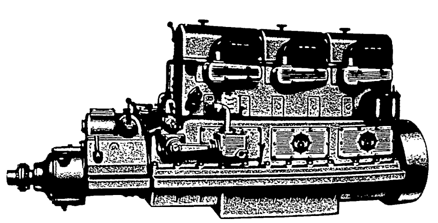
Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
TMR 120	110 - 130	750 - 900





Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
TM 180	165 - 195	750 - 900

Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
TMR 180	165 - 195	750 - 900



TIPO TYPE	Nome telegrafico Code word Mot télégraphique Palabra telegráfica	H.P.	Giri al 1' - R.P.M. Tours/min - V.P.M.		Cilindri Cylinders Cylindres Cilindros	Peso Weight Poid Peso kg	Imballaggio - Packing cases Colisses - Cajas		
			Motore - Engine Moteur - Motor	Elica - Propeller Hélice - Hélice			kg	mc	cub. feet
DM 5	lupetto	5 - 7	1000 - 1500	—	1 vert	220	58	0,40	14
DMF 5	fanellomar	5 - 7	1000 - 1500	—	1 »	188	58	0,40	14
DMR 5	orata	5 - 7	1000 - 1500	500 - 750	1 »	251	65	0,41	15
LM 9	cernia	7 - 9	1000 - 1500	—	1 »	215	58	0,40	14
LMF 9	seppia	7 - 9	1000 - 1500	—	1 »	220	58	0,40	14
LMR 9	aringa	7 - 9	1000 - 1500	500 - 750	1 »	240	65	0,41	15
FM 10	focena	8 - 12	750 - 1000	—	1 »	425	95	0,80	30
DM 12	dentice	10 - 15	1000 - 1500	—	2 »	355	70	0,55	19
DMR 12	rombo	10 - 15	1000 - 1500	500 - 750	2 »	375	78	0,65	23
LM 18	pescespada	14 - 20	1000 - 1500	—	2 »	374	70	0,55	19
LMR 18	luccio	14 - 20	1000 - 1500	500 - 750	2 »	395	78	0,65	23
FM 20	cefalo	16 - 24	750 - 1000	—	2 »	670	130	1,10	38
FMR 20	persico	16 - 24	750 - 1000	375 - 500	2 »	740	150	1,35	48
PM 28	delfino	24 - 32	800 - 1000	—	2 »	890	142	1,46	51
PMR 28	témolo	24 - 32	800 - 1000	400 - 500	2 »	914	165	1,63	57
HM 30	torpedine	30 - 35	800 - 900	—	2 »	1280	230	2,40	85
HMR 30	volpino	30 - 35	800 - 900	400 - 450	2 »	1382	260	2,55	90
HM 50	gambero	40 - 60	600 - 900	—	3 »	1550	260	2,50	88
HMR 50	aragosta	40 - 60	600 - 900	300 - 450	3 »	1700	290	2,70	95
HM 60	argolide	60 - 70	800 - 900	—	4 »	1855	285	2,80	98
HMR 60	tricheco	60 - 70	800 - 900	400 - 450	4 »	2059	300	3,30	116
ZM 80	grongo	70 - 90	700 - 900	—	4 »	1930	290	3,10	109
ZMR 80	branzino	70 - 90	700 - 900	350 - 450	4 »	2900	315	3,50	123
TM 120	palombo	110 - 130	750 - 900	—	4 »	3217	320	3,70	130
TMR 120	squalo	110 - 130	750 - 900	375 - 450	4 »	3402	355	4,15	146
TM 180	merlago	165 - 195	750 - 900	—	6 »	4100	425	5,64	199
TMR 180	storione	165 - 195	750 - 900	375 - 450	6 »	4290	470	6,22	219

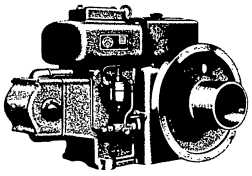
caratteristiche motori diesel marini
characteristics of marine diesel engines
caracteristiques moteurs diesel marins
carateristicas motores diesel marinos

MOTORI DIESEL INDUSTRIALI
INDUSTRIAL DIESEL ENGINES
MOTEURS DIESEL INDUSTRIELS
MOTORES DIESEL ESTACIONARIOS

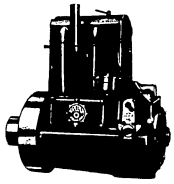
ARONA

MOTORI DIESEL INDUSTRIALI
INDUSTRIAL DIESEL ENGINES
MOTEURS DIESEL INDUSTRIELS
MOTORES DIESEL ESTACIONARIOS

ARONA

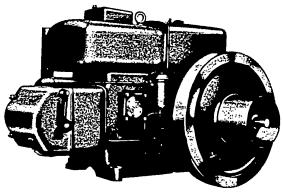


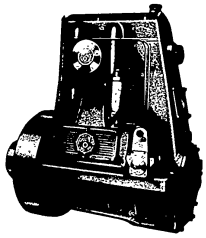
Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
DB 5	4 - 6	1000 - 1500



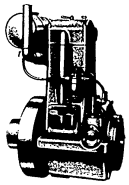
Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
DA 12	10 - 15	1000 - 1500
LA 18	14 - 20	1000 - 1500

Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
FB 10	8 - 12	800 - 1000
PB 15	12 - 16	700 - 1000



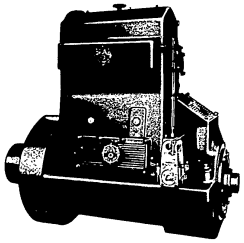


Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
FA 20	16 - 24	750 - 1000
PA 28	24 - 32	800 - 1000

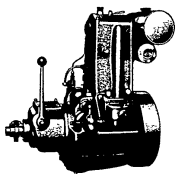


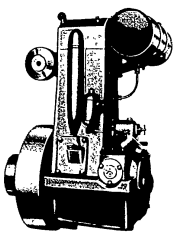
Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
DA 5	5 - 7	1000 - 1500
LA 9	7 - 9	1000 - 1500

Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - R.P.M.
HA 30	30 - 35	800 - 900

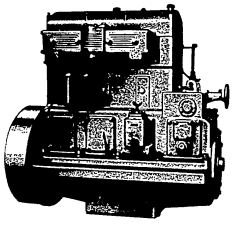


Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
DAF 5	5 - 7	1000 - 1500
LAF 9	7 - 9	1000 - 1500





Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
FA 10	8 - 12	750 - 1000



Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
HA 50	40 - 60	600 - 900

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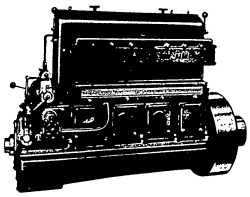
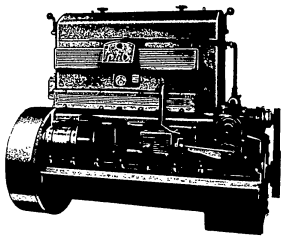
MOTORI DIESEL INDUSTRIALI
INDUSTRIAL DIESEL ENGINES
MOTEURS DIESEL INDUSTRIELS
MOTORES DIESEL ESTACIONARIOS

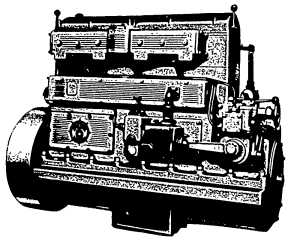
ARON



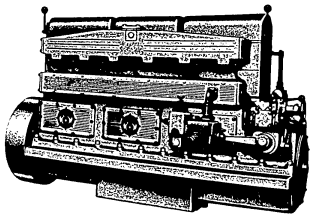
Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
HA 60	60 - 70	800 - 900



Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
ZA 80	70 - 90	700 - 900



Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
TA 120	110 - 130	750 - 900



Tipo - Type	H.P.	giri/1' - R.P.M. tours/1' - V.P.M.
TA 180	165 - 195	750 - 900

TIPO TYPE	Nome telegrafico Code word Mot télégraphique Palabra telegráfica	H. P.	Giri/1' R.P.M. Tours/min. V. P. M.	Cilindri Cylinders Cylindres Cilindros	Peso Weight Poid Peso kg.	Imballaggio Packing cases Caisses Cajas kg.	mc.	cub. feet
DB. 5	bengalino	4 5 6	1000 1250 1500	1 orizz.	195	75	0,27	10
FB. 10	bucorvo	8 10 12	800 900 1000	1 »	410	110	0,60	21
PB. 15	botaurus	12 14 16	700 850 1000	1 »	510	125	0,78	28
DA. 5	pinguino	5 6 7	1000 1250 1500	1 vert	140	48	0,30	11
DAF. 5	fanello	5 6 7	1000 1250 1500	1 »	175	65	0,40	14
LA. 9	frino	7 8 9	1000 1250 1500	1 »	145	48	0,30	11
LAF. 9	ibis	7 8 9	1000 1250 1500	1 »	180	65	0,40	14
FA. 10	molotro	8 10 12	750 900 1000	1 »	325	100	0,57	20
DA. 12	dacelide	10 12 15	1000 1200 1500	2 »	280	65	0,40	14
LA. 18	pellicano	14 17 20	1000 1250 1500	2 »	290	65	0,40	14
FA. 20	falco	16 20 24	750 875 1000	2 »	545	105	0,87	31
PA. 28	folaga	24 28 32	800 900 1000	2 »	790	120	1,14	40
HA. 30	marte	30 35	800 900	2 »	955	180	1,60	56
HA. 50	nettuno	40 50 60	600 750 900	3 »	1240	210	1,87	66
HA. 60	argo	60 70	800 900	4 »	1505	225	2,15	76
ZA. 80	tucano	70 80 90	700 800 900	4 »	2000	250	2,26	80
TA. 120	titanus	110 120 130	750 825 900	4 »	2810	280	2,80	99
TA. 180	teseo	165 180 195	750 825 900	6 »	3750	370	4,23	149

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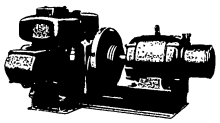
carateristicas motores diesel estacionarios

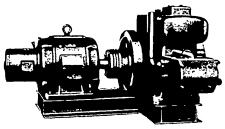
GRUPPI ELETTROGENI
ELECTRIC GENERATOR SETS
GROUPES ELECTROGENES
GRUPOS ELECTROGENOS

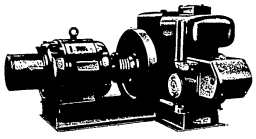
ARONA



Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - r.p.m.
4 BAR 40/4	4	50	1500
7 BAR 40/4	5	60	1800

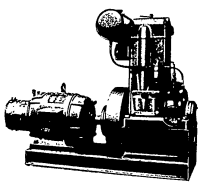
Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - r.p.m.
12 BAR 100/6	7	50	1000
14 BAR 100/6	8.5	60	1200





Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - r.p.m.
17 BAR 150/6	11	50	1000
20 BAR 150/6	13	60	1200

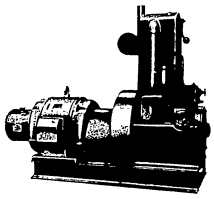
Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - r.p.m.
3 DAR 40/4	4	50	1500
5 LAR 60/6	4	50	1000
6 DAR 40/4	5	60	1800
8 LAR 50/6	5	60	1200
9 LAR 60/6	6	50	1500
10 LAR 50/4	6	60	1800

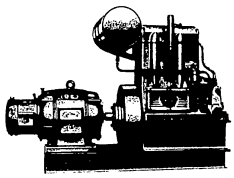


GRUPPI ELETTROGENI
ELECTRIC GENERATOR SETS
GROUPES ELECTROGENES
GRUPOS ELECTROGENOS

ARONA

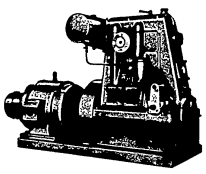
Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - r.p.m.
11 FAR 100/6	7	50	1000
13 FAR 100/6	8.5	50	1200

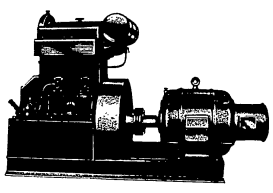




Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - r.p.m.
15 DAR 100/4	10	50	1500
16 LAR 125/6	10	50	1000
18 LAR 125/6	11	60	1200
19 DAR 100/4	12	60	1800
21 LAR 150/4	13.5	50	1500
22 LAR 125/4	15	60	1800

Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - r.p.m.
23 FAR 200/8	15.5	60	900
24 FAR 250/6	18	50	1000
25 PAR 300/8	18	50	750
28 PAR 300/8	22	60	900
32 PAR 400/6	25	50	1000

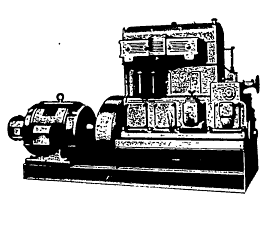




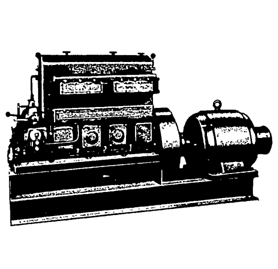
Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - r.p.m.
30 AR 400/8	23.5	50	750
35 AR 400/8	27	60	900

GRUPPI ELETTROGENI
ELECTRIC GENERATOR SETS
GROUPES ELECTROGENES
GRUPOS ELECTROGENOS

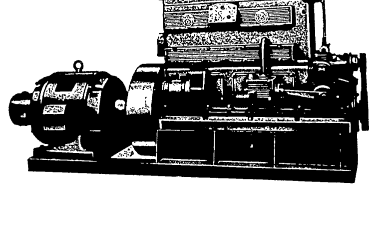
ARONA



Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - VPM
50 HAR 600/8	40	50	750
60 HAR 600/8	48	60	900

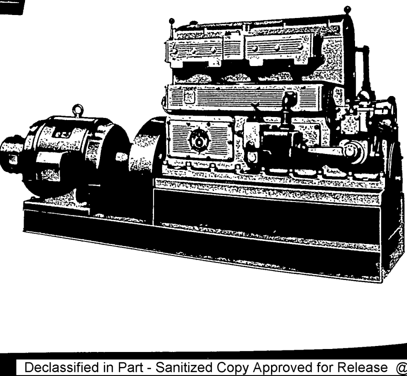


Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - VPM
60 AR 700/8	45	50	750
66 AR 700/8	52	60	900



Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - VPM
80 ZAR 1000/8	63	50	750
90 ZAR 1000/8	75	60	900

Tipo - Type	KVA	Hz	giri/1' - RPM tours/1' - VPM
116 TAR 1500/8	95	50	750
130 TAR 1500/8	107	60	900
165 TAR 2000/8	135	50	750
195 TAR 2000/8	160	60	900

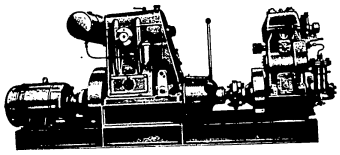


Potenza - Power / Puissance - Potencia KVA	KW	Periodi / Cycles / Periodes / Ciclos	TIPO / TYPE	Nome telegrafico / Code word / Mot télégraphique / Palabra telegráfica	Motore diesel - Diesel engine / Moteur diesel - Motor diesel TIPO / TYPE	H.P.	Giri/min - RPM / Tours/min - VPM	Alternatore - Generator / Alternateur - Alternador TIPO / TYPE	Giri/min - RPM / Tours/min - VPM	Peso / Weight / Poid / Peso Kg.	Imballaggio - Packing cases / Caisses - Cajas Kg.	mc.	cub. feet
4	[illegible]	50	3 DAR 40/4	furetto	DA 5	7	1500	AR 40/4	1500	325	52	0,70	25
4	[illegible]	50	4 BAR 40/4	riccio	DB 5	7	1500	AR 40/4	1500	330	65	0,85	31
4	3,2	50	5 LAR 60/6	istrice	LA 9	7	1000	AR 60/6	1000	360	60	0,80	28,3
5	4	60	6 DAR 40/4	maggiolino	DA 5	7,5	1800	AR 40/4	1800	325	52	0,70	25
5	4	60	7 BAR 40/4	scarabeo	DB 5	7,5	1800	AR 40/4	1800	330	65	0,85	31
5	4	60	8 LAR 50/6	muletto	LA 9	7,5	1200	AR 50/6	1200	345	52	0,72	25,4
6	4,8	50	9 LAR 60/6	orsetto	LA 9	9	1500	AR 60/4	1500	360	60	0,80	28,3
6	4,8	60	10 LAR 50/4	ariete	LA 9	9,5	1800	AR 50/4	1800	345	50	0,72	25,4
7	5,6	50	11 FAR 100/6	tartuca	FA 10	12	1000	AR 100/6	1000	580	110	1,30	46
7	5,6	50	12 BAR 100/6	falena	FB 10	12	1000	AR 100/6	1000	635	135	1,50	52
8,5	6,8	60	13 FAR 100/6	verdone	FA 10	12	1200	AR 100/6	1200	580	110	1,30	46
8,5	6,8	60	14 BAR 100/6	grifone	FB 10	12	1200	AR 100/6	1200	635	135	1,50	52
10	8	50	15 DAR 100/4	rondone	DA 12	15	1500	AR 100/4	1500	470	65	0,86	30,4
10	8,8	50	16 LAR 125/6	condor	LA 18	14	1000	AR 125/6	1000	570	65	0,85	31
11	8,8	50	17 BAR 150/6	sparviero	PB 15	16	1000	AR 150/6	1000	825	170	2	70
11	8,8	60	18 LAR 125/6	castoro	LA 18	16	1200	AR 125/6	1200	570	65	0,85	31
12	9,6	60	19 DAR 100/4	ippocampo	DA 12	16,5	1800	AR 100/4	1800	470	65	0,85	31
13	10,4	60	20 BAR 150/6	cervolante	PB 15	17,5	1200	AR 150/6	1200	825	170	2	70
13,5	10,8	50	21 LAR 150/4	bracco	LA 18	20	1500	AR 150/4	1500	585	70	0,9	32
15	12	60	22 LAR 125/4	pointer	LA 18	21	1800	AR 125/4	1800	570	65	0,85	31
15,5	12,4	60	23 FAR 200/8	levriero	FA 20	20	900	AR 200/8	900	980	150	1,70	60
18	14,4	50	24 FAR 250/6	setter	FA 20	24	1000	AR 250/6	1000	1010	160	1,85	65
18	14,4	50	25 PAR 300/8	alano	PA 28	24	750	AR 300/8	750	1300	200	2,3	81
22	17,6	60	28 PAR 300/8	boxer	PA 28	28	900	AR 300/8	900	1300	200	2,3	81
23,5	18,9	50	30 AR 400/8	mastino	HA 30	30	750	AR 400/8	750	1650	260	3	106
25	20	50	32 PAR 400/6	molos	PA 28	32	1000	AR 400/6	1000	1335	215	2,5	88
27	21,6	60	35 AR 400/8	cerbiatto	HA 30	35	900	AR 400/8	900	1650	260	3	106
40	32	50	50 HAR 600/8	falcone	HA 50	50	750	AR 600/8	750	2270	270	3,2	113
45	36	50	60 AR 700/8	capriolo	HA 60	55	750	AR 700/8	750	2600	340	4	141
48	38,4	60	60 HAR 600/8	albatros	HA 50	60	900	AR 600/8	900	2270	270	3,2	113
52	41,6	60	66 AR 700/8	gabbiano	HA 60	65	900	AR 700/8	900	2600	340	4	141
63	50,4	50	80 ZAR 1000/8	liofante	ZA 80	80	750	AR 1000/8	750	3225	360	4,2	148
75	60	60	90 ZAR 1000/8	centauro	ZA 80	90	900	AR 1000/8	900	3225	360	4,2	148
95	76	50	116 TAR 1500/8	liocorno	TA 120	116	750	AR 1500/8	750	4090	420	5,3	187
[illegible]	86	60	130 TAR 1500/8	dragone	TA 120	130	900	AR 1500/8	900	4090	420	5,3	187
	108	50	165 TAR 2000/8	ippogrifo	TA 180	165	750	AR 2000/8	750	5620	700	8	282
[illegible]	128	60	195 TAR 2000/8	minotauro	TA 180	195	900	AR 2000/8	900	5620	700	8	282

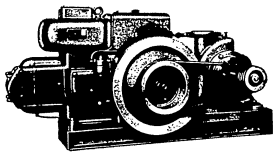
caratteristiche gruppi elettrogeni diesel
characteristics diesel generator sets
caracteristiques groupes électrogènes diesel
carateristicas grupos electrogenos diesel

GRUPPI AUSILIARI DI BORDO
AUXILIARY SETS FOR USE ON BOARD
GROUPES AUXILIAIRES POUR NAVIRES
GRUPOS AUXILIARES DE BORDO

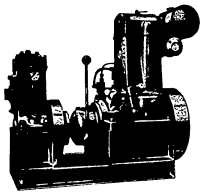
ARONA



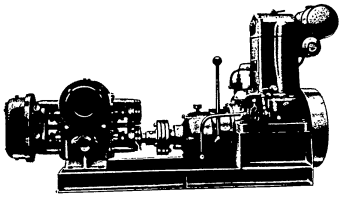
Motodinamo compressore
Diesel driven generator-compressor set
Motordynamo-compresseur
Motordinamo-compressor



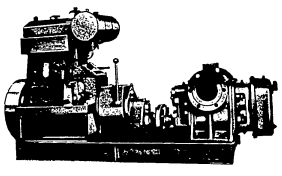
Motopompa antincendio e lavaggio
Diesel driven fire-fighting and washing pump
Motorpompe antincendie et lavage
Motorbomba antincendio y lavaje



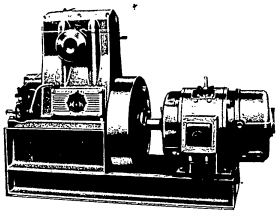
Motocompressore
Diesel driven compressor
Motorcompresseur
Motorcompressor



Motopompa per travaso benzina
Diesel driven gasoline transfer pump
Motorpompe pour transvasement essence
Motorbomba trasiego combustible



Motopompa per travaso liquidi densi
Diesel driven thick transfer pump
Motorpompe pour transvasement liquides épais
Motorbomba trasiego liquidos densos



Motodinamo
Diesel driven generator
Motordynamo
Motordinamo

CARATTERISTICHE GENERALI DEI MOTORI DIESEL "ARONA,,

I motori Diesel « **ARONA** » sono a 4 tempi ed a iniezione diretta. La speciale forma della camera di combustione permette l'avviamento istantaneo da freddo senza l'ausilio di organi surriscaldatori come micce, candele incandescenti, ecc. **Incastellatura** fusa in ghisa ad alta resistenza, fortemente nervata con ampie portine laterali per una facile ispezione dell'interno del motore. **Testate** fuse in ghisa speciale con abbondanti passaggi per l'acqua di raffreddamento. **Camicie** in ghisa centrifugata, riportate e facilmente intercambiabili. **Pistoni** in lega leggera muniti di 4 segmenti di compressione e di raschia olio. **Alberi a gomito** in acciaio forgiato ad alta resistenza. **Lubrificazione** forzata con pompa ad ingranaggi. **Bronzine di biella** con gusci in acciaio rivestiti di metallo antifrizione. **Spinotti** abbondantemente dimensionati, cementati e rettificati. **Distribuzione:** un'unica camma comanda la valvola di aspirazione e quella di scarico. **Valvole** in bagno d'olio. **Guida valvole** riportate e facilmente intercambiabili. **Iniettori** al centro della camera di combustione, facilmente smontabili. **Regolatore di velocità** del tipo centrifugo che mantiene pressochè costante il numero dei giri col variare della potenza assorbita. **Raffreddamento** a circolazione d'acqua con pompa ad ingranaggi in bronzo fino ai motori da 60 Cav., con pompa a stantuffo per quelli di potenza superiore. **Corredo:** i motori Diesel vengono forniti completi di filtro per nafta, filtro per olio, indicatore di pressione dell'olio, borsa con attrezzi e chiavi di servizio.

CHARACTERISTICS OF "ARONA,, DIESEL ENGINES

« **ARONA** » **diesel engine** have a 4-stroke cycle and direct inlection. The special shape of the ignition chamber ensures instant starting without fuses or incandescent plugs. **Frames,** cast in high resistance iron and strongly ribbed, with large side ports for internal inspection. **Cylinder** heads, cast in special iron with large passages for cooling water. **Lines,** of centrifuged iron, interchangeable. **Pistons,** of aluminium alloy, carrying 4 compression rings and scraper rings. **Crankshaft,** forged in high resistance steel. **Lubrication,** forced by gear pump. **Bushings** of the connecting rods, having the shell lined with babbits-metal. **Gudgeon-pins,** fully dimensioned, heat-treated and machined. **Timing:** a single cam controls the suction and exaust valves. **Valves,** working in oil. **Valve-guides,** interchangeable. **Nozzles:** fitted in centre of the ignition chamber and easily removed. **Speed governor,** of centrifugal type, ensuring uniform speed for every load. **Cooling,** by water circulated by bronze gear pump up to 60 HP engines and by piston pump for bigger powers. **Equipment:** the engines are furnished with fuel and lubricant filters, oil pressure indicator, bag of tools and wrenches.

CARACTHERISTIQUES DES MOTEURS DIESEL "ARONA,,

Les Moteurs Diesel « **ARONA** » sont à 4 temps, injection directe. La forme spéciale de la chambre d'explosion permet le démerrage instantané à froid sans mèches bougies ou semblables dispositifs **Bâti** à nervures en fonte à haute resistence avec d'amples orifices pour l'inspection de l'interieur du moteur **Tête de cylindres** en fonte spéciale avec d'amples passages pour l'eau refrigerante. **Chemise** reportée interchangeable en fonte centrifugée et traitée. **Pistons en** alliage leger munt de 4 segments de compression et de réclarage. **Arbre à manivelle** en acier à haute résistence. **Lubrification** forcée moyennant pompe à engranages. **Coussinets de bielle** coquille d'acier garnie d'antifriction. **Gouyon** amplement dimensionné cementé et rectifié. **Distribution** une seule came contrôle la soupape d'aspiration et celle d'echappement. **Soupapes** en bain d'huile. **Guides de soupapes** reportés et interchangeables. **Injecteur** au centre de la chambre d'explosion, demontable. **Regoulateur de vitesse** centrifuge assure l'uniformité de la vitesse sans variation de la puissance absorbé. **Refroidissement** par eau circulée moyennant pompe à engranages en bronze, jusqu'à 60 HP. moyennant pompe à piston pour ceux de puissance supérieure. **Equipement:** les moteurs diesel sont fourni avec filtre à naphte, filtre à huile, indicateur de pression d'huile, sac d'outils et clefs de service

CARACTERISTICAS GENERALES MOTORES DIESEL "ARONA,,

Los motores Diesel « **ARONA** » son de 4 tiempos e inyección directa La especial forma de la camara de explosión permite el arranque istantaneo sin la ayuda de fusibles, bujías. **Caja** nervada colada en hierro con aberturas para inspeccionar el interno del motor **Culata** colada en hierro special con anchos pasajes de agua refrigerante. **Camisa** sobrepuesta intercambiable de hierro centrifugo y tratado. **Embolo** de aleación leqera con 4 segmentos de compressión y de raspadura. **Cinguenal** en acero forgiado montado sobre cojinetes de rodillos. **Lubricación** forzada con bomba a engranajes **Manguitos de biela** con cascara de acero guarnecida de metal antifricción. **Perno de embolo** de dimensiones amplias cementado rectificado. **Distribucción:** actuada porexéentrica que manda la valvula de aspiración y de escape. **Valvulas** trabajan en bano de aceite. **Guias de valvulas** sobrepuentas y intercambiable. **Inyector** puesto al centro de la camara de explosión y separables. **Regulador de velocidad** centrifugo evita cambios de velocidad bajo variaciones en la potencia consumida. **Enriamiento** mediante agua circulada por bomba a engranajes de bronze fino al motor de 60 HP por bomba a émbolo para los motores de potencia superior. **Equipo:** los motores Diesel son fornidos con filtro de fuel oil, filtro de aceite, indicador de presión de aceite herramientas juego de slaves.

ARONA

OFFICINE MECCANICHE E FONDERIE

FAUSTO ARONA & FIGLI

VOGHERA (ITALIA)

PIAZZA CARDUCCI 6 TELEFONO 76241 2 3

MILANO (ITALIA)

VIA VENINI N. 24 TELEFONO 287440

SOCIETÀ EDISON

SEZIONE ACCUMULATORI

MELZO

CATALOGO N. 1

LUGLIO 1956

ACCUMULATORI STAZIONARI

TUDOR

SOCIETÀ EDISON

SOCIETÀ PER AZIONI CON SEDE IN MILANO
CAPITALE L. 160.000.000.000

SEZIONE ACCUMULATORI

MELZO

Indirizzo telegrafico: ACCUMULATORE - MELZO
Indirizzo per corrispondenza:
SOC. EDISON - SEZ. ACCUMULATORI - MELZO (Milano)
TELEFONI
MELZO { 5255 / 5282 (Centralino Gorgonzola)
MILANO (Ufficio recapito): 893.344

CATALOGO N. 1

LUGLIO 1956

....

ACCUMULATORI STAZIONARI

TUDOR

A RICHIESTA SI SPEDISCONO:

a) **gli altri cataloghi, e cioè:**

CATALOGO N. 2
Accumulatori per trazione **TUDOR** e **TUDOR-IRONCLAD**

CATALOGO N. 3
Batterie **TUDOR** per autoveicoli e motocicli

CATALOGO N. 4
Accumulatori portatili **TUDOR**

CATALOGO N. 8
Batterie **TUDOR** speciali per la pesca notturna.

CATALOGO N. 10
Accumulatori **TUDOR-ALCALINI** licenza S A F. T. al ferro-nichel e al cadmio-nichel

b) **e le pubblicazioni tecniche:**

Le batterie di accumulatori stazionari **TUDOR** per impianti fissi

Le batterie di accumulatori **TUDOR** a grande capacità specifica per la propulsione dei veicoli elettrici

Istruzioni per la messa in funzione e la condotta delle batterie **TUDOR-IRONCLAD** per la propulsione di veicoli elettrici

Istruzioni per la condotta e per la manutenzione degli accumulatori **TUDOR-ALCALINI** licenza S. A. F. T. al ferro-nichel e al cadmio-nichel

CATALOGO GENERALE
DEGLI
ACCUMULATORI STAZIONARI
TUDOR

PREMESSA

Il presente catalogo contempla gli accumulatori Tudor per batterie stazionarie. Le applicazioni principali di tali accumulatori si riscontrano nelle batterie per riserva o per equilibrazione di carico in impianti di luce e forza motrice, nelle batterie a repulsione per tranvie e funicolari e per impianti di forza motrice a carichi variabili (laminatoi, montacarichi, ecc.), nelle batterie per impianti telegrafici, telefonici, radiotelegrafici e radiotelefonici, nelle batterie per laboratori scientifici, nelle batterie per servizi ausiliari delle centrali elettriche e cabine di trasformazione, ecc.

Alle caratteristiche generali di tale applicazione corrisponde la struttura degli accumulatori in questione, che sono costituiti da piastre positive del tipo così detto «a grande superficie» (fig. 1), ottenute per fusione, con l'impiego di piombo purissimo, in modo da ricavare sulle due faccie di esse una duplice serie di sottili nervature (dette «lamelle»), che hanno lo scopo di aumentare al massimo la superficie di contatto delle piastre con l'elettrolito, e fanno quindi realizzare al massimo le reazioni elettrochimiche, alle quali è dovuto il funzionamento dell'accumulatore.

Le piastre negative invece, che nel tipo Tudor primitivo erano costituite da griglie riempite da pasta, simili cioè a

quelle che, per speciali ragioni, sono tuttora impiegate nei tipi Tudor di accumulatori trasportabili, sono attualmente costituite da un telaio di piombo antimoniale, nei cui vani è pres-

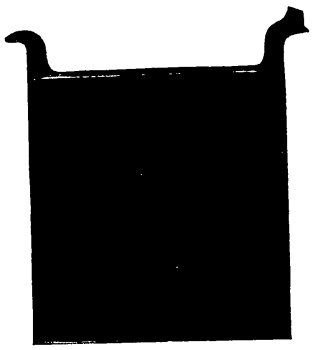


Fig. 1 — Piastra positiva « a grande superficie »

sata la materia attiva (piombo spugnoso), tenuta a posto da due lamine sottili di piombo finemente perforate, saldate al telaio (fig. 3). Tale tipo di piastra negativa, che per la sua struttura ha assunto la denominazione di piastra « a cassette ».

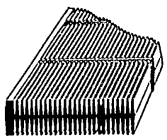


Fig. 2 — Sezione di una piastra positiva.

a suo tempo protetto da un relativo brevetto, è stato poi, alla scadenza di esso, adottato da quasi tutte le fabbriche di accumulatori.

L'isolamento fra la serie di piastre positive e quella di piastre negative è costituito da sottilissime tavolette di legno speciale, chimicamente trattate, denominate « separatori » e anche « diaframmi ». Esse sono tenute a posto mediante bac-

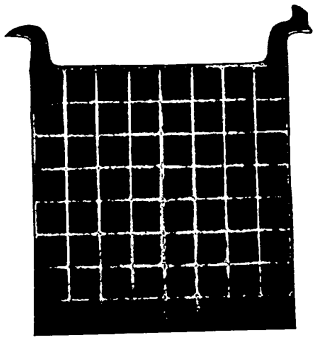


Fig. 3 — Piastra negativa « a cassette ».

chette di cloruro di polivinile disposte verticalmente, appoggiate alle piastre mediante spine; tali bacchette servono anche ad assicurare la giusta distanza fra le piastre.

L'antico sistema di isolamento mediante tubetti di vetro è stato da molti anni abbandonato non solo nel montaggio degli

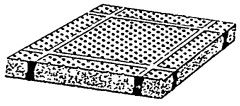


Fig. 4 — Sezione di una piastra negativa.

accumulatori Tudor, ma anche in quello degli accumulatori della maggior parte delle fabbriche, e sostituito con quello sopra descritto. Però si è naturalmente sempre in grado di

fornire, per la manutenzione di vecchie batterie esistenti, sia i tubetti di vetro, sia le piastre con le opportune guide per sostenerli.

Le piastre positive e, rispettivamente, quelle negative di ogni accumulatore sono unite in « parallelo » mediante un regolo di piombo (così da formare un « gruppo » positivo e un « gruppo » negativo); per costituire la serie degli elementi di ogni batteria il regolo positivo di un elemento si salda al regolo negativo dell'elemento adiacente, quando uno stesso regolo non porti addirittura saldate da un lato le piastre, per es., positive di un elemento e dall'altro le piastre negative dell'elemento contiguo. Le operazioni di saldatura richiedono speciale abilità, sicchè è sempre opportuno farle eseguire dai montatori appositi; quando ciò non sia possibile, si forniscono i gruppi già costituiti, con le piastre saldate ai rispettivi regoli, che si connettono in tal caso, fra un elemento e l'altro, mediante bulloni di ferro piombato. Gli accumulatori di tal genere sono chiamati « accumulatori saldati », e, per ovvi motivi, hanno un prezzo superiore a quello degli accumulatori per i quali le piastre vengono fornite sciolte; ma mentre questi richiedono l'opera di un montatore per saldare le connessioni, quelli la eliminano senz'altro.

L'elettrolito, in cui sono immerse le piastre, è costituito da una soluzione di acido solforico purissimo, del peso specifico di 1,21 circa.

Per contenere l'elettrolito e le piastre si adoperano recipienti di vario genere a seconda della capacità degli accumulatori e delle esigenze di installazione, e precisamente:

— vasi di vetro per gli accumulatori compresi fra i tipi J 1 e JR 1 e i tipi J 14 e JR 14;
— due vasi di vetro affiancati per quelli compresi fra i tipi J 16 e JR 16 e i tipi J 28 e JR 28;
— un recipiente di ebanite speciale per quelli compresi fra i tipi J 16 e JR 16 e i tipi J 26 e JR 26;
— una cassa di legno rivestita internamente con lamiera di piombo e verniciata con vernice speciale isolante e resistente all'acido, per i tipi dall'J 24 e JR 24 in su.

È da notare a questo punto che nella costruzione degli accumulatori stazionari si impiegano piastre di varie dimensioni a seconda delle capacità da conseguire.

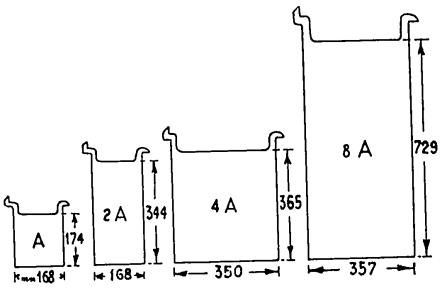


Fig. 5

I tipi di piastre comunemente adoperati sono (vedi fig. 5):

a) piastre tipo A per accumulatori dai tipi J 1 e JR 1 ai tipi J 5 e JR 5;

b) piastre tipo 2 A per accumulatori dai tipi J 6 e JR 6 ai tipi J 28 e JR 28;

c) piastre tipo 4 A per accumulatori dai tipi J 24 e JR 24 ai tipi J 148 e JR 148;

d) piastre tipo 8 A per gli accumulatori dai tipi J 152 e JR 152 ai tipi J 280 e JR 280.

Si costruiscono anche accumulatori di capacità superiori a quelle indicate nel presente catalogo, adoperando piastre di un tipo maggiore denominato 12 A; ma, trattandosi di tipi

non usuali, sono nel presente catalogo omessi. Si fanno invece eventuali offerte a richiesta.

Si possono costruire anche, su richiesta, piastre ed accumulatori di qualsiasi tipo e dimensioni.

Nelle tabelle del presente catalogo gli accumulatori TUDOR stazionari, normalmente costruiti, sono ripartiti in due grandi categorie: tipi J, per batterie a scarica lenta, e tipi JR, per batterie a scarica rapida.

Per i primi si indicano le capacità ai regimi di scarica in 3-5-7½ e 10 ore; per i secondi si indicano le capacità per la scarica in 1 ora e in 2 ore. Il regime di scarica in 1 ora è da considerarsi il massimo, al quale normalmente può essere sottoposto — compatibilmente con la buona conservazione — un accumulatore, ma intensità di scarica maggiori possono — entro certi limiti — essere sopportate per brevi periodi di tempo e in via eccezionale.

In taluni casi può, per speciali motivi, convenire di adottare, per batterie stazionarie, accumulatori di tipo trasportabile, montati cioè in recipienti di ebanite, usando sia piastre positive e negative simili a quelle degli accumulatori sopra descritti, sia piastre positive e negative a griglia impastata, sia infine piastre positive a grande superficie e negative a griglia impastata. Per impianti di bordo, per esempio, tali accumulatori possono riuscire particolarmente adatti.

In questi casi si fanno offerte speciali a richiesta.

A conclusione di questi brevi cenni preliminari si richiama l'attenzione dei lettori sul fatto che il maggior titolo di merito e il maggiore coefficiente di garanzia a favore degli accumulatori TUDOR sta nel fatto che sono ormai più di sessant'anni dacchè HENRY TUDOR ha inventato il sistema, dal quale ebbe origine la fabbricazione di tali accumulatori, ed in tale periodo di tempo sono state installate, dalle numerose fabbriche di accumulatori TUDOR sparse in tutto il mondo, molte decine di migliaia di batterie TUDOR, che hanno sempre funzionato alla perfezione.

CONDIZIONI GENERALI DI FORNITURA

I prezzi si intendono per consegna dei materiali franco su vagone Melzo. L'imballaggio viene fatturato integralmente al costo: ma ⅔ di tale importo vengono accreditati se l'imballaggio viene restituito in buono stato e franco su vagone Melzo, entro due mesi dalla spedizione. Perciò nei preventivi viene considerato solo ⅓ del valore dell'imballaggio.

I pesi indicati nel presente catalogo sono approssimati e dati a semplice titolo di informazione generica, per poter stabilire le dimensioni degli scaffali e calcolare il carico dei pavimenti, le spese di trasporto, di dogana, ecc.

Per stabilire il peso completo di un accumulatore pronto a funzionare si dovrà tener conto del peso dell'acido; per valutare il carico sui pavimenti bisognerà tener presente anche il peso degli scaffali.

La spedizione, anche se effettuata in porto franco, deve intendersi sempre effettuata a rischio e pericolo del committente; è necessario perciò che il destinatario faccia, occorrendo, in tempo debito, all'arrivo dei materiali, le verifiche del caso, presentando il regolare reclamo, in caso di avarie o mancanza di materiali, all'azienda che ha eseguito il trasporto.

Il committente deve provvedere ad un buono e sicuro magazzinaggio nei suoi locali dei materiali destinati alla fornitura; egli è responsabile di qualunque mancanza o danno, che venisse poi riscontrato dal personale di montaggio.

Nel caso di sciopero, incendio, mancanza di mezzi di trasporto, ecc., non incombe alla Società fornitrice alcuna responsabilità per eventuali ritardi rispetto ai termini di consegna per i quali si fosse impegnata.

Nel prezzo degli accumulatori sono comprese tutte le parti intrinseche che li costituiscono, cioè il recipiente, gli elettrodi, gli isolatori per il recipiente e il regolo di collegamento tra elemento ed elemento.

Con ogni batteria si fornisce una certa riserva di vasi e eventualmente di altre parti, ma ciò non costituisce un diritto

per il committente ad una sostituzione gratuita di questi materiali di riserva, qualora tutti, o parte di essi, durante il trasporto o durante il montaggio, si rompessero, o anche semplicemente dovessero venire utilizzati.

Tutti gli altri accessori occorrenti al montaggio e alla manutenzione delle batterie sono considerati a parte ed esposti nei preventivi (vedi pag. 13 e segg.).

Restano sempre escluse dalle forniture e sono quindi sempre a carico del committente:

l'eventuale imposta sui consumi;

l'eventuale assicurazione marittima;

la fornitura della corrente per la prima carica, le prove, ecc.;

tutte le condutture, che collegano fra loro le singole file di elementi e quelle fra la batteria, la dinamo, il quadro e l'inseritore, con i relativi isolatori, e la mano d'opera pel montaggio;

le condutture per le prese di corrente delle lampade a mano con le loro valvole di sicurezza ed il loro montaggio;

il quadro di distribuzione con i relativi apparecchi;

la prestazione dei manovali di aiuto per i montatori;

l'illuminazione dei locali;

gli eventuali lavori di muratore e di falegname;

infine, per le forniture destinate all'estero, i relativi dazi doganali.

CONDIZIONI DI PAGAMENTO

Salvo diversi accordi, i pagamenti sono dovuti normalmente in contanti alla cassa della Società in Melzo, come segue:

$^1/_3$ all'atto dell'ordinazione definitiva;

$^2/_3$ all'avviso che i materiali sono pronti per la spedizione.

CONDIZIONI DI GARANZIA

Per le batterie montate in Italia, la Società assume per 12 mesi consecutivi, a partire dalla data in cui la spedizione è stata completata, una garanzia, nel senso che si obbliga a riportare a sue spese la batteria alla capacità indicata, quando questa, per dimostrato difetto di costruzione, venisse a diminuire. Si esige in ogni caso però che sia stato precedentemente da essa approvato lo schema di distribuzione, che l'acido pel primo riempimento e l'acqua distillata per i successivi rabboccamenti siano stati provveduti da essa oppure da uno dei fornitori da essa indicati e che la condotta e la manutenzione della batteria sieno state sempre fatte conformemente alle prescrizioni impartite.

Durante tutto il periodo di garanzia si deve permettere in qualsiasi momento agli incaricati della Società l'accesso ai locali delle batterie e dei quadri di manovra.

La capacità si intende riferita alla temperatura dell'elettrolito all'inizio della scarica di 25 °C. e per la batteria complessivamente, non per i singoli elementi di essa.

Il materiale, che occorresse fornire per ottemperare agli obblighi di garanzia, sarebbe dalla Società fornito completamente a sue spese. Per contro il materiale che si rendesse disponibile in seguito ad una eventuale riparazione fatta in conto garanzia diverrebbe senz'altro di sua proprietà.

Qualunque altro compenso per danni diretti o indiretti, o per qualsiasi altra ragione, è sempre esplicitamente escluso perchè di tale condizione è tenuto conto nello stabilire il prezzo degli accumulatori.

Per le batterie in recipienti di vetro, montate dalla Società, essa si tiene responsabile per l'eventuale rottura dei vasi di vetro per un mese a partire dal giorno della fine del montaggio, semprechè la cagione della rottura sia da imputarsi alla qualità dei vasi stessi, come sarebbe, per esempio, il caso di rotture spontanee o simili. I recipienti che si rompessero

dopo quest'epoca sarebbero sempre sostituiti soltanto per conto del committente, il quale dovrebbe ugualmente sostenere la spesa per i lavori e per i materiali accessori necessari per questa sostituzione.

Per le lastre di vetro eventualmente montate a copertura degli accumulatori resta escluso qualsiasi impegno di sostituzione in caso di rotture.

Se il montaggio non è eseguito dalla Società, questa non assume alcuna garanzia.

Per le batterie fornite all'estero le eventuali condizioni di garanzia sono da convenirsi.

La garanzia non può mai dar diritto a sospensione di pagamenti da parte del committente. Anzi ogni garanzia viene a cessare quando i pagamenti non sieno eseguiti alle scadenze stabilite.

Per le batterie a repulsione e per quelle destinate ad equilibrare il carico non si può assumere, per intrinseche ragioni tecniche, una garanzia di capacità. Per tali batterie si può assumere solo una garanzia di buon funzionamento.

In luogo della garanzia di 12 mesi su contemplata, si assume, a richiesta, la manutenzione delle batterie, per un certo numero di anni, a condizioni determinate e contro pagamento di un canone annuo (v. Appendice I a pag. 25).

Si assume pure la sorveglianza delle batterie, mediante periodiche visite di revisori tecnici, dietro corrispettivo di una minima quota, rappresentante press'a poco il puro e semplice rimborso delle spese vive di viaggio di tali revisori. Questi hanno in tal caso il compito di verificare l'andamento del servizio e della condotta della batteria, di dare i suggerimenti e le istruzioni del caso per ottenere il miglior rendimento e la migliore conservazione della batteria stessa; di compiere gli accertamenti necessari per poter tempestivamente prevedere e disporre i periodici necessari ricambi di piastre, diaframmi, ecc., per modo da rendere tali operazioni quanto più possibile economiche e non disagiose (si ricordi che una piccola riparazione, eseguita a tempo, può farne risparmiare una di gran

lunga maggiore, che potrebbe rendersi necessaria più tardi); di costituirsi insomma in certo qual modo consulenti gratuiti dei proprietari di batterie, che abbiano stipulato tali accordi (v. Appendice II a pag. 31).

CONDIZIONI TECNICHE GENERALI

Per una batteria viene garantita solo la capacità corrispondente ad un dato regime di scarica, pur rimanendo libero il committente di scegliere, fra le capacità indicate nel presente catalogo, quella che desidera.

Le tensioni finali di scarica per i vari tipi di accumulatori, in corrispondenza ai vari regimi, sono le seguenti:

Durata della scarica	ore 1	2	3	5	7 1/2	10
Tensione finale di scarica	volt 1,70	1,72	1,75	1,77	1,78	1,80

Delle perdite, tanto nelle condutture tra le varie file di elementi da cui è costituita la batteria, quanto tra queste e il quadro, si deve tenere il debito conto a parte.

Nelle batterie a repulsione conviene adoperare, fra le intensità di corrente di carica indicate, quella normale od una minore, semprechè le condizioni di servizio lo permettano. La corrente massima di carica si deve impiegare soltanto se le condizioni di esercizio lo richiedano assolutamente.

ACCESSORI

(Da preventivarsi a parte, come detto a pag. 10).

Staffe per i regoli di estremità. — Agli estremi di ogni fila di elementi occorre, sul regolo dell'elemento corrispondente, una staffa per l'attacco della relativa conduttura di rame.

Il prezzo della staffa comprende la staffa stessa e il materiale occorrente alla saldatura della conduttura nella staffa.

Per poter preventivare il numero preciso di staffe occorrenti bisogna stabilire in precedenza la disposizione della batteria.

Staffe per i regoli di inseritore. — Per l'unione di ogni conduttura d'inseritore colla batteria occorre pure una staffa.

Il prezzo di una staffa d'inseritore comprende la staffa stessa e il materiale occorrente alla saldatura della conduttura nella staffa.

Il numero delle staffe occorrenti per l'inseritore può essere precisato solo dopo aver stabilito la disposizione degli elementi e lo schema di distribuzione.

Materiale di saldatura. — Il materiale di saldatura comprende: piombo, ossigeno ed idrogeno compressi in bombole.

Scaffali di legno. — Gli scaffali di legno (figure 6 e 7)

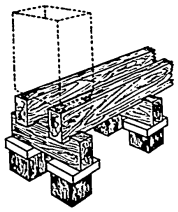


Fig. 6 — Scaffale a un piano.

sono costruiti con legno resinoso ben stagionato, e vengono spalmati con un duplice strato di materia resistente all'acido solforico.

Gli accumulatori piccoli, cioè quelli dei tipi dall'J 1 e JR 1 all'J 14 e JR 14, possono essere montati su scaffali a

due piani soprastanti, purchè le batterie non siano costituite da più di 66 elementi. Però, disponendo di spazio sufficiente, conviene in ogni caso adottare, anche per tali tipi di accumulatori, la disposizione ad un solo piano.

Se il numero di 66 elementi è superato, non si deve adot-

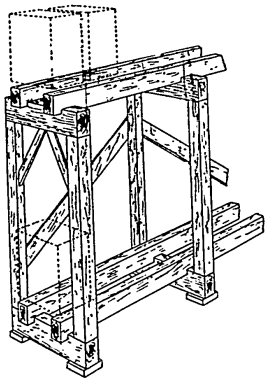


Fig. 7 — Scaffale a due piani.

tare altra disposizione che quella ad un piano, per non rendere la sorveglianza troppo difficile e disagevole.

Per accumulatori dai tipi J 1 e JR 1 ai tipi J 68 e JR 68 è sufficiente poter effettuare la sorveglianza da un solo lato delle file della batteria e perciò essi si possono montare in file doppie lungo i muri, lasciando un passaggio di servizio di almeno mm. 800. Accumulatori di tipo maggiore richiedono da ambedue le parti una corsia, e cioè, da una parte uno spazio di almeno mm. 500 per il semplice transito, e dall'altro una corsia che permetta l'eventuale rimozione dei recipienti e che quindi deve essere di almeno mm. 800 per gli accumu-

latori dai tipi J 72 e JR 72 ai tipi J 148 e JR 148 e di larghezza eguale alla lunghezza dell'accumulatore più 100 mm. per i tipi dall'J 152 e JR 152 all'J 192 e JR 192. Per i tipi maggiori dell'J 192 e JR 192, occorrono ai due lati corridoi rispettivamente di mm. 1200 e mm. 500.

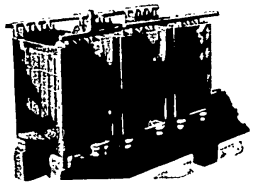


Fig. 8 — Accumulatori tipo J 3.

Per « lunghezza » degli accumulatori si intende sempre la dimensione esterna del recipiente in senso normale alla superficie delle piastre.

Negli accumulatori dei tipi dall'J 1 e JR 1 all'J 3 e JR 3

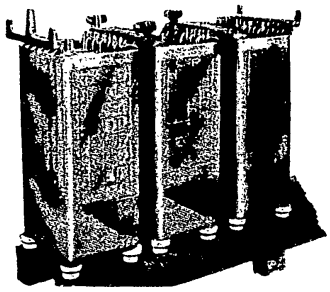


Fig. 9 — Accumulatori « saldati » tipo J 12.

gli elettrodi vengono montati in senso normale alla direzione dello scaffale e quelli di un elemento sono uniti a quelli degli elementi contigui mediante un regolo applicato lateralmente ad

essi (fig. 8). In tutti gli altri tipi di accumulatori gli elettrodi vengono montati in senso parallelo alla direzione degli scaffali e quelli di un elemento vengono uniti a quelli degli elementi contigui mediante regoli interposti (figure 9, 10 e 11).

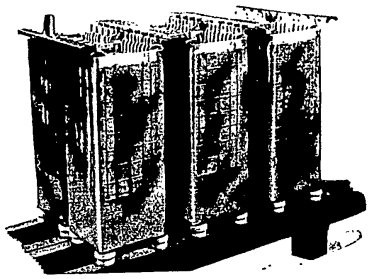


Fig. 10 — Accumulatori tipo J 16 in recipiente doppio di vetro.

La distanza tra i singoli elementi varia per i diversi tipi di accumulatori secondo la seguente tabella:

Tipi J e JR	1 a 3	. . . . .		circa mm.	30
»	4 a 28	in recipienti di	vetro	» »	65
»	24 a 148	» »	» legno	» »	30
»	152 a 280	. . . . .		» »	50

Gli scaffali per batterie di più di 10 elementi sono muniti di piatti isolanti, che variano di forma e di grandezza a seconda della grandezza degli accumulatori e della tensione della batteria.

Il prezzo di detti piatti per isolamento semplice sino a 500 volt è compreso nell'importo degli scaffali.

Per tensioni superiori a 500 volt si deve adoperare un isolamento speciale, di cui il prezzo viene indicato a parte nei singoli preventivi.

Marciapiedi rialzati. — Per gli accumulatori dei tipi superiori a quello J 148 data l'altezza loro occorrono, oltre agli scaffali, dei marciapiedi rialzati, il cui piano venga a trovarsi a mm. 700 sotto l'orlo superiore degli accumulatori.

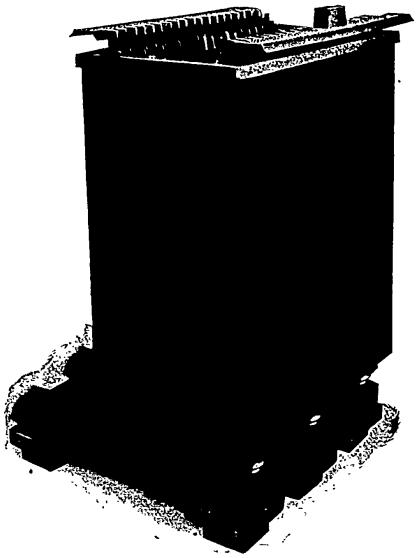


Fig. 11 — Accumulatore tipo J 152 in cassa di legno

In batterie di 125 elementi in serie, o meno, questi marciapiedi non hanno isolamento alcuno, mentre vengono isolati in tutte le batterie composte di più di 125 elementi; un isolamento speciale per alta tensione viene applicato quando si tratti di batterie di oltre 500 volt.

Marciapiedi bassi. — Per gli accumulatori dei tipi dall'J 1 all'J 148 in batterie composte di più di 125 elementi, occorre, per ragioni di sicurezza, l'adozione di marciapiedi bassi, isolati da terra.

Per tensioni superiori a 500 volt occorre un isolamento speciale ad alta tensione.

Recipienti per liquidi di rabboccamento. — Ogni batteria occorre sia dotata di due recipienti per la conservazione dell'acqua distillata e dell'acido destinati alla batteria, e di una brocca in vetro.

Quando si tratti di grandi batterie montate in locali situati a diversi piani od in parecchie sale comunque separate, ogni locale deve essere provvisto di tali recipienti e di una di tali brocche.

Fig. 12

Morsetti a ponte. — Servono per isolare un elemento in caso di guasti, ricambi di piastre, ecc.; si usano però unicamente in batterie montate in recipienti di vetro (fig. 12).

Fig. 13

Densimetri. — Servono a misurare la densità dell'acido. Comunemente ne vengono forniti due per ogni batteria (fig. 13).

Recipienti per separatori di scorta. — Servono per conservare in acqua acidulata con acido solforico i separatori di riserva, affinchè questi non si asciughino e non si screpolino. Vengono adoperati esclusivamente per batterie in recipienti di legno, perchè per le batterie in recipienti di vetro, venendo fornita sempre una certa riserva di tali recipienti, può all'uopo essere adoperato uno di questi. Per ogni impianto basta un solo recipiente.

ACIDO SOLFORICO ED ACQUA DISTILLATA

La purezza dell'acido solforico negli accumulatori è essenziale pel buon funzionamento e per la buona conservazione, e conseguente durata, di essi. È perciò che ogni garanzia data per le batterie viene sempre subordinata alla condizione che, tanto l'acido solforico pel primo riempimento, quanto l'acqua distillata pei periodici rabboccamenti sieno sempre forniti o dalla Società o da quei fabbricanti, che si sono impegnati contrattualmente verso di lei a fornire prodotti, le cui qualità rispondano pienamente alle prescrizioni da lei date per essi.

Se il committente ordina direttamente l'acido, deve sempre indicare esplicitamente al fornitore, che l'acido stesso è destinato a servire per batterie di accumulatori Tudor.

Il peso specifico dell'acido solforico per il primo riempimento deve essere di 1,19 riferito alla temperatura di 15 °C.

Le rotture di damigiane o i danni eventuali alle stesse durante il trasporto o l'esecuzione dei lavori restano a carico del committente. Dette damigiane rimangono sempre di proprietà della Società e debbono essere restituite in buono stato franco alla stazione di provenienza entro un termine di 30 giorni a partire dalla messa in funzione della batteria. Ogni damigiana, che non sia restituita, sarà fatturata a parte a prezzo di costo.

È stato molte volte notato che l'elettrolito di una data batteria di accumulatori, puro da principio, viene poi in seguito a contenere del cloro. Questa impurità, anche in quantità minima, danneggia moltissimo le piastre. L'origine di essa è sempre da ricercarsi nell'uso di liquidi di rabboccamento non corrispondenti alle prescrizioni. Bisogna perciò che gli utenti di batterie facciano rigorosamente osservare dal proprio personale le prescrizioni suindicate al riguardo. Si tenga in modo particolare presente che le acque di pozzo e di condotta contengono quasi sempre del cloro, e perciò non devono mai essere adoperate. Qualcuno ritiene di poter eliminare tali impurità con la bollitura. Ciò è un grave errore. La bollitura sterilizza le acque dal punto di vista batterico, ma non elimina le impurità chi-

miche. Anche l'acqua piovana contiene qualche volta del cloro e perciò l'uso di essa deve pure essere bandito. Infine si consiglia di non usare mai acque di scarico dei condensatori di macchine a vapore; varie volte si sono riscontrate in tali acque impurità molto dannose alle piastre, pur essendosi ottenuti con campioni prelevati in altri momenti, risultati analitici soddisfacenti.

Data la essenziale importanza di procurare e mantenere una assoluta purezza dell'elettrolito, con ogni batteria si fornisce una cassetta di reagenti con le relative istruzioni per analizzare i liquidi di rabboccamento prima del loro impiego.

MONTAGGIO, MESSA IN FUNZIONE E CONSEGNA

Montaggio. — Normalmente nel preventivare la fornitura di batterie si comprende anche il montaggio delle stesse, nonchè la saldatura delle condutture ai poli di esse. Però anche in tal caso restano sempre esclusi dai preventivi, e quindi dagli obblighi di fornitura, i manovali di aiuto al montatore. Questi manovali di aiuto devono essere forniti e pagati dal committente, dal quale dipenderanno per tutto il resto e cioè anche, in particolare, nei riguardi di eventuali infortuni, mentre disciplinarmente dovranno stare completamente agli ordini del montatore.

A questi manovali incombono tutti i lavori di facchinaggio occorrenti per portare i materiali sul luogo di montaggio, il loro disimballo, l'aiuto per la verifica di essi, la loro pulizia e infine il porgimento di essi al montatore per la messa in opera.

I manovali debbono anche provvedere al versamento dell'acido negli accumulatori e alla chiusura e trasporto degli imballaggi e delle damigiane vuote da rispedirsi.

Qualora un montatore fosse impedito di incominciare o di proseguire il lavoro per cause non dipendenti dalla Società, il tempo di aspettativa dovrà essere compensato a parte in ragione delle tariffe in vigore al momento del fatto, indicate nei

relativi moduli di preventivo. Sono pure da rimborsarsi a parte le spese degli ulteriori viaggi di andata e ritorno da Melzo al luogo di montaggio, quando un montatore, per ragioni indipendenti dalla Società, dovesse recarsi sul luogo di montaggio più di una volta.

Per forniture all'estero si stipulano volta per volta le relative condizioni di montaggio.

Quando le spese di viaggio non sono incluse nel preventivo vengono fatturate a parte al loro reale valore. Le ore di viaggio vengono considerate come ore di lavoro e conteggiate quindi in ragione delle tariffe in vigore al momento.

Le spese di vettura o autotrasporti, per località non munite di comunicazioni ferroviarie o tranviarie, vengono pure conteggiate in base all'effettivo esborso effettuato, a meno che il committente non metta una vettura o un autoveicolo a disposizione del personale.

Il trasporto del bagaglio, degli attrezzi e dell'apparecchio da saldare, si conteggia anch'esso in base alle spese effettivamente sostenute.

Somministrazioni personali in natura ai montatori, come vitto e alloggio, non sono mai prese in considerazione quale ragione di riduzione di spese di montaggio, anche se effettivamente tributate. Esse vanno in ogni caso ad esclusivo vantaggio del montatore.

Riempimento e messa in funzione. — Nell'importo dei preventivi si comprende normalmente una quota fissa quale compenso per l'assistenza di un montatore al versamento dell'elettrolito ed alla messa in funzione della batteria relativa. Però detta quota fissa presuppone che il riempimento e la messa in funzione si possano effettuare immediatamente dopo il termine dei lavori di montaggio; perciò in caso di eventuale aspettativa derivante da cause indipendenti dalla Società, ogni ora di essa si computerà a parte in ragione delle tariffe in vigore al momento.

Lo stesso vale nel caso in cui la prima cariça dovesse prolungarsi oltre il termine previsto, per non potersi essa eseguire

con almeno tre quarti dell'intensità massima di corrente prescritta, e senza interruzioni.

Verranno infine fatturate a parte le spese per la eventuale ripetizione di viaggi che i montatori dovessero fare per cause indipendenti dalla Società, come, ad esempio, quando la messa in funzione non potesse effettuarsi immediatamente dopo avere finito il montaggio.

Consegna. — La consegna della batteria si intende avvenuta con l'esecuzione delle prove di collaudo da effettuarsi, secondo le norme C. E. I., immediatamente dopo la preparazione della batteria al collaudo da eseguirsi dal personale della Società.

Se la prova di capacità non può avere luogo in questo momento, sarà fatta al più tardi entro 30 giorni dalla fine della prima carica, a spese del committente e soltanto dietro sua richiesta da farsi con lettera raccomandata. Trascorso questo termine senza che la prova sia stata eseguita per ragioni indipendenti dalla Società, essa si intenderà, agli effetti degli impegni assunti, come effettuata con esito favorevole e la batteria si intenderà definitivamente presa in consegna da parte del committente.

Fabbriche fornitrici
di acido solforico

SOCIETÀ "MONTECATINI"

Milano - *Via Filippo Turati, 18*
Roma - *Via Salandra*
Portici - *(Napoli)*

SOCIETÀ BOMBRINI PARODI-DELFINO

Milano - *Via Palestro, 2*
Roma - *Via del Corso, 267*
Colleferro - *(Roma)*

SOCIETÀ INDUSTRIE CHIMICHE Dr. BASLINI

Milano - *Via L. Vitali, 1*

Schema di contratto
per la manutenzione di batterie di accumulatori stazionari

Tra
che nel seguito sarà indicato con la denominazione « Utente » e la Società Edison - Sezione Accumulatori in Melzo, che nel seguito sarà indicata con la sigla « TUDOR », si conviene col presente contratto quanto segue:

Art. 1

Oggetto del contratto.

La « TUDOR » assume l'impegno di mantenere costantemente in efficienza, provvedendo ai necessari periodici ricambi dei relativi elettrodi e separatori, la batteria di accumulatori sottoindicata

....

a partire dal .... fino al 31 dicembre
alle condizioni indicate nei seguenti articoli e contro la corresponsione di un canone annuo di L. .... (lire ....)
pagabile anticipatamente alla sua cassa in Melzo, come indicato all'art. 6.

Art. 2

Capacità della batteria e obblighi relativi della Tudor.

Durante tutta la validità del presente contratto la « TUDOR » è tenuta a ripristinare la capacità della batteria nel caso che essa dovesse scendere sotto il limite indicato nel precedente art. 1, con un margine di tolleranza del 20°/₀ (venti per cento).

La capacità si intende riferita alla temperatura dell'elettrolito all'inizio della scarica di 25 °C. e per tutta la batteria, non cioè per ogni singolo elemento. I controlli saranno eseguiti secondo le norme C. E. I. per gli accumulatori al piombo.

Tutti i materiali, esclusi vetri, scaffali e isolamenti esterni, occorrenti alle necessarie riparazioni, resi franco alla stazione di Melzo, nonchè i relativi lavori, saranno a carico della « TUDOR ».

Il materiale che si rende libero in seguito ad una riparazione eseguita in conto manutenzione dalla « TUDOR » (rottami delle piastre, o delle casse sostituite, fango, ecc.) diviene senz'altro proprietà della « TUDOR » stessa, e dovrà dall'Utente essere reso franco stazione Melzo subito dopo il termine dei lavori.

La « TUDOR » ha diritto, ma non obbligo, di applicare alla batteria in questione quelle modificazioni costruttive che essa introducesse nella sua corrente lavorazione durante la validità del presente contratto. In particolare ha quindi il diritto di adoperare, per le riparazioni, piastre di tipo, forma e peso diversi da quelli iniziali, purchè mantenga la capacità nelle condizioni contrattuali.

La « TUDOR » non ha altri obblighi all'infuori di quelli sopra specificati. In particolare qualunque eventuale pretesa di risarcimento di danni diretti o indiretti per parte dell'Utente è esclusa, perchè così esplicitamente convenuto fra le parti, le quali hanno tenuto il debito conto di questa condizione nella fissazione del canone indicato all'art. 1.

Art. 3

Sorveglianza e condotta della batteria.

L'Utente è tenuto a curare sempre la buona sorveglianza e la condotta della batteria, in conformità alle norme di servizio della « TUDOR », specialmente per quanto concerne l'eliminazione dei corti-circuiti interni degli elementi, che deve essere curata dal sorvegliante della batteria, con l'eventuale ricambio dei separatori messi a disposizione dalla « TUDOR ».

Per i periodici rabboccamenti e per le eventuali sostituzioni di elettrolito, l'Utente provvederà a sue spese l'acido solforico della qualità corrispondente alle prescrizioni della « TUDOR », e l'acqua distillata.

Tali liquidi, prima di venire adoperati, devono essere analizzati secondo le indicazioni della « TUDOR », e non si devono in nessun caso usare se da tale analisi risulti la presenza di impurità.

Non è permesso di far erogare alla batteria, nelle 24 ore, un numero di amperora superiore alla capacità indicata all'art. 1, salvo casi eccezionali.

Art. 4

Prove di capacità.

L'Utente potrà richiedere alla « TUDOR » prove di capacità in qualunque momento. Se la prova effettuata dimostrerà che la batteria non corrisponde alle condizioni dell'art. 2, le spese pel personale della « TUDOR » destinato a tali prove saranno a carico di questa; in caso contrario saranno a carico dell'Utente.

Al principio di ogni prova la batteria deve trovarsi in buono stato di carica. All'occorrenza si dovrà sottoporre la batteria al trattamento, che sarà indicato dalla « TUDOR ».

Altre spese, all'infuori di quelle suindicate, non si conteggeranno in alcun caso, nè da una parte, nè dall'altra.

Art. 5

Prestazioni a carico dell'Utente.

Sono a carico dell'Utente: 1° le spese di trasporto dalla stazione di Melzo al luogo di installazione della batteria, e viceversa, sia per i materiali forniti, sia per quelli sostituiti, (compreso il fango) sia per gli attrezzi, imballaggi, damigiane e quanto altro occorso per una riparazione o sostituzione; 2° l'eventuale imposta sui consumi per i materiali forniti; 3° i manovali di aiuto occorrenti ai montatori, tanto per l'esecuzione dei lavori, quanto per il disimballo dei materiali in arrivo e l'imballo dei materiali in partenza (rottami, fango, ecc.), comprese tutte le assicurazioni obbligatorie per legge; 4° la corrente necessaria per qualsiasi trattamento, riparazione o prova.

Sono pure a carico dell'Utente i lavori eventualmente occasionati da deterioramenti per causa di forza maggiore, per difetto di sorveglianza da parte del personale dell'Utente o per servizio non corrispondente alle

caratteristiche della batteria ed alle prescrizioni della «TUDOR»; per uso di liquidi di rabboccamento diversi da quelli prescritti dalla «TUDOR», per intervento di terze persone; per introduzione di materie estranee negli elementi o per influenza di vapori nocivi. In caso di rifiuto da parte dell'Utente a provvedere in merito, la «TUDOR» avrà facoltà di rescindere in via immediata il presente contratto, senza pregiudizio però del diritto di mantenerlo in vigore, e di pretendere dall'Utente l'esatta osservanza di quanto sopra stabilito.

Art. 6

Pagamenti dei canoni.

I canoni sono pagabili in contanti, presso la cassa della «TUDOR» in Melzo, al 1° gennaio di ogni anno.

Per il periodo intercedente fra la data di inizio del presente contratto e il 31 dicembre successivo l'Utente pagherà alla «TUDOR», entro otto giorni dall'inizio del contratto, una quota di canone proporzionale ai giorni intercorrenti fra tali date.

Solo dopo avvenuto il pagamento del primo canone, o quota-parte di canone, il contratto resta perfezionato per la «TUDOR».

Nel caso di eventuali ritardi nel pagamento dei canoni, decorreranno automaticamente gli interessi al tasso ufficiale della Banca d'Italia del momento, aumentato di $2\frac{1}{2}$ (due e mezzo).

La «TUDOR» però si riserva in ogni caso il diritto di rescindere in via immediata il presente contratto, qualora il pagamento dei canoni non venga effettuato entro un mese dalla relativa scadenza.

Art. 7

Casi accidentali e di forza maggiore.

Scioperi, incendi, mancanza di mezzi di trasporto e casi di forza maggiore sollevano la «TUDOR» dall'immediato adempimento dei suoi obblighi restando però essa sempre obbligata a corrispondervi nel termine di tempo praticamente più breve.

Art. 8

Adeguamenti.

Il canone annuo è stabilito su un prezzo base del piombo di L. / kg.

Per le forniture di piastre che si dovessero effettuare in epoca in cui la quotazione del piombo fosse superiore, sarà dovuto alla «TUDOR» un compenso supplementare e precisamente, per ogni lira in più rispetto alla quotazione di L. / kg.:

L. per ogni piastra positiva

L. per ogni piastra negativa mediana.

L. per ogni piastra negativa di estremità

Per il calcolo dei compensi servirà di base la quotazione media indicata per il piombo in pani di prima fusione del giornale «IL SOLE» di Milano, nella rubrica «Metalli non ferrosi», nel giorno di sabato precedente quello in cui verrà eseguita la spedizione dei materiali da Melzo.

Nella fissazione dei compensi supplementari suindicati è stato tenuto conto del rottame ricuperabile da ogni sostituzione di piastre, rottame che - come specificato dall'art. 2 del presente contratto - diviene senz'altro proprietà della «TUDOR».

Per la mano d'opera, la cui incidenza nel canone di cui all'art. 1 è, all'inizio del contratto, del %, si è tenuto conto delle disposizioni vigenti alla data del

Qualora il costo della mano d'opera dovesse, durante il periodo di validità del presente contratto, subire variazioni in aumento o in diminuzione, su richiesta della parte interessata, si addiverrà all'adeguamento del canone ed alla determinazione dei relativi importi di conguaglio alla data del 31 dicembre dell'anno in cui si sono verificate le variazioni.

Per quanto riguarda le altre voci interessanti l'industria degli accumulatori, qualora queste dovessero subire variazioni di notevole entità, si addiverrà, su richiesta di una delle parti, ad una equa revisione del canone di cui all'art. 1 del presente contratto, apportando ad esso corrispondenti aumenti o diminuzioni per modo da compensare integralmente le variazioni intervenute. Qualora la quotazione del piombo dovesse scendere al disotto di L. / kg. si addiverrà parimenti ad una equa revisione del canone di cui all'art 1.

Art. 9

Spese di registrazione e imposta generale sulle entrate.

Le spese di registrazione del presente contratto e l'imposta generale sulle entrate sono a carico dell'Utente.

Art. 10

Contestazioni e arbitrato.

Per qualsiasi controversia potesse insorgere fra le parti, queste rinunciano esplicitamente ad adire le vie giudiziali, obbligandosi a deferire le controversie stesse ad un collegio arbitrale composto di tre membri, di cui due eletti uno per ciascuna delle parti ed il terzo eletto dai primi due o dal Presidente dell'Associazione Elettrotecnica Italiana, i quali giudicheranno inappellabilmente quali amichevoli compositori. Qualora entro quindici giorni dalla notifica dell'arbitro di una parte, l'altra parte non avesse notificato il proprio, anche questo verrà nominato dal Presidente dell'Associazione Elettrotecnica Italiana.

Nessuna contestazione potrà però mai dare luogo a sospensione di pagamenti.

Appendice II

Schema di accordo

per la revisione periodica di batterie di accumulatori stazionari

In base al presente accordo, a partire dal assumiamo in revisione la seguente Vostra batteria di accumulatori:

. . . . . .

Il presente accordo comporta per noi l'impegno:

1°) di far accuratamente ispezionare n volte all'anno la Vostra batteria dai nostri tecnici specializzati, onde stabilire con sicurezza il suo stato di conservazione e sorvegliare se è tenuta a regola d'arte ed usata adeguatamente;

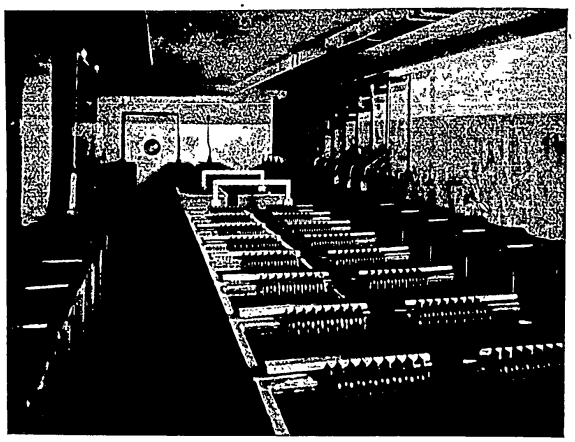
2°) di farVi avere un rapporto scritto sul risultato delle revisioni, con le eventuali proposte circa i cambiamenti consigliabili e le riparazioni necessarie, ed i nostri rilievi tecnici.

Ci verrà da Voi corrisposto a compenso un canone annuo anticipato di L.

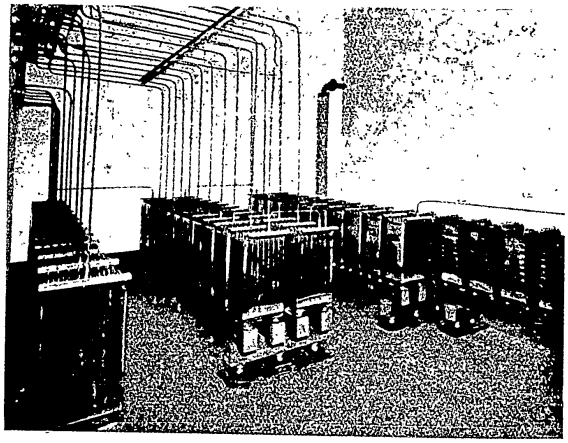
Non sono a nostro carico, in base al presente accordo, prove di capacità nè lavori di qualsiasi genere.

Il presente accordo ha la durata di un anno, a partire dal e si intende tacitamente rinnovato di anno in anno, se tre mesi prima della sua scadenza non viene disdetto da Voi o da noi mediante lettera raccomandata.

Il canone annuo potrà essere variato in base alle variazioni del costo della mano d'opera che si verificassero durante il periodo di validità del presente accordo.

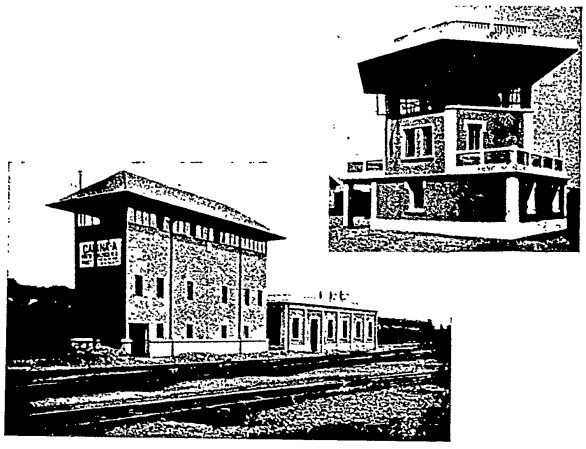


Batteria di accumulatori *Tudor* installata per riserva d'illuminazione presso il Credito Italiano di Milano.



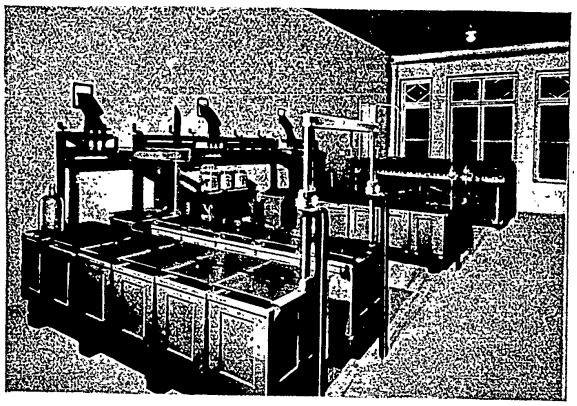
Batteria di accumulatori *Tudor* per i servizi ausiliari della Centrale Tel dell'Azienda Elettrica Consorziale delle Città di Bolzano e Merano.

Veduta panoramica della stazione viaggiatori F. S. di Milano Centrale (comandi elettrici funzionanti con accumulatori *Tudor*).

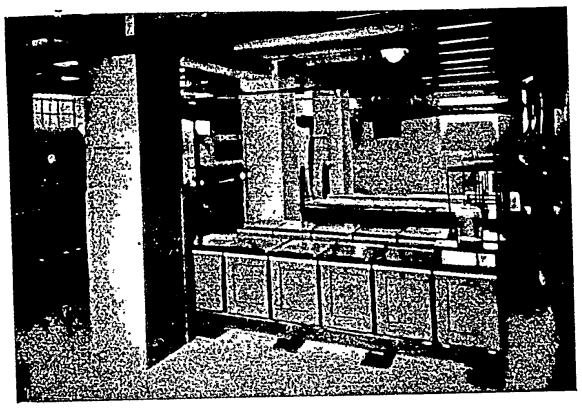


Due delle cabine di manovra equipaggiate di accumulatori *Tudor*, installate nella stazione F. S. Milano-Smistamento.

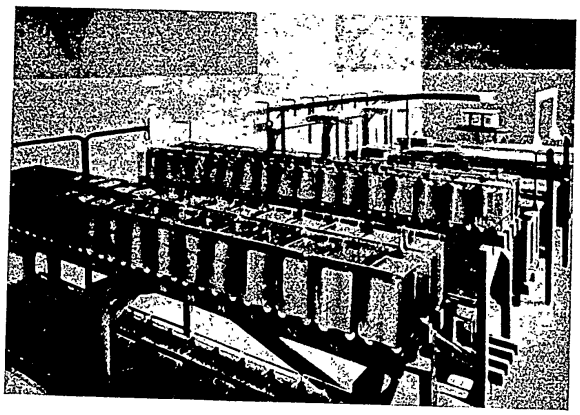
Batteria di accumulatori *Tudor* in funzione presso la R. A. I. di Milano.



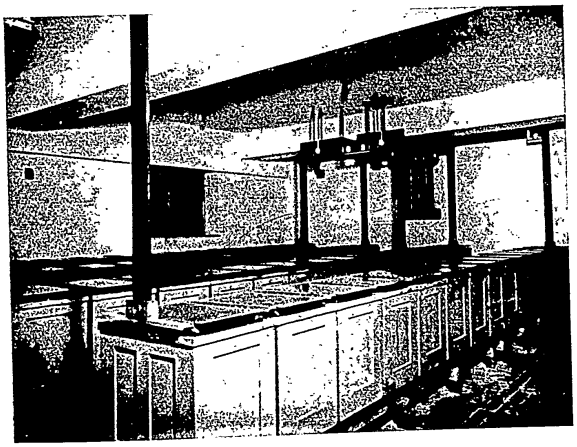
Batteria di accumulatori *Tudor* presso la stazione telefonica amplificatrice di Roma.



Batteria di accumulatori *Tudor* presso la stazione telefonica amplificatrice di Siena.

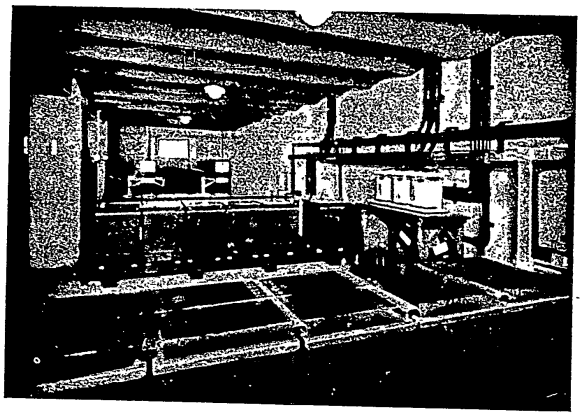


Batteria di accumulatori *Tudor* presso la stazione telefonica amplificatrice di Firenze.



Batteria di accumulatori *Tudor* presso la centrale Argonne della STIPEL di Milano.

Batteria di accumulatori *Tudor* presso la stazione telefonica amplificatrice di Viterbo.



Batteria di accumulatori *Tudor* presso la stazione telefonica amplificatrice di Abbadia.

ACCUMULATORI TIPO J

A SCARICA LENTA

ACCUMULATORI IN RECIPIENTE SINGOLO DI VETRO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg.
J 1	27 30 33 36	3 5 7 1/2 10	9 6 4.5 3.5	9	215 80 355	8.5	5	0.85	4.7 5.6
J 2	54 60 66 73	3 5 7 1/2 10	18 12 9 7.5	18	215 130 355	14	7	1.30	7.8 9.3
J 3	81 90 99 109	3 5 7 1/2 10	27 18 13.5 11	27	215 180 355	18.5	9.5	1.65	11 13.1
J 4	108 120 133 145	3 5 7 1/2 10	36 24 17.5 14.5	36	215 230 355	24	11	2.30	13.5 16.1
J 5	135 150 166 180	3 5 7 1/2 10	45 30 22 18	45	215 230 355	28	12	2 30	13 15.5
J 6	162 180 199 218	3 5 7 1/2 10	54 36 26.5 22	54	215 165 635	32	15	2.80	17.5 20.8
J 8	216 240 265 290	3 5 7 1/2 10	72 48 35.5 29	72	215 200 635	42	17	2.90	21 25
J 10	270 300 331 363	3 5 7 1/2 10	90 60 44 36.5	90	215 240 635	50	20	2.95	24.5 29.2
J 12	324 360 398 435	3 5 7 1/2 10	108 72 53 43.5	108	215 280 650	60	23	3.05	28 33.3
J 14	378 420 464 508	3 5 7 1/2 10	126 84 62 51	126	215 315 650	68	26	3.05	32 38.1

ACCUMULATORI IN RECIPIENTE DOPPIO DI VETRO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
J 16	432 480 530 580	3 5 7 1/2 10	144 96 71 58	144	215 410 635	84	34	5.90	42 50
J 18	486 540 596 650	3 5 7 1/2 10	162 108 80 65	162	215 450 635	92	37	6.05	45.5 54.2
J 20	540 600 663 725	3 5 7 1/2 10	180 120 88 73	180	215 490 635	100	40	6.05	49 58.3
J 22	594 660 729 798	3 5 7 1/2 10	198 132 97 80	198	215 530 650	110	43	6.25	52.5 62.5
J 24	648 720 795 870	3 5 7 1/2 10	216 144 106 87	216	215 570 650	120	46	6.25	56 66.7
J 26	702 780 862 940	3 5 7 1/2 10	234 156 115 94	234	215 605 650	128	49	6.35	60 71.5
J 28	756 840 928 1015	3 5 7 1/2 10	252 168 124 102	252	215 640 650	136	52	6.35	64 76.2

ACCUMULATORI IN CASSE DI EBANITE SPECIALE

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido Kg.	Quantitativo di acido solforico per elemento — litri Kg.
J 16	432 480 530 580	3 5 7 1/2 10	144 96 71 58	144	230 375 650	82	34 40,4
J 18	486 540 590 650	3 5 7 1/2 10	162 108 80 65	162	235 415 650	90	38 45,2
J 20	540 600 663 725	3 5 7 1/2 10	180 120 88 73	180	235 455 650	98	41 48,7
J 22	594 660 729 798	3 5 7 1/2 10	198 132 97 80	198	230 520 650	108	49 58,3
J 24	648 720 795 870	3 5 7 1/2 10	216 144 106 87	216	230 560 650	118	52 61,8
J 26	702 780 862 940	3 5 7 1/2 10	234 156 115 94	234	230 600 650	126	56 66,6

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
J 24	648 720 795 870	3 5 7 1/2 10	216 144 106 87	216	455 325 635	137	31	7.20	53 63
J 28	756 840 928 1015	3 5 7 1/2 10	252 168 124 102	252	455 360 635	157	35	7.35	59 70
J 32	864 960 1060 1160	3 5 7 1/2 10	288 192 141 116	288	455 395 635	177	39	7.40	65 78
J 36	972 1080 1193 1305	3 5 7 1/2 10	324 216 159 131	324	455 435 635	196	42	7.55	72 86
J 40	1080 1200 1325 1450	3 5 7 1/2 10	360 240 177 145	360	465 480 635	214	46	7.80	78 93
J 44	1188 1320 1458 1595	3 5 7 1/2 10	396 264 194 160	396	465 515 635	234	49	7.95	84 100
J 48	1296 1440 1590 1740	3 5 7 1/2 10	432 288 212 174	432	465 555 640	253	54	8.10	92 110
J 52	1400 1560 1720 1885	3 5 7 1/2 10	468 312 230 189	468	465 590 640	272	57	8.25	98 117
J 56	1510 1680 1885 2030	3 5 7 1/2 10	504 336 247 203	504	465 630 640	291	60	8.40	105 125
J 60	1620 1800 1985 2175	3 5 7 1/2 10	540 360 265 218	540	465 665 640	311	63	8.60	111 132

NB. - Gli accumulatori sopra indicati possono essere montati, a richiesta, anche in casse di ebanite speciale.

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
J 64	1725 1920 2120 2320	3 5 7 1/2 10	576 384 283 232	576	465 700 640	331	67	8.80	117 140
J 68	1835 2040 2250 2465	3 5 7 1/2 10	612 408 300 247	612	465 740 640	349	71	9	125 149
J 72	1940 2160 2385 2610	3 5 7 1/2 10	648 432 318 261	648	465 775 640	369	74	12.60	131 156
J 76	2050 2280 2515 2755	3 5 7 1/2 10	684 456 336 276	684	465 815 640	388	79	12.75	138 165
J 80	2160 2400 2650 2900	3 5 7 1/2 10	720 480 353 290	720	465 850 640	407	82	12.90	144 172
J 84	2265 2520 2780 3045	3 5 7 1/2 10	756 504 371 305	756	465 885 640	428	85	13.05	150 179
J 88	2375 2640 2915 3190	3 5 7 1/2 10	792 528 389 319	792	465 925 640	448	89	13.25	158 188
J 92	2480 2760 3045 3335	3 5 7 1/2 10	828 552 406 334	828	465 960 640	467	93	13.40	164 195
J 96	2590 2880 3180 3480	3 5 7 1/2 10	864 567 424 348	864	465 1000 640	487	96	13.60	171 204
J 100	2700 3000 3310 3625	3 5 7 1/2 10	900 600 442 363	900	465 1035 640	507	100	13.75	177 211

NB. - Gli accumulatori sopra indicati possono essere montati, a richiesta, anche in casse di ebanite speciale.

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
J 104	2805 3120 3445 3770	3 5 7 1/2 10	936 624 459 377	936	465 1070 640	526	103	13 95	184 219
J 108	2915 3240 3575 3915	3 5 7 1/2 10	972 648 477 392	972	465 1110 645	546	106	14.15	191 228
J 112	3020 3360 3710 4060	3 5 7 1/2 10	1008 672 495 406	1008	465 1145 645	565	109	14.40	197 235
J 116	3139 3480 3840 4205	3 5 7 1/2 10	1044 696 512 421	1044	465 1185 645	584	113	14.60	204 243
J 120	3240 3600 3975 4350	3 5 7 1/2 10	1080 720 530 435	1080	465 1220 645	605	116	14.90	211 251
J 124	3345 3720 4105 4495	3 5 7 1/2 10	1116 744 548 450	1116	465 1255 645	624	120	17.75	217 259
J 128	3455 3840 4240 4640	3 5 7 1/2 10	1152 768 565 464	1152	465 1295 645	644	124	18.—	224 267
J 132	3560 3960 4370 4785	3 5 7 1/2 10	1188 792 583 479	1188	465 1335 645	663	128	18.20	231 275
J 136	3670 4080 4505 4930	3 5 7 1/2 10	1224 816 601 493	1224	465 1370 645	683	132	18.45	237 282
J 140	3780 4200 4635 5075	3 5 7 1/2 10	1260 840 618 508	1260	465 1405 645	703	135	18.70	244 291

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
J 144	3885 4320 4770 5220	3 5 7 1/2 10	1296 864 636 522	1296	465 1440 645	722	138	19.—	250 298
J 148	3995 4440 4905 5365	3 5 7 1/2 10	1332 888 654 537	1332	465 1480 645	742	141	19.25	257 306
J 152	4100 4560 5035 5510	3 5 7 1/2 10	1368 912 671 551	1368	490 880 1095	792	116	16.20	259 309
J 160	4320 4800 5300 5800	3 5 7 1/2 10	1440 960 707 580	1440	490 920 1095	830	121	16.35	272 324
J 168	4535 5040 5565 6090	3 5 7 1/2 10	1512 1008 742 609	1512	490 960 1095	869	127	16.50	285 340
J 176	4750 5280 5830 6380	3 5 7 1/2 10	1584 1056 777 638	1584	490 1000 1095	906	132	16.65	297 354
J 184	4965 5520 6095 6670	3 5 7 1/2 10	1656 1104 813 667	1656	490 1040 1095	944	139	16.80	310 369
J 192	5180 5760 6360 6960	3 5 7 1/2 10	1728 1152 848 696	1728	490 1080 1095	983	144	17.—	322 384
J 200	5400 6000 6625 7250	3 5 7 1/2 10	1800 1200 883 725	1800	490 1120 1095	1022	150	21.75	336 400
J 208	5615 6240 6890 7540	3 5 7 1/2 10	1872 1248 919 754	1872	490 1155 1095	1060	155	21.90	346 412

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
J 216	5830 6480 7155 7830	3 5 7 1/2 10	1944 1296 954 783	1944	490 1195 1095	1099	160	22.—	359 428
J 224	6045 6720 7120 8120	3 5 7 1/2 10	2016 1344 989 812	2016	490 1235 1095	1136	165	22.10	373 444
J 232	6260 6955 7685 8410	3 5 7 1/2 10	2088 1392 1025 841	2088	490 1275 1095	1174	171	22.25	384 457
J 240	6480 7200 7950 8700	3 5 7 1/2 10	2160 1440 1060 870	2160	490 1315 1095	1213	176	22.35	397 473
J 248	6695 7440 8215 8990	3 5 7 1/2 10	2232 1488 1093 899	2232	490 1355 1095	1251	181	22.50	409 487
J 256	6910 7680 8480 9280	3 5 7 1/2 10	2304 1536 1131 928	2304	490 1395 1095	1290	187	22.60	422 503
J 264	7125 7920 8745 9570	3 5 7 1/2 10	2376 1584 1166 957	2376	490 1435 1095	1328	192	22.70	435 518
J 272	7340 8160 9010 9860	3 5 7 1/2 10	2448 1632 1201 986	2448	490 1475 1095	1367	198	22.90	447 532
J 280	7560 8400 9275 10150	3 5 7 1/2 10	2520 1680 1237 1015	2520	490 1515 1095	1405	204	23.05	461 549

ACCUMULATORI TIPO JR

A SCARICA RAPIDA

ACCUMULATORI IN RECIPIENTE SINGOLO DI VETRO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
JR 1	19 22	1 2	19 11	9	215 80 355	8.5	5	0.85	4.7 5.6
JR 2	37 44	1 2	37 22	18	215 130 355	14	7	1.30	7.8 9.3
JR 3	55 66	1 2	55 33	27	215 180 355	18.5	9.5	1.65	11 13.1
JR 4	74 89	1 2	74 44.5	36	215 230 355	24	11	2.30	13.5 16.1
JR 5	93 111	1 2	93 55.5	45	215 230 355	28	12	2.30	13 15.5
JR 6	111 133	1 2	111 66	54	215 165 635	32	15	2.80	17.5 20.8
JR 8	148 176	1 2	148 88	72	215 200 635	42	17	2.90	21 25
JR 10	185 220	1 2	185 110	90	215 240 635	50	20	2.95	24.5 29.2
JR 12	222 266	1 2	222 133	108	215 280 650	60	23	3.05	28 33.3
JR 14	259 310	1 2	259 155	126	215 315 650	68	26	3.05	32 38.1

ACCUMULATORI IN RECIPIENTE DOPPIO DI VETRO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
JR 16	296 354	1 2	296 177	144	215 410 635	84	34	5.90	42 50
JR 18	333 398	1 2	333 199	162	215 450 635	92	37	6.05	45.5 54.2
JR 20	370 442	1 2	370 221	180	215 490 635	100	40	6.05	49 58.3
JR 22	407 488	1 2	407 244	198	215 530 650	110	43	6.25	52.5 62.5
JR 24	444 532	1 2	444 266	216	215 570 650	120	46	6.25	56 66.7
JR 26	481 576	1 2	481 288	234	215 605 650	128	49	6.35	60 71.5
JR 28	518 620	1 2	518 310	252	215 640 650	136	52	6.35	64 76.2

ACCUMULATORI IN CASSE DI EBANITE SPECIALE

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido Kg.	Quantitativo di acido solforico per elemento — litri Kg
JR 16	296 354	1 2	296 177	144	230 375 650	82	34 40,4
JR 18	333 398	1 2	333 199	162	235 415 650	90	38 45,2
JR 20	370 442	1 2	370 221	180	235 455 650	98	41 48,7
JR 22	407 488	1 2	407 244	198	230 520 650	108	49 58,3
JR 24	444 532	1 2	444 266	216	230 560 650	118	52 61,8
JR 26	481 576	1 2	481 288	234	230 600 650	126	56 66,6

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
JR 24	444 532	1 2	444 266	216	455 325 635	137	31	7.20	53 63
JR 28	518 620	1 2	518 310	252	455 360 635	157	35	7.35	59 70
JR 32	592 708	1 2	592 354	288	455 395 635	177	39	7.40	65 78
JR 36	666 798	1 2	666 399	324	455 435 635	196	42	7.55	72 86
JR 40	740 886	1 2	740 443	360	465 480 635	214	46	7.80	78 93
JR 44	814 974	1 2	814 487	396	465 515 635	234	49	7.95	84 100
JR 48	888 1060	1 2	888 530	432	465 555 640	253	54	8.10	92 110
JR 52	962 1150	1 2	962 575	468	465 590 640	272	57	8.25	98 117
JR 56	1036 1240	1 2	1036 620	504	465 630 640	291	60	8.40	105 125
JR 60	1110 1328	1 2	1110 664	540	465 665 640	311	63	8.60	111 132

NB. - Gli accumulatori sopra indicati possono essere montati, a richiesta, anche in casse di ebanite speciale.

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
JR 64	1184 1416	1 2	1184 708	576	465 700 640	331	67	8.80	117 140
JR 68	1258 1506	1 2	1258 753	612	465 740 640	349	71	9	125 149
JR 72	1332 1594	1 2	1332 797	648	465 775 640	369	74	12.60	131 156
JR 76	1406 1680	1 2	1406 840	684	465 815 640	388	79	12.75	138 165
JR 80	1480 1770	1 2	1480 885	720	465 850 640	407	82	12.90	144 172
JR 84	1554 1860	1 2	1554 930	756	465 885 640	428	85	13.05	150 179
JR 88	1628 1948	1 2	1628 974	792	465 925 640	448	89	13.25	158 188
JR 92	1702 2036	1 2	1702 1018	828	465 960 640	467	93	13.40	164 195
JR 96	1776 2124	1 2	1776 1062	864	465 1000 640	487	96	13.60	171 204
JR 100	1850 2214	1 2	1850 1107	900	465 1035 640	507	100	13.75	177 211

NB - Gli accumulatori sopra indicati possono essere montati, a richiesta, anche in casse di ebanite speciale.

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
JR 104	1923 2300	1 2	1923 1150	936	465 1070 640	526	103	13.95	184 219
JR 108	1997 2390	1 2	1997 1195	972	465 1110 645	546	106	14 15	191 228
JR 112	2071 2480	1 2	2071 1240	1008	465 1145 645	565	109	14.40	197 235
JR 116	2145 2568	1 2	2145 1284	1044	465 1185 645	584	113	14.60	204 243
JR 120	2219 2656	1 2	2219 1328	1080	465 1220 645	605	116	14.90	211 251
JR 124	2293 2745	1 2	2293 1373	1116	465 1255 645	624	120	17.75	217 259
JR 128	2367 2834	1 2	2367 1417	1152	465 1295 645	644	124	18.—	224 267
JR 132	2441 2920	1 2	2441 1460	1188	465 1335 645	663	128	18.20	231 275
JR 136	2515 3010	1 2	2515 1505	1224	465 1370 645	683	132	18.45	237 282
JR 140	2589 3100	1 2	2589 1550	1260	465 1405 645	703	135	18.70	244 291

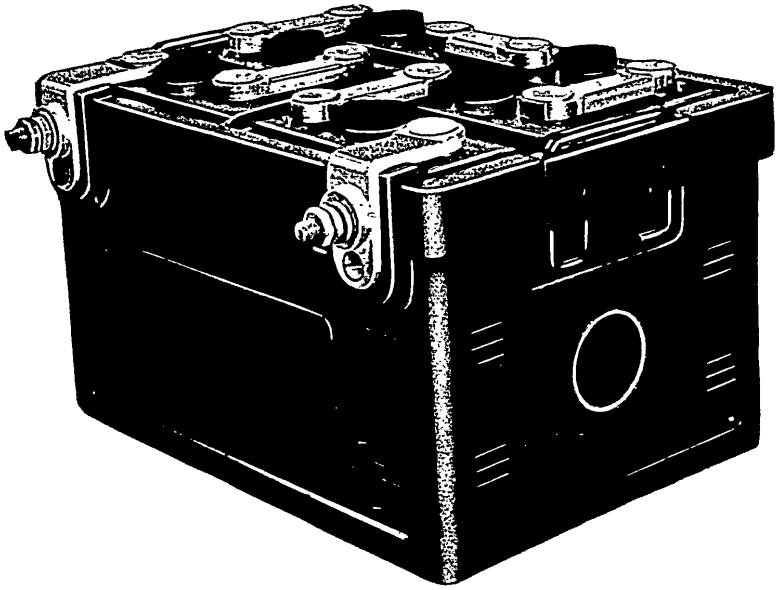
ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza mm	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solforico per elemento — litri kg
JR 144	2663 3188	1 2	2663 1594	1296	465 1440 645	722	138	19.—	250 298
JR 148	2737 3276	1 2	2737 1638	1332	465 1480 645	742	141	19 25	257 306
JR 152	2811 3364	1 2	2811 1682	1368	490 880 1095	792	116	16.20	259 309
JR 160	2959 3540	1 2	2959 1770	1440	490 920 1095	830	121	16.35	272 324
JR 168	3107 3720	1 2	3107 1860	1512	490 960 1095	869	127	16.50	285 340
JR 176	3255 3896	1 2	3255 1948	1584	490 1000 1095	906	132	16.65	297 354
JR 184	3403 4074	1 2	3403 2037	1656	490 1040 1095	944	139	16.80	310 369
JR 192	3551 4250	1 2	3551 2125	1728	490 1080 1095	983	144	17.—	322 384
JR 200	3699 4428	1 2	3699 2214	1800	490 1120 1095	1022	150	21 75	336 400
JR 208	3847 4605	1 2	3847 2303	1872	490 1155 1095	1060	155	21.90	346 412

ACCUMULATORI IN CASSE DI LEGNO

TIPO	Capacità amperora	Durata della scarica ore	Intensità di scarica ampere	Intensità massima di carica ampere	Dimensioni esterne compreso gli isolatori — larghezza lunghezza altezza m m	Peso di un elemento senza acido kg	Peso dell'imballaggio per elemento kg	Peso dello scaffale a un piano per elemento kg	Quantitativo di acido solfcrico per elemento — litri kg
JR 216	3995 4780	1 2	3995 2390	1944	490 1195 1095	1099	160	22.—	359 428
JR 224	4143 4960	1 2	4143 2480	2016	490 1235 1095	1136	165	22.10	373 444
JR 232	4291 5135	1 2	4291 2568	2088	490 1275 1095	1174	171	22.25	384 457
JR 240	4439 5314	1 2	4439 2657	2160	490 1315 1095	1213	176	22.35	397 473
JR 248	4587 5490	1 2	4587 2745	2232	490 1355 1095	1251	181	22 50	409 487
JR 256	4735 5668	1 2	4735 2834	2304	490 1395 1095	1290	187	22.60	422 503
JR 264	4883 5845	1 2	4883 2923	2376	490 1435 1095	1328	192	22.70	435 518
JR 272	5031 6020	1 2	5031 3010	2448	490 1475 1095	1367	198	22.90	447 532
JR 280	5179 6200	1 2	5179 3100	2520	490 1515 1095	1405	204	23.05	461 549

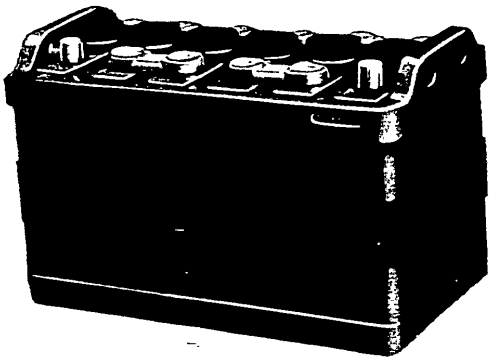
BATTERIE TUDOR



per:

AUTOVETTURE
AUTOCARRI
AUTOBUS
AUTOPULLMANN
AUTOMOTRICI
TRATTORI
MACCHINE AGRICOLE
MOTORI MARINI
MOTOSCAFI
ECC.

cariche-secche (dry charged)
con separatori microporosi



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CATALOGO

N. 3

MAGGIO 1957

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BATTERIE **TUDOR** DA 6 VOLT

TIPO	Motto telegrafico	Capacità (secondo Norme C E I) al regime di 20 ore Ah	Capacità (secondo Norme C E I) al regime di 10 ore Ah	Corrente di carica massima A	Corrente di carica normale A	Dimensioni esterne in mm. lunghezza	Dimensioni esterne in mm. larghezza	Dimensioni esterne in mm. altezza	Schema di montaggio
3 CE5 6 - 60 UNI 508	AUGUS	74	67	25	12	200	175	240	1
3 SA 6 6 - 60 UNI 510	APRIL	78	72	26	9	235	175	200	1
3 CMN 5 SUPERIOR 6 - 60 UNI 508	LAMIN	80	73	28	12	200	175	240	1
3 CE 6 6 - 75 UNI 508	EVEST	89	81	31	14	235	180	240	1
3 CE 6/VW	FALAN	89	81	31	14	223	175	217	1
3 CE 6 F 6 - 75 UNI 508	SANEZ	89	81	31	14	235	180	240	1
3 SA 7 F	SACCA	93	84	30	11	265	175	200	2
3 CMN 6 SUPERIOR 6 - 75 UNI 508	TIMEN	96	87	34	14	235	180	240	1
3 CMN 6 F SUPERIOR 6 - 75 UNI 508	FOREM	96	87	34	14	235	180	240	1
3 CMN 7 SUPERIOR 6 - 90 UNI 508	FILAR	110	102	39	14	265	178	235	1

TIPO	Motto telegrafico	Capacità (secondo Norme C E I) al regime di 20 ore Ah	Capacità (secondo Norme C E I) al regime di 10 ore Ah	Corrente di carica massima A	Corrente di carica normale A	Dimensioni esterne in mm. lunghezza	Dimensioni esterne in mm. larghezza	Dimensioni esterne in mm. altezza	Schema di montaggio
3 CMN7 F SUPERIOR	RICAN	112	102	39	14	265	178	235	1
3 CMN 8	CIMEN	128	116	44	16	495	105	225	9
3 CLM 7 6 - 110 UNEL 71111	IBIEN	138	125	48	17	265	190	245	1
3 CMN 9 F	RIAME	144	131	50	18	310	170	235	1
3 CMN 9/FG	FUGOR	144	131	50	18	312	172	245	1
3 ATL 7 F	IDEON	158	140	56	20	265	150	245	1
3 CM 12 F	TERLI	182	167	60	21	375	160	230	1
3 CM 13 F	ADITA	195	180	66	23	410	180	240	1
*3 CLM 14	MACAR	275	250	96	34	575	190	265	3
*3 ATL 14 SUPERIOR	TARLE	315	280	112	40	575	190	280	3

NB. — Le batterie i cui tipi sono contraddistinti con * sono montate in cassetta di legno; le altre sono montate in monoblocco di ebanite
— Le batterie i cui tipi terminano con la lettera F hanno il monoblocco senza maniglie
— Per i prezzi, vedi listino a parte.

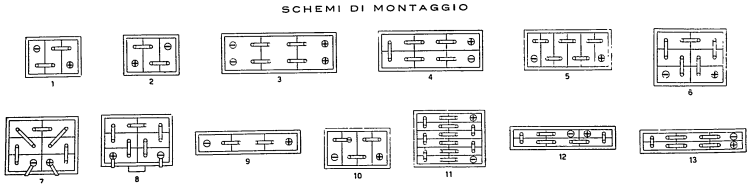
AVVERTENZE IMPORTANTI

1 - **Tutte le capacità indicate nel presente catalogo sono garantite secondo le norme CEI le quali prescrivono, fra l'altro, per le batterie d'auto, la durata minima di tre minuti e mezzo per la scarica d'avviamento a freddo (— 10 °C).**
2 - **I tipi contraddistinti con SUPERIOR appartengono alla serie speciale di batterie ad alta capacità.**
3 - **I morsetti di presa di corrente (UNI 515) vengono forniti solo dietro richiesta e fatturati a parte.**
4 - **Tipi diversi di prese vengono eseguiti su specifica richiesta.**

CONDIZIONI GENERALI DI FORNITURA

Imballaggio: L'imballaggio viene fatturato al costo.
Spedizione : Le merce si intende resa franco fabbrica. La spedizione è sempre effettuata a rischio e pericolo del committente
Se nell'ordinazione non viene fatta diversa speciale menzione, le batterie vengono spedite cariche e pronte all'uso.
Garanzia : Le batterie sono costruite con impiego di materiali di prima qualità; esse sono garentite contro ogni difetto di fabbricazione **Richiedete sempre il bollettino di garanzia !** Le dimensioni indicate non sono impegnative e potranno essere modificate in qualunque momento
Pagamenti : Salvo accordi speciali, all'atto dell'ordinazione dovrà essere versato l'importo relativo, mentre si disporrà per l'incasso contro assegno delle eventuali spese di trasporto.
Foro competente: Per ogni eventuale contestazione sarà competente il Foro di Milano.

SCHEMI DI MONTAGGIO



Le batterie per motocicli e motocarri sono elencate in un supplemento al presente catalogo

BATTERIE **TUDOR** DA 12 VOLT

TIPO	Motto telegrafico	Capacità (secondo Norme C E I) al regime di 20 ore Ah	Capacità (secondo Norme C E I) al regime di 10 ore Ah	Corrente di carica massima A	Corrente di carica normale A	Dimensioni esterne in mm. lunghezza	Dimensioni esterne in mm. larghezza	Dimensioni esterne in mm. altezza	Schema di montaggio
6 P 6	ITIOS	27	24	8	3	260	140	150	4
6 TO 3 SUPERIOR 12 - 30 UNEL 71113	TOTER	36	33	12	4	240	145	200	5
6 TO 3 F SUPERIOR 12 - 30 UNEL Pr 578	TELAR	36	33	12	4	240	145	200	5
6 SP 3 SUPERIOR 12 - 38 UNEL 71113	ALTER	42	39	15	5	250	175	200	6
6 SP 3 C SUPERIOR	CABUL	42	39	15	5	240	172	220	5
6 SP 3 F SUPERIOR 12 - 36 UNEL Pr 578	FADAR	42	39	15	5	230	172	200	5
6 CMN 3 12 - 40 UNI 509	BALIS	48	44	16	6	248	178	230	5
6 CMN 3 CF	BIRON	50	45	16	6	260	173	220	5
6 SP 4 SUPERIOR 12 - 50 UNEL 71113	RELTA	56	52	20	7	310	175	200	5
6 SP 4 F SUPERIOR	BODOL	56	52	20	7	286	170	200	5
6 CMN 4 SUPERIOR 12 - 50 UNI 509	ANSAL	64	58	22	8	310	172	237	5
6 CMN 4 L	MAIES	64	58	22	8	490	108	225	12
6 SP 5 SUPERIOR 12 - 62 UNEL 71113	ARTEL	70	65	27	9	370	175	200	5
6 CE 5 12 - 60 UNI 509	AUROS	74	67	25	12	370	180	235	5
6 CLM 4	COMER	80	70	28	10	330	190	245	5
6 SP 6 SUPERIOR 12 - 75 UNEL 71113	SEMAN	84	78	30	10	420	175	200	5
6 CE 6	AIRES	89	81	31	14	350	228	232	6

TIPO	Motto telegrafico	Capacità (secondo Norme C E I) al regime di 20 ore Ah	Capacità (secondo Norme C E I) al regime di 10 ore Ah	Corrente di carica massima A	Corrente di carica normale A	Dimensioni esterne in mm. lunghezza	Dimensioni esterne in mm. larghezza	Dimensioni esterne in mm. altezza	Schema di montaggio
6 CMN 7	BENAR	112	102	39	14	512	190	238	4
*6 ATL 5 SUPERIOR	SEITA	113	100	40	14	237	394	280	8
6 ATL 5 M SUPERIOR 12 - 100 UNEL 71115	ATIES	113	100	40	14	222	392	260	8
6 CMN 8	BUSEN	128	116	44	16	512	221	238	4
6 FM 7 F	DISOR	132	120	48	17	260	365	290	6
*6 CLM 7/1 12 - 110 UNI 1650	COMIL	132	120	48	17	295	400	280	8
*6 ATL 7 SUPERIOR 12 - 110 UNI 1650	LERTA	158	140	56	20	295	400	280	8
6 ATL 7/M SUPERIOR 12 - 140 UNEL 71115	MITAL	158	140	56	20	285	392	260	8
*6 CMN 11/1	ARNAG	169	150	60	21	520	280	250	4
6 CM 12	FIDEL	176	160	60	21	520	288	245	13
*6 AT 8	OMATO	177	160	64	23	350	350	265	6
*6 AT 8 L	ARAMO	177	160	64	23	350	350	245	7
*6 CLM 10/1 12-160 UNI 1650	CUTAR	190	170	68	24	390	400	280	8
*6 ATL 10 SUPERIOR 12 - 160 UNI 1650	TERLA	225	200	80	29	390	400	280	8
*6 CLM 14/2 12 - 220 UNI 1650	CARRO	270	240	96	34	505	400	280	8
*6 ATL 14 SUPERIOR UNI 1650	ERTAL	315	280	112	40	505	400	280	8

NB. - Le batterie tipo 6 AT 8 L «ARAMO» è munita di prese di corrente speciali

BATTERIA **TUDOR** DA 8 VOLT con presa a 6 V

4 CLMA 7	SELMA	155	140	56	20	345	200	265	10

BATTERIA **TUDOR** DA 24 VOLT

12 SP 4 SUPERIOR	DOMIN	56	52	20	7	295	360	220	11

«TUDOR» la batteria più "nervosa" anche con climi rigidi.

Una fitta rete di SERVIZI e RIVENDITORI TUDOR sparsi per tutta la Penisola è a disposizione degli automobilisti per illustrare le caratteristiche della nostra produzione ed in particolare delle batterie TUDOR-SUPERIOR per automezzi.
La serie delle batterie TUDOR - SUPERIOR è stata creata per l'automobilista esigente che apprezza la lunga durata e la potenza della batteria anche nelle più onerose condizioni di esercizio.
TUDOR - SUPERIOR significa : – avviamento sicuro anche alle basse temperature,
– luce potente anche a batteria semiscarica,
– lunga durata anche in condizioni di servizio gravoso.
Rivolgetevi al SERVIZI TUDOR.
Essi sono a vostra disposizione anche per tutto quanto ha attinenza coll'equipaggiamento elettrico dell'automezzo.

AGENTE RAPPRESENTANTE: **R. I. M. S. A.** S. p. A. - GENOVA
Ufficio Commerciale: **MILANO** - Via Cimarosa 9/a - Telefono 482.893 - 483.524 - 495.105 - Telegrammi: RIMSASPICA

FILIALI E DEPOSITI:

ASCOLI PICENO	S I M E - Via D. Angelini, 112 - Telef. 2004 - 2005	MILANO	R I M S A. - Via Cimarosa, 9/a - Telef. 482.893
BARI	R. I. M. S. A. - Via Abbrescia, 97/99 - Telef 13.800	NAPOLI	R I M S A. - Via Pedrovo, 8/B - Telef. 56.042
BOLOGNA	ARCANGELI SPARTACO - Via Don Minzoni 4/a - Telef. 38.819	PADOVA	MARIO ROSSI - Via Cristoforo Moro, 2 - Telef. 25.089
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IMPORTANTE

Tutte le batterie **TUDOR** rispondono alle prescrizioni del nuovo progetto di Norme internazionali I. E. C. (International Electrotechnical Commission), il quale contempla la prova di *starting ability* (avviamento) a — 18 °C.

TABELLA DI DISTRIBUZIONE DELLE BATTERIE TUDOR SUI VARI TIPI DI AUTOVEICOLI E TRATTORI

(DATI FORNITI A SOLO TITOLO INDICATIVO)

AUTOVEICOLI NAZIONALI

ALFA ROMEO:	
N R, 6 C: 2300, 1500, 1750	6 SP 4 6 SP 4 F 6 CMN 4
6 C 2500 Gran Turismo - 3 carbur.	6 SP 4 6 SP 4 F
2500	6 CL M 4
1900	6 SP 3
AR 52 e 51	6 SP 3 C
450 - 450 A - 430 - 430 A - 900 - 800	6 ATL 7
900 A - 800 A - 900 AF - 140 A - 140 AF	6 CLM 10/1 6 ATL 10
T 430 e T 800	6 CLM 7/1 6 ATL 7
Autopullmann 800	6 ATL 14 6 CLM 14/2
«Romeo»	6 SP 6
«Giulietta»	6 SP 3 F
BIANCHI: S 5, S 9, 1400, 1500 S 8, S 8 bis, 2009	6 CMN 4 6 CE 5
Mediolanum 1935	6 CMN 11/1
CDU 35, Miles, Civis	6 CLM 7/1
Sforzesco 20	6 SP 5
Audax - Fiumero	6 ATL 5/M 6 SP 4
FERRARI: 166 Inter - 166 MM	6 SP 4 F
FIAT: 500 A - B - C senza regol. 1100 E con regol.; 1400, 1900, 615	6 SP 3
600 - 1100/103	6 TO 3 F 6 TO 3
500 C con regolatore	6 TO 3 F 6 SP 4
1100 e 1500 tutte le serie	6 SP 4 F
Campagnole, AR 51, 1400 Diesel e 1900 Diesel	6 SP 3 C
furgone 514, 614, 621 N	3 CL M 7 3 ATL 7 F
626 N - 682	6 CLM 7/1 6 ATL 7
632 - 634 - 635 - 635 RNLP	6 ATL 7/M 3 CL M 7
621 1ª serie, 603, 605	6 CE 5
626 - 656 RNL - 666 Autopullmann	6 CLM 10/1 6 ATL 10
640 N Autocarro 4 tonn.	6 CLM 7/1 6 ATL 5
640 N, 670 N - 642	6 ATL 5/M 6 CLM 10/1
666 N	6 ATL 10 6 ATL 14
Autocarri 640 BN - 680 N - 680 BN - 680 BNU - 682	6 ATL 7 6 ATL 7/M
615 N - 1400 N	12 SP 4
ISO: Isetta vettura	6 P 6
Isocarro	6 TO 3 F
ISOTTA FRASCHINI	
D 65 e D 80 (3ª serie)	6 CLM 7/1 6 ATL 7
D 80 Autopullmann	6 ATL 7/M
LANCIA: Appia	6 SP 3 F
Aprilia 1350 cm³ - 6 volt	3 SA 6
Aprilia 1500 cm³ - 6 volt	3 CE 6 3 CMN 6
Aprilia 12 volt - Ardena - Lambda (8ª e 9ª serie)	6 CMN 4 6 SP 4
Astura	6 SP 4 F 6 CE 5
Ardea - 12 volt	6 CMN 3 6 SP 3
Augusta e Ardea 6 volt	3 CE 5 3 CMN 5
Aurelia - Beta	6 SP 4 6 SP 4 F
Epsilon	3 CMN 9 F
Esatau fino al n. 1336	6 AT 8 L
dal n. 1337	6 ATL 7 6 ATL 7/M
Omicron 2ª e 3ª serie; Ro-Ro	6 AT 8 L
Ro	3 CMN 7
3 Ro	6 CLM 7/1
MACCHI-BÜSSING	6 ATL 7/M
MASERATI 2000	6 CMN 4
MORETTI	6 SP 3
OM: 6 BUD, Titano 137 colon. CPO	6 CLM 7/1
Taurus 340, Ursus	6 ATL 5/M
Super Taurus 350 - 440	6 CLM 10/1
Orione Autopullmann	6 ATL 10 6 CLM 14/2 6 ATL 14
Orione 400 - 580 - 400/8 - 580/8	6 ATL 7 6 ATL 7/M
Leocino	6 SP 3
SPA: 25 C 18	6 CE 5
25 C 12, 24, 29, 30, 31, 38	6 CE 5
34 - 35	6 AT 8
31 Diesel	6 CMN 11 1
10.000	6 CLM 10 1 6 ATL 10

APPLICAZIONI VARIE

Automotrici	3 CLM 14 3 ATL 14
Motori marini	3 CM 13 F 6 ATL 14

AUTOVEICOLI ESTERI

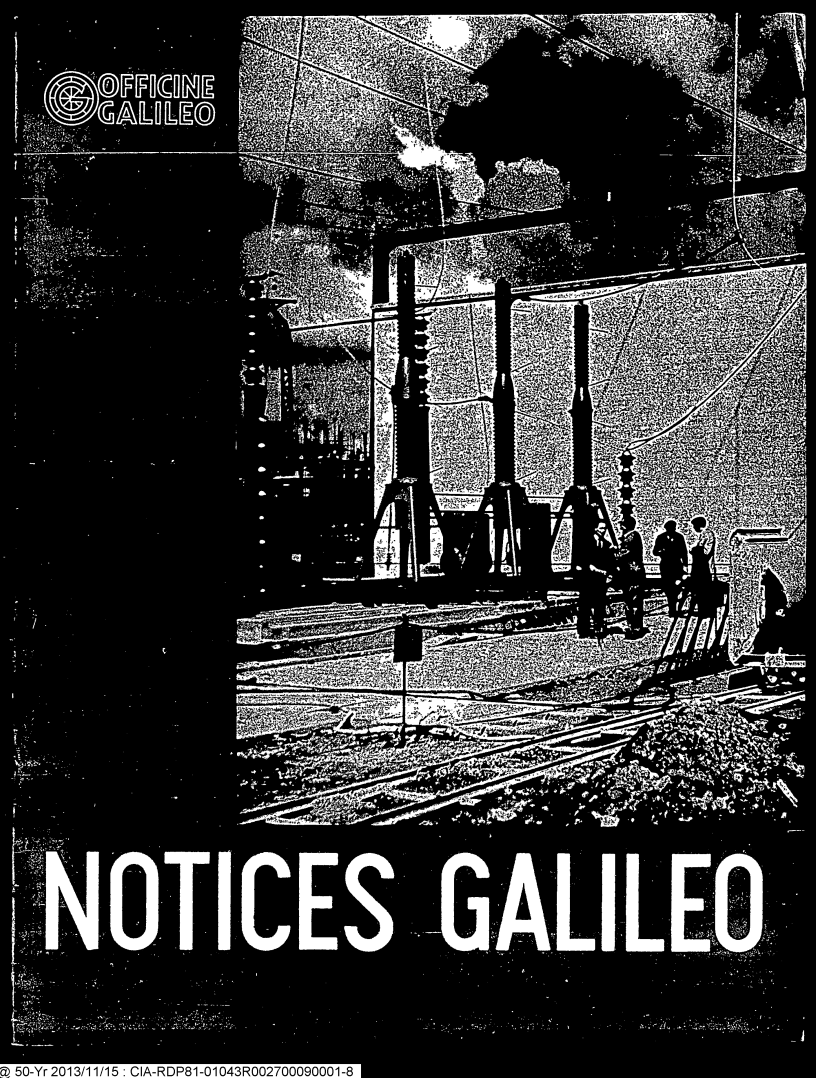
BEDFORD: Autocarri	3 CMN 9 F
BUICK: 1938-42	3 CMN 8
50-70	6 CMN 4 L
CADILLAC: 1936-40: V 8-60, 65, 61; 1936-38: V 8-70, 75	3 CMN 7
1938-40: V 16-90	3 CLM 7 3 ATL 7 F
1939-40: V 8-75; 1941-42: tutti i mod	3 CMN 7
CHEVROLET: Autocarri 3 tonn.	6 CMN 3 CF 3 CMN 9 F
CITROËN: camion 6 c, 4 C, 6 C, C 4 F, C 6 F	3 CMN 7
DODGE: 1934 DR-6	3 CMN 7
1935-41; 1942	3 CE 6 F
FORD: V 8-18	3 SA 7 F 3 CE 6 F
Autocarri 1939-45	3 CMN 9 F
G. M. C.: Autocarri 3 tonn	3 CMN 9 F
JAGUAR: - Mark VII	6 SP 5
JEEP	3 CE 6 F 3 CMN 6 F
OPEL	3 CE 6/VW
PORSCHE 356	3 CMN 5
STUDEBAKER: Commander 6 cil. - President 8 cil 1946: M 5, M 15, M 16, M 17	3 CMN 7 3 CMN 6 F
VOLKSWAGEN: 11 C	3 CE 6/VW
APPLICAZIONI VARIE	3 CL M 7 3 ATL 7 F 3 CMN 7
Autocarri americani	3 CMN 9 F 3 CM 12 F 3 CM 13 F 4 CL MA 7

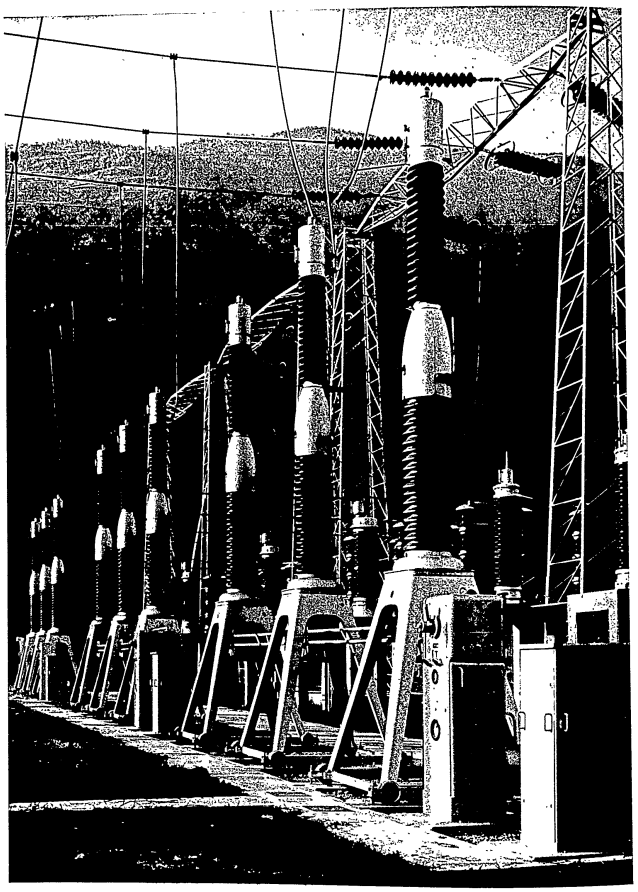
TRATTORI NAZIONALI

ANSALDO FOSSATI:	
TCA 70 - AF 8	3 CL M 7 3 ATL 7 F
F 8 4 R	3 CMN 9 F
ARBOS BUBBA: IO 5	6 SP 3
Arlete 2	6 SP 5
Mielitrebbia	6 ATL 5/M
BREDA: C 6	6 TO 3
SD D 6 e 75 D	3 CMN 7
ERON: D 12	3 CMN 7 F
D 18 e D 35	3 CMN 7
D 25	6 SP 5
FIAT: 18 "La Piccola"	6 SP 5
25 S; 25 CS; 25 CL	12 SP 4
55 R	6 ATL 5/M
LAMBORGHINI: DL 20 - 25	6 CMN 3
DL 30	6 SP 5
DL 40 - 45 - 48 - 52	6 ATL 5/M
LANDINI: "Landinetta"	6 CMN 4
L 25	6 SP 5
L 35 - 45 - 55	6 SP 6
LOMBARDINI: TL 30 - TL 40	6 SP 5
MONTI: R	6 SP 5
MOTOMECCANICA: MR 75	6 SP 4
R 108	3 CMN 9 F
RP 3 - CP 3/8	6 CL M 4
RP 3 - CP 3/8 - 1956	6 SP 6
OM: 35 - 40 - motopompe G 2	6 SP 5
ORENSTEIN e KOPPEL: escav L 051 e trattore D 36	6 CMN 7
» L 201	6 ATL 5/M
» L 351	6 CMN 8
» L 5 101 e trait. T 18 - D 25	6 SP 6
ORSI: Anteo	6 SP 5
O. T. O.: C 25 - C 40	6 SP 5
RAIMONDI: Bruco	6 SP 6
ROSSI: R 4	6 SP 4
SAME: DA 12 e DA 25 DT	6 SP 5
DA 38 DT e DA 55 DT	6 ATL 5/M
SAVIGLIANO: 105 F Ciclope	6 ATL 7/M
SLANZI: SD 51 e SD 53	6 SP 4
ZANDONÀ: 40	6 CMN 7
48	6 CMN 8

TRATTORI ESTERI

ALLGAIER: AP 17	3 CMN 5
AP 22	6 SP 6
A 111 - 12 HP	6 SP 4
A 133	3 CMN 7 F
A 40	3 CM 12 F
ALLIS-CHALMERS: HD 5 B	3 CMN 9 F
HD 9 B	3 CM 13 F
BAUTZ: AS 120 - 15 HP	6 SP 5
AS 170 - 20 HP AS 220 - 22 HP	6 SP 6
BISCHOF: 45 HP	6 CMN 7
BROWN DAVID: Tasmester 30 D - 30 DS - 50 HP	3 CMN 9 F
CATERPILLAR: tutti i tipi	3 CMN 7
DEUTZ: 32 - 35 CV	3 CMN 7
40 - 50 CV	3 CMN 9 F
11 CV	6 SP 4
15 - 17 CV	6 SP 5
60 CV	6 SP 6
60 CV cingoli	6 CMN 8
FAHR: D 12 - D 90	6 SP 4
D 17; D 17 H; D. 22 P; D 22 PH	6 SP 6
D 45 L	6 CM 12
D 25, D 30 L, D 60	6 CMN 8
FENDT-DIESELROSS: 12 HP - 15 HP	6 SP 4
20 HP - 24 HP	6 SP 5
28 HP	6 SP 6
40 HP	3 CMN 7
FERGUSON: TED 20 e TEH 20	6 SP 3 C
TEF 20	3 CMN 9/FG
FORDSON: DDN	6 FM 7 F
L 4 - 53 HP	3 CMN 9 F
HANOMAG: R 19	6 CMN 7
R 27 - R 35	6 CMN 8
R 45-K 55-R 40-KV 50	6 SP 6
INTERNATIONAL - MC-CORMICH: TD. 14 A	3 CM 12 F
Super WD 9	3 CMN 9 F
Super BMD	3 CMN 7 F
DLD 2	6 CMN 4
DED	6 SP 5
DGD 4	6 SP 6
LANZ BULLDOG: tutti i tipi	6 SP 5
LANZ HERMANN: 20 CV	6 SP 6
32 CV	6 CMN 7
40 CV	6 CMN 8
M. A. N.: AS. 440 A - 4440 H	6 CMN 7
MASSEY HARRIS: trattore 744	3 CMN 9 F
NUFFIELD: P 4 Nafte	6 CMN 7
P 4 Petrolio	6 SP 4
OLIVER: Stand 77 - 66 - 88	3 CE 6/VW
OC 3 - OC 18 - motofrebbia	
ADH - 80	3 CM 12 F
DD - DDH	6 CMN 8
PRESIDENT: 15 HP petrolio	6 SP 3 C
RENAULT:	3 CMN 7 F
RITSCHER:	6 CE 5
SCHLÜTER: 20 HP	6 SP 6
22 HP	6 SP 4
50 HP	6 SP 5
AS 17 - 18 - 20	6 CMN 4
STEYR: 80 - 15/17; 180 - 30/35	6 SP 5
SULZER: S 25 - S 32	6 SP 5
S 45	6 SP 6
TURNER: 4 V 2 - 4 V 3	6 SP 6
WAHL: 17/28	6 SP 5
15 - 15 SP	6 CMN 8
40	6 CMN 7
ZETOR MAJOR: Super HP 26 - 32	6 CMN 7





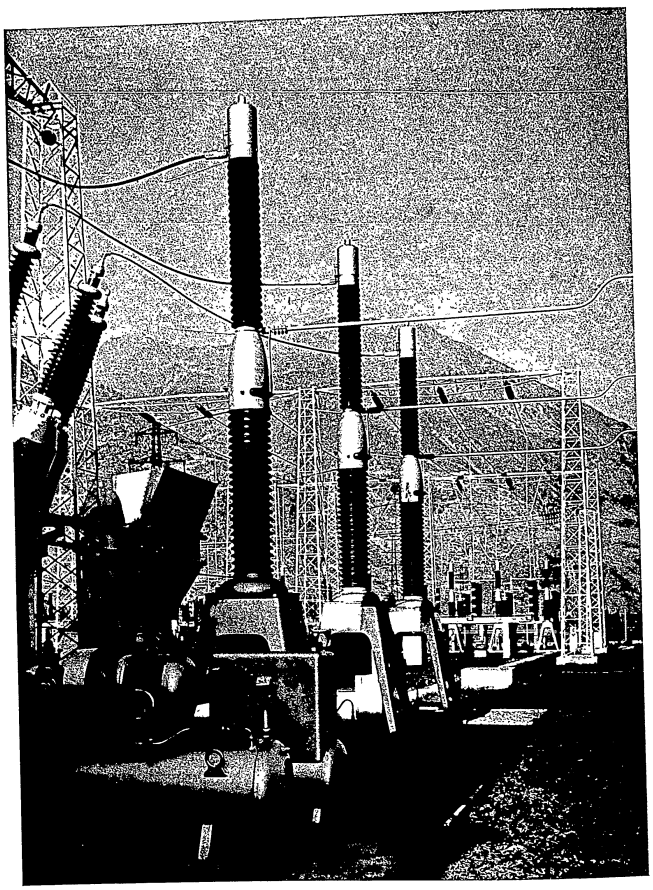
Sous-station de Tirano - Soc. Montecatini - Groupe de disjoncteurs OCER 150 - classe 150 - 2500 M V A.

NOTICES GALILEO
sur les essais des disjoncteurs

La figure de la couverture représente un disjoncteur OCER 150 kV installé a la station d'essais à haute tension de l'Electricité de France à Fontenay-aux-Roses.

SOMMAIRE

REDACTION:
BUREAU DE PUBLICITE DES OFFICINE GALILEO DI BATTAGLIA TERME S. p. A. - PADOVA (ITALIE)



Sous-station de Tirano - Soc. Montecatini
Un des disjoncteurs OCER 220 - classe 220 - 3000 MVA - type à réenclenchement ultrarapide à pôles indépendants.

Introduction

G. Someda

Les problèmes qui préoccupent le technicien qui doit choisir un disjoncteur se présentent sous deux aspects différents:

— la certitude de pouvoir couper, sans danger d'éclatement ou d'incendie, les court-circuits les plus graves;

— le fonctionnement régulier du disjoncteur dans toutes les conditions normales de manoeuvre, ce est à dire que la formation de surtensions dangereuses dans toutes les parties de l'installation sera évitée. L'un et l'autre aspect sont d'égale importance pour la bonne marche du service, bien que celle donnée parfois aux deux problèmes, au cours des années précédentes, ait été subordonnée à l'évolution de la technique. Quand les puissances mises en jeu étaient faibles et que l'on construisait uniquement des disjoncteurs à grand volume d'huile et à petite vitesse d'ouverture, le un et l'autre problème avaient trouvé dans les anciennes constructions, une solution de compromis, sinon bonne, mais dans beaucoup de cas suffisante. Avec l'accroissement des puissances on est arrivé à de sérieux dégâts, aux éclatements et incendies.

Alors commença la véritable étude rationnelle du disjoncteur et à la base de sa spécification se posa le problème de la puissance de coupure c'est à dire son comportement en cas de court-circuit. Non seulement furent introduites des nouveautés dans la construction (chambres d'éclatement, cellules de désionisation etc.) mais également de nouveaux procédés pour l'extinction de l'arc (eau, air comprimé). On augmenta ainsi la sécurité dans la coupure des courants de court-circuit, mais on ne trouva pas toujours parallèlement une juste prise en considération de l'importance du bon fonctionnement du disjoncteur dans les conditions ordinaires qui comprennent un grand nombre de manoeuvres, souvent avec de faibles courants d'induction (ouverture des transformateurs à vide) ou avec des courants de capacité (ouverture des lignes à vide).

Aujourd'hui dans l'étude d'un disjoncteur on donne une importance très grande à tous les aspects du problème, quel que soit le moyen adopté pour arriver au but.

D'aucuns préfèrent conserver au disjoncteur une grande simplicité de structure et de fonctionnement et associer au disjoncteur proprement dit, là où il est nécessaire — parce que les cas pratiques peuvent être différents selon les installations — des limiteurs de surtensions indépendants.

D'autres au contraire préfèrent incorporer (et cela particulièrement pour les disjoncteurs, qui de par leur nature comportent un danger fréquent et caractérisé de surtensions) comme organe permanent du disjoncteur, un amortisseur de surtensions sous forme de résistances appropriées, linéaires ou non.

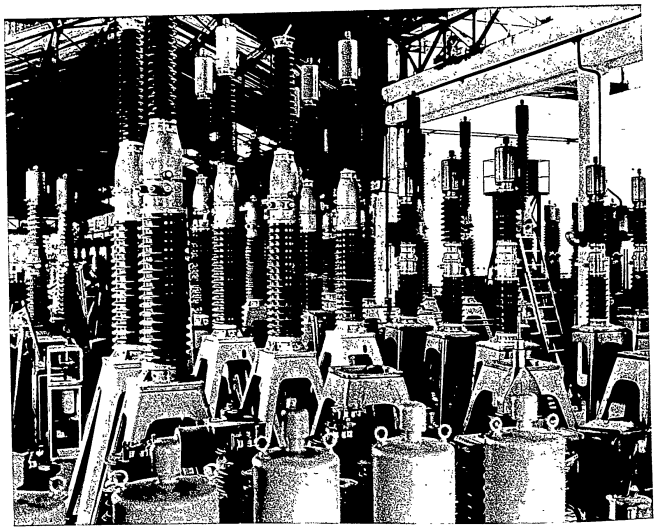
Cette controverse est abondamment éclairée par le grand nombre de précieux rapports présentés cette année, à la Conférence internationale des grands réseaux électriques (CIGRE) à Paris, rapports dont on peut déduire qu'en ce qui concerne les deux grandes catégories de disjoncteurs à haute et très haute tension (disjoncteurs à volume d'huile réduit et disjoncteurs à air comprimé) l'adoption d'amortisseurs de surtensions incorporés dans l'appareil, n'est fréquente que dans ces derniers. Pour les disjoncteurs à volume d'huile réduit, de construction rationnelle, les surtensions dans les cas normaux sont d'un ordre de grandeur acceptable et ce n'est que dans des cas exceptionnels qu'il y a lieu de prendre en considération l'emploi d'amortisseurs, lesquels en raison précisément du caractère exceptionnel, peuvent être installés comme des organes indépendants et séparés par conséquent du disjoncteur. Bien qu'aujourd'hui les bureaux d'étude disposent en principe d'un ensemble d'éléments suffisants pour une détermination rationnelle du dimensionnement des appareils, il est clair que, pour un matériel si délicat et si compliqué, seule l'expérience peut donner la sécurité et la précision nécessaires à une construction définitive.

Les grands progrès réalisés sont dus indiscutablement à l'aide formidable que les laboratoires d'essais à grande puissance ont donné aux constructeurs étrangers qui en ont eu à leur disposition. Dans notre pays nous n'avons pu bénéficier que de l'expérience — plus incertaine — obtenue sur les appareils en service. Mais dans ces dernières

années, l'idée d'exploiter comme Laboratoires d'essais les grandes installations elles-mêmes, a fait du chemin et en fait aujourd'hui l'opinion est unanime à reconnaître que l'essai définitif doit être fait sur les grands réseaux, là où l'on peut disposer de moyens permettant de réaliser, soit des essais de court-circuit à très grande puissance, soit des essais avec des lignes ou transformateurs à vide, et cela parcequ'a été reconnue pour le constructeur la grande utilité de pouvoir disposer d'une installation telle qu'on puisse déterminer le comportement des différents organes, pour en tirer les orientations nécessaires aux études entreprises. Les constructeurs européens ont trouvé aujourd'hui leur véritable banc d'essai dans le grand centre que l'Electricité de France a déjà réalisé — et qui sera développé ultérieurement — à Fontenay-aux-Roses, dans les environs de Paris. Vers ce centre convergent les lignes à 220 kV du grand réseau français et l'on peut parconséquent y avoir à sa disposition les puissances les plus élevées de court-circuit.

C'est de ce banc d'essai que les constructeurs tirent aujourd'hui la vérification de leurs appareils. Les « Officine Galileo » ont eu la possibilité de présenter en réception à ce centre d'Expériences un disjoncteur à faible volume d'huile de la série OCER pour 150 kV.

Les essais, auxquels l'auteur de cette Introduction a assisté, ont obtenu un brillant succès, et c'est pourquoi il a volontiers répondu à l'invitation de présenter ce fascicule aux techniciens italiens. Avec des résultats des essais on y trouvera des renseignements sur le travail déployé pour les obtenir et aussi sur le programme, de réalisation prochaine, d'une aide expérimentale plus efficiente et continue aux études que le progrès réclame sans cesse.



Officines Galileo de Battaglia Terme - Padoue.
Vue d'une portion de la salle de montage de disjoncteurs HT. avec un groupe d'appareils prêts à être réceptionnés.

L'enregistrement des phénomènes de transition dans les essais de court-circuit des disjoncteurs

E. Scantini

La technique moderne a rendu possible l'enregistrement des phénomènes transitoires très rapides, grâce à l'emploi d'appareils très sensibles munis de dispositifs dotés d'une inertie négligeable, de caractéristiques telles qu'on puisse obtenir l'enregistrement de faibles quantités électriques avec une fidélité absolue.

Tels sont en particulier les oscillographes électromagnétiques et ceux à rayons cathodiques.

Quand il s'agit d'enregistrement de phénomènes électriques il est nécessaire de préciser avant tout qu'il ne faut envoyer dans l'oscillographe qu'une valeur telle que l'appareil puisse la supporter sans danger et qu'elle soit une fraction déterminée de la grandeur réelle. Dans ce but on utilise des résistances ohmiques ou des capacités, ou bien des transformateurs de mesure.

Par contre s'il s'agit de l'enregistrement de phénomènes transitoires mécaniques, on devra par des systèmes appropriés, les convertir en variation de grandeurs électriques reliées aux premiers par un rapport déterminé, et susceptibles d'être enregistrées par l'oscillographe. Dans tous les cas, l'enregistrement oscillographique est fait avec du matériel photographique très sensible — et c'est pourquoi tout oscillographe électromagnétique est muni d'un dispositif optique susceptible de faire converger les rayons lumineux sur un ruban sensible (sur support de papier, de celluloïde ou simili) qui se déroule avec un mouvement uniforme (axe des temps) dans un sens perpendiculaire à l'oscillation du spot.

L'oscillographe cathodique, s'il est à cathode chaude (tube de Brown) est equipé avec une chambre photographique, dans laquelle se trouve le ruban sensible qui se déplace avec un mouvement uniforme de translation et de rotation (axe des temps) pendant que l'objectif projette l'image du spot oscillant.

Naturellement dans ce cas, il est nécessaire d'insérer dans l'oscillographe le dispositif de l'axe des temps pendant lesquels le spot tracera les seules oscillations véritables; parfois le matériel sensible est fixe et la déflation est donnée, suivant l'axe des temps, par un circuit de décharge de condensateurs ou de déflexion à dents de scie.

Enfin pour la coordination des phénomènes électriques et de leur enregistrement, il est nécessaire de procéder à une série d'opérations successives à intervalles de temps très brefs et constants.

Une des plus intéressantes applications des résultats ainsi obtenus, concerne les essais sur les disjoncteurs et c'est pourquoi nous passerons à la description détaillée de l'appareillage oscillographique utilisé dans la station d'essais de disjoncteurs de la Société Adriatique de l'Electricité.

Essais de disjoncteurs

Les principales grandeurs qu'il importe de connaitre sont:

Tension aux pôles ou entre phases, intensité, puissance développée dans l'arc pendant la rupture, position des contacts, pressions développées sur les différentes parties du disjoncteur.

Ces grandeurs, suivent le schéma adopté pour les essais et le nombre d'appareils disponibles, peuvent être relevées sur un ou plusieurs pôles du disjoncteur.

Pour que soit possible une évaluation exacte des tensions entre l'entrée et la sortie d'un disjoncteur au cours d'une ouverture, il importe d'avoir présent à l'esprit, qu'elles présentent des amplitudes, formes d'onde et fréquences parfois différentes. En particulier pour pouvoir définir sur ce point le comportement d'un disjoncteur il importe de pouvoir mesurer: la tension à la fermeture, la tension de l'arc et la tension de rétablissement.

La tension à la fermeture sera la tension nominale du disjoncteur avec forme d'onde et fréquences normales. La tension de l'arc a des valeurs variables, mais qui en principe, ne dépassent pas de plus d'un dixième les valeurs précédentes, avec une forme d'onde tailladée caractéristique.

La tension de rétablissement, dans certains cas, peut atteindre des valeurs supérieures à la tension nominale avec des harmoniques de fréquence élevée dépendant des caractéristiques du réseau. Ce phénomène se présente en particulier dans la coupure de longues lignes à vide. (Dans ce cas il est préférable d'employer des répartiteurs ohmiques ou de capacité).

Avec un oscillogramme électromagnétique à réflexion muni d'équipages appropriés à la tension nominale d'essai on peut relever l'allure générale des tensions pendant l'ouverture mais il n'est pas possible d'en faire un relevé exact, non plus d'ailleurs que pour les tensions d'arc qui sont en général trop faibles, pour le début de l'arc et pour la valeur maxima de la tension de rétablissement — parce que des oscillations de fréquence élevée se présentent quand la rapidité du rétablissement est supérieure à la fréquence propre des équipages.

Pour le relevé de la tension d'arc on emploie un

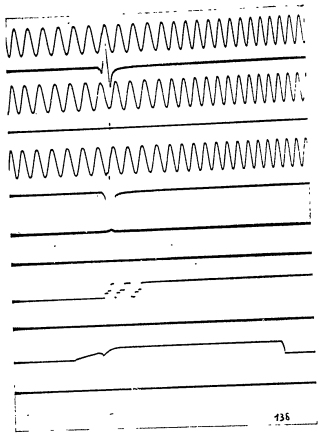


Fig. 1 - Oscillogramme de coupure à vide

oscillographe à rayon cathodique (Fig. 2) approprié à la tension que l'on pense avoir pour celle de l'arc. Pour l'enregistrement des tensions de rétablissement qui possèdent des harmoniques à fréquence élevée, on a recours également à un oscillographe à rayon cathodique.
Sous l'effet des tensions plus élevées que l'on observe avant et après l'arc, le spot sort de l'échelle mais l'appareil ne subit aucun dommage. Toutefois pour éviter que l'oscillogramme ne devienne confus par la présence de tracés trop nombreux, la période d'enregistrement est synchronisée par le dispositif que l'on décrira ci-après, de façon qu'elle coïncide avec les environs du temps où l'on mesure la tension de l'arc.

Appareil pour l'enregistrement avec l'oscillographe cathodique

Le dispositif est constitué (fig. 2) par un tambour rotatif sur lequel est enroulée une pellicule photographique normale de 6 cm. de hauteur. Le tambour est placé dans une chambre obscure et fait face à la caisse de l'oscillographe par un tube contenant un objectif très lumineux. Pour l'enregistrement d'un phénomène, le tambour est mis en mouvement, entraînant ainsi l'axe des temps, et enregistrant verticalement et parallèlement à l'axe du tambour les déviations du tracé lumineux de l'oscillograp. .
Le petit moteur qui provoque la rotation d. l tambour est à deux pôles; l'accouplement e.t fait au moyen de câbles à 3 poulies, et l'on peut ainsi obtenir des enregistrements de 1, 2, 4 périodes par tour. Pour que l'oscillogramme ne soit pas rendu confus par la superposition de plusieurs tracés on peut utiliser un obturateur photographique synchronisé, ou bien le dispositif spécial dont sont dotés certains oscillographes et qui permet de supprimer l'image. L'obturateur, aussi bien que le suppresseur d'images

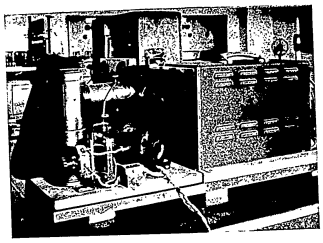


Fig. 2 - Oscillographe à rayon cathodique.

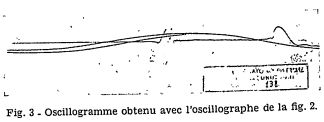


Fig. 3 - Oscillogramme obtenu avec l'oscillographe de la fig. 2.

sont commandés électriquement par le synchroniseur de façon que le dispositif d'enregistrement n'entre en fonctionnement que pendant la période intéressante à observer. Pour atteindre la vitesse d'enregistrement des harmoniques à fréquence élevée que l'on obtient à la remise sous tension, il est nécessaire d'utiliser le dispositif de post-accélération du faisceau électronique qui donne la plus grande luminosité de l'image. On peut ainsi enregistrer des vitesses de déplacement du spot de plus de 5 cm. par millionième de seconde, plus que suffisantes pour tous les besoins des essais de disjoncteurs.
Un exemple d'oscillogramme obtenu avec un tel dispositif est représenté à la figure 3.

Enregistrement par l'oscillographe électromagnétique

Pour l'enregistrement des courants de court-circuit, et comme il a été dit plus haut, de l'allure générale des tensions etc., on utilise un oscillographe électromagnétique à 12 équipages.
Il y a lieu de noter en premier lieu, qu'il ne sera pas possible généralement de disposer d'un réducteur d'intensité de valeur nominale comparable à celle du court-circuit et que dès lors les enregistrements seront affectés d'erreurs dérivant de la saturation du réducteur lui-même.
Une mesure exacte n'est possible qu'en utilisant des shunts anti-inductifs convenables, mais qui seront d'un emploi difficile surtout dans les essais sur réseaux.

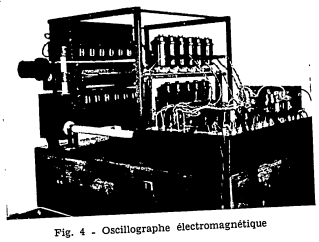
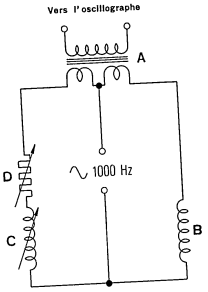


Fig. 4 - Oscillographe électromagnétique

Dans l'oscillographe électromagnétique que nous employons et qui a été étudié et construit par la maison Galileo, il y a douze sources lumineuses correspondant aux douze équipages équidistants, disposées suivant deux rangées horizontales superposées, mais décalées, de façon que les rayons lumineux réfléchis viennent converger sur un même plan.
Pour les reproductions photographiques on applique un chassis spécial présentant une ouverture (munie d'un obturateur synchronisé à commande électrique), de façon qu'il coïncide avec le plan d'oscillation des rayons lumineux. A l'intérieur du chassis, une bobine sur laquelle est enroulée une pellicule sensible peut accomplir un tour complet sous l'action d'un ressort, avec une vitesse sensiblement uniforme et en une seconde environ. L'appareil est accompagné d'une boite de résistances potentiométrique pour faire varier les constantes d'amplitude de l'enregistrement.

Relevé des caractéristiques mécaniques des disjoncteurs

Les caractéristiques mécaniques pour le relevé desquelles un appareillage spécial a été construit sont: la pression et la position des contacts.
Pour l'enregistrement de la pression on a adopté un pont à déséquilibre sur un côté duquel est placé en série l'élément à mesurer. Celui-ci est constitué par une bobine enroulée sur un noyau en forme d'E dont le côté ouvert est face à un diaphragme en acier (fig. 6).
Le diaphragme, encastré dans une armature appropriée est introduit dans la chambre de coupure, et sous l'effet de la pression qui se développe en lui soit par la formation de l'arc ou par soufle d'air, il se déforme en réduisant l'entrefer qui le sépare du noyau. La réactance de la bobine varie en conséquence.
Une série de diaphragmes d'épaisseurs diverses a été construite pour être utilisée suivant les pressions atteintes dans la chambre de coupure et pour éviter des déformations de caractère permanent qui pourraient fausser les mesures.
Le pont est réglé pour le milieu de la réactance variable C de manière que dans les conditions normales de pression, le courant soit égal dans les deux branches; sous l'effet de la pression, la valeur de la réactance B augmentant, on obtient un déséquilibre qui par l'intermédiaire du transformateur différentiel est transmis à l'appareil enregistreur. Une relation linéaire entre la pression et l'intensité au secondaire du transformateur est suffisante pour l'exactitude qu'il importe d'obtenir dans ce genre de mesures.
Le pont est alimenté par un oscillateur à 1.000 périodes par seconde et par un amplificateur, et avant l'essai il est taré au moyen d'un petit compresseur à main.
Pour l'enregistrement de la course des contacts du disjoncteur on emploie un potentiomètre cir-



A - Transformateur différentiel
B - Bobine du rélévateur de pression
C - Réactance de compensation
D - Résistance de compensation

Fig. 5 - Schéma du pont à déséquilibre.

culaire à encoches, dont l'équipage mobile est lié rigidement à l'arbre de commande de l'interrupteur.
En transmettant à l'oscillographe les tensions variables fournies par le potentiomètre on obtient un diagramme à gradins (fig. 1), chacun d'eux correspondant à une position déterminée du contact mobile. Par le diagramme on peut vérifier la vitesse du contact mobile, l'accélération la position d'extinction de l'arc etc.

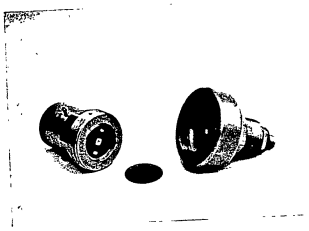


Fig. 6 - Diaphragme de l'élément révélateur.

Dispositif de synchronisation des commandes

Ce qui a été exposé ci-dessus suffit pour qu'on puisse se faire une idée de la complexité des appareils de mesure et des appareils auxiliaires nécessaires à l'obtention d'essais corrects sur les disjoncteurs et des difficultés que l'on a pour accomplir à la main toutes les opérations nécessaires à leur mise en service au moment exact où le disjoncteur entre en fonctionnement.
D'un autre côté, l'essai d'ouverture en court-circuit d'un disjoncteur est une opération qui présente toujours un certain risque, aussi bien pour le disjoncteur lui-même que pour tout l'appareillage qui participe à l'essai; aussi est-il nécessaire d'avoir la certitude qu'on n'ait pas à recommencer l'essai par suite d'un fonctionnement intempestif des instruments de mesure.
On est cependant parvenu à rendre complètement automatique tout l'ensemble des opérations nécessaires à l'essai, en adoptant un appareil spécial qui commande directement au moyen de relais les diverses manoeuvres, successivement et à des intervalles de temps qui sont réglés à volonté L'appareil représenté dans la figure 7 est essentiellement constitué par un cylindre isolant subdivisé en douze anneaux recouverts partiellement et en longueurs variables par une plaque de laiton. Les différents anneaux peuvent être rendus indépendants les uns des autres ou bien étant rigidement bloqués. L'ensemble des anneaux tournant le cylindre peut tourner autour de son axe principal et il est mis en mouvement par un petit moteur électrique, toujours en prise mais à accouplement élastique. Pendant que le moteur est en mouvement, un loqueteau d'arrêt peut maintenir immobile le cylindre dont la mise en marche est commandée par un électro-aimant qui soulève alors le loqueteau.

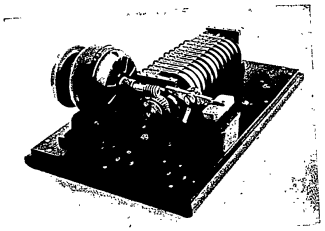


Fig. 7 - Dispositif de synchronisation des commandes.

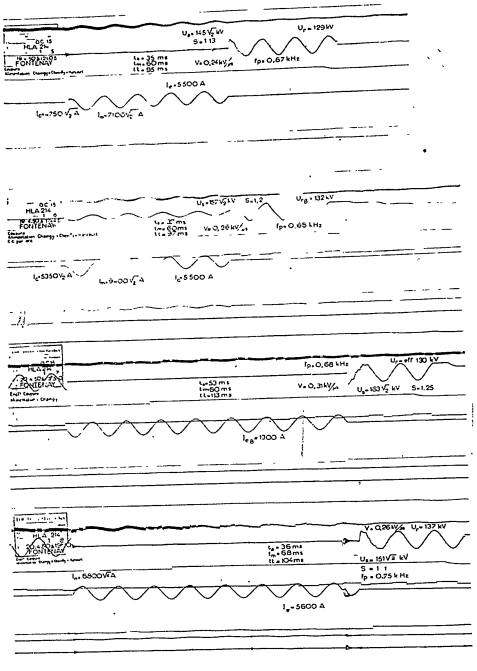
Sur la surface extérieure de chaque anneau sont disposés deux contacts glissants traversés par un courant qui aboutit aux relais de commande de l'appareil.
Dans la position de départ, les contacts glissants prennent appui sur la partie isolée de la surface des anneaux; quand on fait tourner le cylindre, après un certain temps, qui, à égalité de vitesse de rotation ne dépend que de la position initiale de chaque anneau, les contacts rencontrent la plaque de laiton et fermant le circuit font ouvrir les relais de commande.
En faisant varier les décalages angulaires respectifs des anneaux on peut prédisposer l'appareil pour commander un cycle d'opérations suivant l'ordre voulu, ainsi que les intervalles de temps que l'on désire. On peut obtenir jusqu'à 12 manoeuvres différentes, en 0,5 seconde, à des intervalles de quelques millièmes de seconde.
Pour obtenir que la vitesse de rotation soit aussi constante que possible, il est d'usage de prévoir le démarrage du cylindre, le moteur étant en mouvement et de munir ce dernier d'un volant.
Le fonctionnement de l'appareil est excellent. En principe on éxécute quelques oscillogrammes d'essai pour connaitre les temps d'intervention des relais, et l'on procède ensuite aux essais de coupure-circuit avec la certitude d'avoir le cycle exact de manoeuvre et l'enregistrement de toutes les phases.

Directives pour les projets de disjoncteurs à HT à faible volume d'huile et résultats des essais

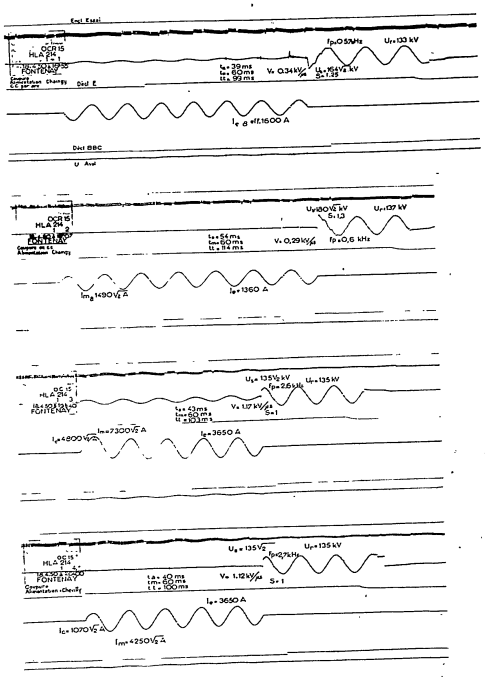
G. Scarpa

En vue de reprendre ex-novo, après un temps d'arrêt, la construction d'appareils électriques — et en particulier de disjoncteurs — en utilisant diverses expériences et essais, on s'est posé la question de savoir quelle était la meilleure directive à suivre pour la réalisation de disjoncteurs, spécialement à haute et très haute tension, qui constitueraient un certain progrès, soit du côté construction, soit du côté de leur réalisation et si possible, du côté économique par rapport aux matériels existants.
Le premier point sur lequel on devait prendre position était de savoir si pour les tensions élevées il convenait d'adopter l'interruption multiple ou l'interruption unique; le choix a été déterminé par l'ensemble de raisons ci-après:
La première considération est qu'il n'existe pas une répartition uniforme de la tension de rétablissement dans les coupures successives. Cette répartition est difficile à établir car elle ne dépend pas seulement des capacités et des résistances des divers couples de contact, le disjoncteur étant ouvert et dans la position de repos, mais elle dépend aussi et surtout des résistances transitoires des zones d'arc particulières au moment qui suit immédiatement le passage à zéro de l'intensité, résistances qui peuvent varier d'une coupure a l'autre par suite des différences inévitables dans la vitesse et l'intensité de la désionisation.
Une autre considération importante vient du fait que des expériences diverses ont démontré que la tension d'arc absorbée par chaque coupure était indépendante de la tension du circuit et du nombre des coupures successives, ce qui démontre que l'énergie dissipée dans l'appareil et par suite la décomposition de l'huile et la production de gaz sont pratiquement proportionnelles au nombre des coupures et que par conséquent avec une seule coupure on doit avoir la plus faible consommation d'huile.
Finalement, on a choisi une coupure par pôle jusqu'à la limite d'au moins 275 kV; on a créé un modèle de chambre d'extinction qui puisse être utilisé pour tous les types de différentes tensions nominales. Il s'agit d'une chambre de longueur variable, constituée par un ensemble d'éléments identiques — dont on utilise un nombre variable suivant la tension d'emploi de l'appareil — et telle qu'on puisse disposer d'une certaine réserve pour répondre à des éventualités imprévues, réserve qui est généralement de 100%. La durée de coupure et la vitesse de déplacement du contact mobile ont été déterminées de manière qu'on obtienne l'extinction définitive de l'arc en 3 à 4 demi-périodes pour tous les types compris entre 30 et 275 kV.
La chambre de coupure choisie est celle dite à labyrinthe; elle est constituée essentiellement par une série de petites chambres à huile, latérales par rapport au canal central dans lequel se déplace la tige mobile de contact et dans lequel l'arc est étiré. Ces chambrettes sont disposées sur autant de plans différents — parallèles entre eux — et décalées angulairement et successivement autour du canal central. Les résultats obtenus sont en premier lieu d'arriver à une production faible de gaz, même pour de hautes valeurs de l'intensité, grâce à la petite surface de l'huile exposée à l'arc, et ensuite d'obtenir un bon effet désionisant. Ce dernier résultat est obtenu par l'action de jets de gaz provenant des chambrettes à huile, agissant chacun dans un sens bien déterminé. Les chambrettes étant décalées angulairement entre elles, le filet ionisé est divisé en plusieurs tronçons, chacune des parties sectionnées étant chassée dans une direction différente, ce qui crée des intervalles isolants empêchant un rallumage de l'arc. Cette action est surtout efficace à l'instant très bref où le courant passe par zéro.
Comme il s'agit de disjoncteurs à faible volume d'huile, on s'est préoccupé de prolonger le plus possible la longévité de cette dernière. On y est arrivé en empêchant le barbotage des gaz dans l'huile, car, ne s'y lavant pas, ils ne lui cèdent pas le charbon qu'ils ont en suspension et pour ce faire, on fait passer les gaz dans un tube situé dans le prolongement du contact fixe creux, tube qui débouche au-dessus du niveau normal de l'huile et qui se termine par un séparateur à action centrifuge.
L'huile contenue dans le tube est soulevée par les gaz dont la formation est rapide et elle est projetée contre la paroi cylindrique du chapeau; quand le tube est vide, les gaz s'échappent directement dans l'atmosphère sous forme d'une

Oscillogrammes d'essa.. d'un disjoncteur ty.. OCER 150



Oscillogrammes d'essais d'un disjoncteur type OCER 150



fumée noire. On a réalisé ainsi une sorte de fusil, dans lequel l'huile joue le rôle de projectile qui sort séparément des gaz formés, lesquels s'échappent à leur tour dès que le projectile, c'est à dire l'huile, a été chassée. Et de ce fusil — ou mieux de ce petit canon — étant donnée l'analogie de fonctionnement, les disjoncteurs ont un peu la structure, c'est à dire un tube très robuste de faible diamètre, susceptible de bien supporter des pressions très élevées.

La caractéristique de ces disjoncteurs est la simplicité des organes mécaniques actionnant les contacts. La tige mobile de contact est constamment guidée, pendant toute sa course, par un dispositif de bielles avec manivelle et crosse, de façon que son déplacement se fasse sans frottement et qu'elle ne se déforme pas sous l'action violente des coupures de court-circuits.

Dans les types de tensions supérieures à 100 kV, et dans le but de ne pas accélérer excessivement et inutilement les appareils de commande, on a intercalé un système multiplicateur de déplacement et de vitesse à pantographe, entre la tige mobile et la tige isolante de manoeuvre.

Les organes mobiles, étanches à l'huile, n'accomplissent que de petits angles de rotation, entre des coussinets spéciaux; de la sorte les frottements sont faibles et les garnitures ont une longue durée. Une autre caractéristique importante de ces disjoncteurs réside dans leur structure principale qui est réalisée par des cylindres de papier bakélisé; la porcelaine des isolateurs n'est jamais soumise à des efforts de quelque nature que ce soit et elle n'a d'autre fonction que de protéger des intempéries les cylindres isolés, mécaniquement résistants.

Ceci confère à ces disjoncteurs une robustesse mécanique exceptionnelle qui contraste peut-être avec leur frêle apparence due au faible diamètre du corps du disjoncteur, qui doit d'ailleurs être ainsi afin de résister plus facilement aux pressions internes.

Le disjoncteur est un appareil encore en évolution — ce qui apparait comme évident si l'on considère la multiplicité des types — les appareils étant souvent très différents même dans chaque type; en outre, le dimensionnement à lui donner résulte d'un ensemble d'hypothèses qui doivent être confirmées dans la pratique au moyen d'essais. Ces essais exigent l'emploi de moyens qui trop souvent n'existent pas encore chez les constructeurs italiens et pour lesquels nous-mêmes sommes obligés de recourir à l'étranger en attendant que les « Officine Galileo » aient terminé le laboratoire d'essais à grande puissance en construction à Marghera.

Un premier cycle d'essais exécuté dans une centrale spécialement aménagée du groupe sur des disjoncteurs basés sur le même principe de construction, mais pour des tensions moyennes, a donné pleine confirmation de la valeur des hypothèses de fonctionnement et de dimen-

sionnement; d'autres essais réalisés sur des réseaux à 130 KV avec coupure de court-circuits faibles et moyens, artificiellement provoqués, de lignes à vide et de transformateurs à vide ont confirmé le dimensionnement choisi pour les disjoncteurs à 150 KV.

Des constructeurs étrangers s'étant également intéressés à ce type très moderne de matériel, en ont estrepris la construction dans leurs établissements et un disjoncteur à 150 KV a été soumis, avec un résultat particulièrement heureux, à un cycle de 33 essais de court-circuits, jusqu'à 1.000.000 de KVA dans un laboratoire anglais de haute puissance, ce qui a permis d'obtenir confirmation du dimensionnement choisi pour l'appareil. Un disjoncteur du même type a été également soumis à un cycle d'essais d'ouverture et de fermeture immédiatement consécutive, puis d'une ouverture par court-circuit à la terre sur un réseau à 130 KV de la Spett. Montecatini; grâce à ces essais qui ont atteint 1.500 A sous 130 KV et à tous les éléments dont on a obtenu un enregistrement oscillographique, on a remarqué que la seconde ouverture succédant au réenclenchement se faisait toujours dans le même temps et dans les mêmes conditions que la première, ce qui démontre clairement que ce type de disjoncteurs convient parfaitement à ce service particulier. Les durées de fonctionnement on été les suivantes:

Du début de l'ouverture jusqu'à l'extinction de l'arc:: sec. 0,10;

De l'extinction de l'arc jusqu'à la fermeture du circuit: sec. 0,30;

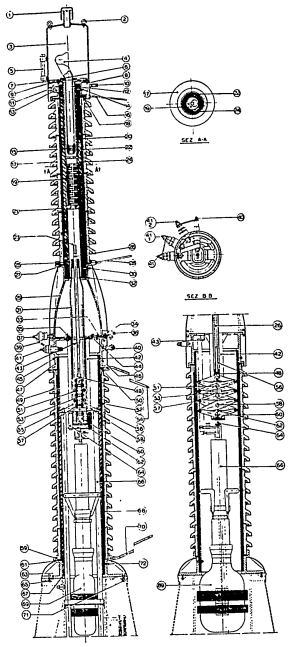
De la fermeture des contacts à l'extinction suivante de l'arc: sec. 0,12;

La durée de l'arc a toujours été environ 3 demi-périodes.

Récemment, un des disjoncteurs Galileo-Scarpa de 150 KV du type OCER 150 a été soumis à un cycle d'essais de réception à la station de Fontenay-aux-Roses de l'Electricité de France près de Paris, dans laquelle on peut obtenir la plus grande intensité de court-circuit sur le réseau français à 240 KV.

Comme dans ce poste il n'y a pas d'autre tension disponible que celle à 230 KV, mais compte tenu du fait que le réseau avait son neutre à la terre, il a été décidé d'essayer à 230 KV le disjoncteur de 150 KV en provoquant un court-circuit artificiel entre phase et terre et en admettant que la tension de rétablissement par pôle ne dépasserait pas de beaucoup 130 KV.

Les résultats des essais de court-circuit sont enregistrés dans le tableau ci-après, duquel il résulte qu'on a coupé la plus grande puissance disponible, soit 770 MVA environ par pôle, et par conséquent une puissance triphasée de 2.310 MVA, le circuit étant à 230 KV avec neutre à la terre (3 fois la puissance coupée par un pôle), soit une puissance triphasée de 1.540 MVA pour



un circuit à 150 KV avec neutre isolé (2 fois la puissance coupée par un pôle). Le disjoncteur a supporté tout le cycle d'essais — dont le plus important a été répété 3 fois — sans aucun inconvénient ou signe de fatigue; le seul signe visible — d'ailleurs prévu — étant la sortie de la fumée noire par l'échappement placé à cet effet au sommet du pôle. Comme prévu également, l'arc s'est constamment éteint avant d'intéresser le milieu de la chambre de coupure; la pression qui s'est développée en différents points a été très inférieure à celle que l'on attendait.

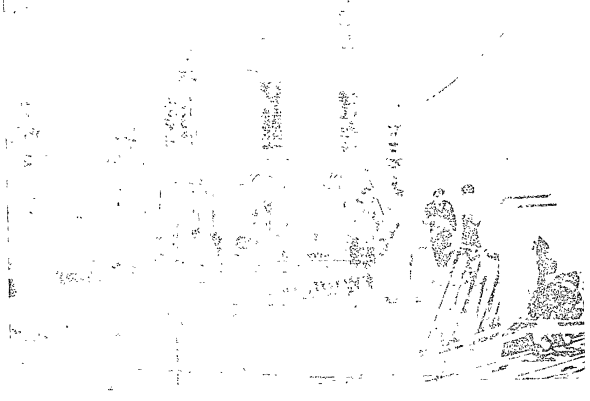
L'emploi d'appareils construits pour supporter des pressions élevées n'a pas permis d'avoir une indication bien précise; cependant la plus grande valeur trouvée a été bien inférieure à 10 atmosphères. Une confirmation — par une autre voie — de la très basse pression même pour des intensités très élevées est donnée par le fait que la tension d'arc est extrêmement basse, ce que l'on peut voir dans les oscillogrammes reproduits ci-inclus.

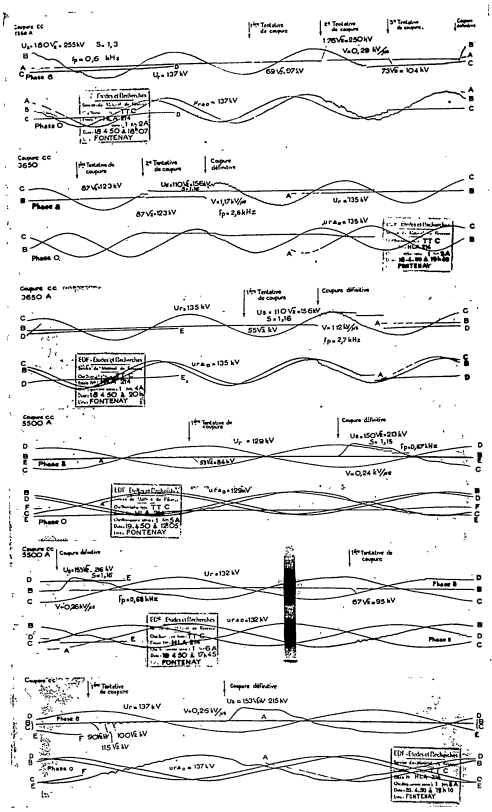
Cette basse tension d'arc, parfois complètement inappréciable, prouve la faible valeur de la puissance et de l'énergie libérées par l'arc.

Tout cela démontre que, tout en coupant la plus grande puissance possible disponible au poste d'essai, le disjoncteur était encore bien loin d'atteindre la limite de ses disponibilités.

Il a été constaté que l'usure des contacts, après tous les essais, était négligeable et que la rigidité diélectrique de l'huile était à peu près égale à celle qu'elle possédait lorsqu'elle a été introduite dans l'appareil avant les essais; que son noircissement, s'il était appréciable, n'était pas intense; que la chambre de coupure contrôlée dans toutes ses parties était comme neuve, et que toutes ces constatations permettaient de déduire que l'appareil pouvait continuer à rem-

Courant de fermeture A max.	Courant coupé A eff. simm.	Tension de retour par pôle première semipériode valeur efficace kV	Tension de retour par pôle définitive valeur efficace kV	Puissance de coupe triphasée sur réseau à 150 kV avec neutre isolé MVA	Puissance de coupe triphasée sur réseau à 230 kV avec neutre à la terre MVA
—	1600	164	133	426	640
—	1360	180	137	373	560
—	3650	135	135	986	1480
—	3650	135	135	986	1480
—	5500	145	129	1420	2130
—	5500	157	132	1450	2175
2500	1300	163	130	338	507
10000	5600	151	137	1535	2300





Les oscillogrammes reproduits ci dessus ont été exécutés sur un disjoncteur OCER 150-150 KV installé au poste d'essais à grande puissance à Fontenay-aux-Roses, de l'Electricité de France, qui a bien voulu en autoriser la reproduction.

plir sa fonction comme si rien ne s'était passé Sur le même appareil ont été éxécutées, avec bonheur, des coupures de lignes à vide avec alimentation à neutre isolé, tension d'environ 165 KV, sur des longueurs variant entre 18 et 214 KM, isolement normal pour 230 KV.

Essais sur les disjoncteurs à petit volume d'huile pour des tensions de service jusqu'à 15 kV

A. Sperti

1 - Généralités :

Dans les cycles d'essais de réception avec les plus grandes puissances de coupure disponibles que les « Officine Galileo » avaient en programme pour leurs disjoncteurs, une large part était réservée aux disjoncteurs pour tension de service jusqu'à 15 KV. Nous exposerons en premier lieu les motifs qui nous ont conduits à nous arrêter à ces appareils, puis après une brève description d'un nouveau type de disjoncteur pour 15 KV nominaux, nous donnerons les résultats des essais.

Pour la bonne marche du service d'un réseau de transport et de distribution de l'énergie, il importe que tous les appareils branchés sur le réseau remplissent leurs fonctions avec le maximum de sécurité: en particulier, les interrupteurs placés aussi bien sur la haute que sur la basse tension; le mauvais fonctionnement de l'un de ces derniers, peut provoquer en effet, le déclenchement des disjoncteurs à haute tension, privant ainsi de courant non seulement la petite zone intéressée par la distribution mais une zone bien plus grande.

Pour chaque disjoncteur HT, il y a de nombreux interrupteurs de distribution installés. Ces derniers sont soumis à tous les court-circuits provoqués par les usagers: établissements industriels, jours etc. et en outre à ceux provoqués per les surtensions dues à des phénomènes atmosphériques et contre lesquelles les-lignes de distribution sont désarmées en raison de leur faible isolement. En outre ils sont appelés souvent à interrompre le courant normal par suite des surcharges, des changements de service etc. On voit que ces appareils sont souvent mis en oeuvre; ils doivent donc exiger la plus faible manutention possible pour éviter des pertes de temps ou un personnel nombreux.

Les disjoncteurs sont aujourd'hui divisés en deux catégories principales, suivant la nature du fluide d'extinction employé: air comprimé ou huile. A notre avis le disjoncteur à faible capacité d'huile est préférable parceque outre les avantages techniques qu'il présente — adaptabilité à l'extinction soit de faibles courants inductifs soit de grandes intensités de court-circuits du réseau, insensibilité à ses propres fréquences, etc. — il offre une très sensible économie dans les dépenses d'installation et de manutention.

Un disjoncteur de ce type ne doit pas être traité à la légère sous prétexte qu'il travaille à basse tension; non seulement il doit être étudié dans ses moindres détails, mais il faut que ses possibilités soient vérifiées par des essais directs tendant à déterminer, outre la plus grande puissance de coupure, le comportement de l'appareil dans le temps.

En fait, de la coupure de nombreux court-circuits, du nombre d'ampères et des conditions dans lesquelles se trouvent l'huile et les contacts, on peut tirer les enseignements indispensables pour arriver à un bon fonctionnement.

Seules les « Officine Galileo », en Italie, ont eu la possibilité d'éxécuter un cycle complet d'essais, la S.A.D.E. ayant mis à leur disposition une centrale hydroélectrique constituée par deux générateurs, avec les quels on pouvait obtenir une puissance de court-circuit de 270 MVA et une tension de rétablissement de 13 KV environ, et cela en surexcitant les générateurs et en agissant en sorte que le court-circuit dure le moins possible (environ une demi ou une période).

L'appareil d'enregistrement, décrit dans une autre partie de ce fascicule permet de suivre parfaitement toutes les phases de la coupure.

En déterminant par des essais les caractéristiques du disjoncteur on a pu éviter ces désagréables surprises que donnent des appareils dont les possibilités on été surévaluées par le constructeur qui ne possède pas de moyens de contrôle.

2 - Description de l'OPR 15

Le disjoncteur qui à la fin de l'année dernière a été soumis au cycle d'essais dont il a été question ci-dessus est du type «traversée» à faible volume d'huile.

La figure 1 représente une section de cet appareil. Les caractéristiques de sa construction sont celles qui nous sont propres; en particulier il y a lieu de remarquer qu'à part la tige mobile de contact il n'y a aucune partie de l'appareil qui soit en mouvement. En fait, dans un disjoncteur dont les contacts sont soumis à la température de l'arc —

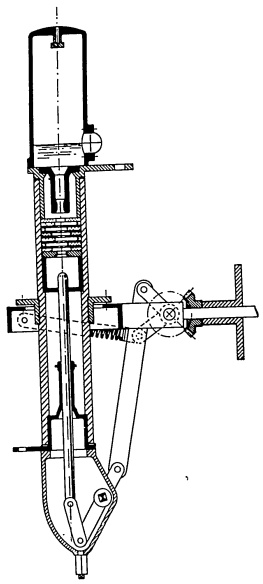


Fig. 1 - Disjoncteur OPR 15-15 KV-400 A (section schématique).

température certainement supérieure à 3.000° — et par conséquent sujets à être dégradés et avec le temps à être déformés, il est prudent de réduire au minimum les parties en mouvement, ressorts etc. pour éviter qu'un obstacle quelconque vienne en compromettre la marche.

Le système d'extinction à cellules désionisantes avec chambres de coupure décalées de 120° l'une par rapport à l'autre, garantit une faible tension d'arc avec une très faible énergie développée n'obligeant pas par conséquent les gaz et l'huile à suivre des parcours peut-être très bien étudiés sur le papier, mais qu'on est bien loin de savoir s'ils correspondent véritablement à ce qui se passe à l'intérieur du disjoncteur pendant l'extinction de l'arc.

L'arc est maintenu sur le parcours du contact mobile dans les chambres dont le diamètre est un peu supérieur à celui de la tige du contact, ce qui assure une tension d'arc extrêmement réduite, toute extension étant empêchée. La quantité d'huile consommée par la coupure est dérisoire et la rigidité diélectrique de l'huile se maintient malgré plusieurs coupures, surtout parce que les produits de la combustion et les parcelles de charbon n'ont la possibilité de se mélanger qu'avec une petite partie de l'huile contenue dans le disjoncteur et que la majeure partie s'en va directement à l'exterieur.

Nous verrons par la suite en examinant les résultats des essais comment ces conditions théoriques ont été réalisées.

Le mouvement de la tige mobile de contact s'effectue de haut en bas, par un système de bielles, manivelle et crosse, commandé par un arbre carré lequel sort à l'extérieur à travers un presse-étoupe.

Le contact est toujours guidé et les angles de rotation effectués par l'arbre sont petits. L'ouverture se fait par des ressorts, bandés pendant la manoeuvre de fermeture et qui donnent au contact mobile la vitesse convenable.

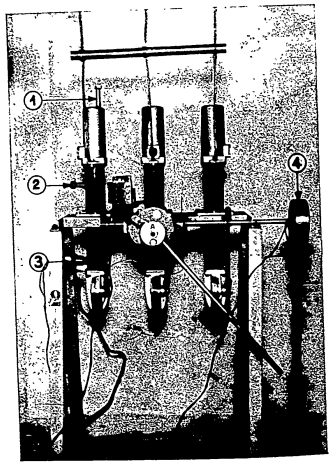


Fig. 2 - Disjoncteur OPR 15-15 KV-400 A (installation pour les essais).

3 - Essais

La photographie 2 montre le disjoncteur installé pour les essais. On note en (1) un pressostat à maximum pour mesurer la pression dans la chambre de détente, en (2) un autre pressostat du même type, installé au quart environ de la chambre et en (3) un pressostat enregistreur placé sur le récipient de base.

Un rhéostat à potentiomètre (4) sert à indiquer la position des contacts. On a effectué en tout 45 coupures totalisant dans l'ensemble 240.000 ampères.

Pendant ces essais, le disjoncteur n'a pas été révisé. Ce n'est qu'après 23 coupures pour un total de 115.000 A coupés qu'on a changé l'huile.

Avant d'être mise dans les pôles, l'huile a été contrôlée au spintéromètre avec des sphères de 10 mm. à 5 mm. de distance avec décharge à 50 KV; après cette épreuve on laissait l'huile se décanter pendant un quart d'heure environ, puis elle subissait une decharge à 42 KV. Elle se trouvait alors en état de pouvoir continuer parfaitement le service.

Le diagramme supérieur de la fig. 3 indique comment a varié la durée de la coupure en passant de 25 à 10.000 ampères.

On peut voir comment cette durée varie de 0,015 a 0,01 seconde et ceci dépend d'une part de ce qu'avec l'augmentation de l'intensité le disjoncteur éteint mieux et d'autre part du moment auquel a commence pour une intensité donnée, l ouverture des contacts.

Dans l'autre diagramme sont reportés les points de la coupure du disjoncteur auxquels se produit l extinction en fonction de l'intensité coupée. On peut voir que, lorsque l'intensité varie, le point où se produit la coupure reste aux environs du tiers de la chambre désionisante.

Cela signifie que l'on a une marge de sécurité notable, égale à près des deux tiers des chambres et pendant laquelle l'arc peut être encore éteint dans des cas exceptionnels. Une fois le contact sorti des chambres, la distance de sectionnement en huile libre est telle qu'elle peut supporter à elle seule la tension d'essai du disjoncteur. Pendant l'extinction, à cause de l'énergie développée par l'arc, l'intérieur du disjoncteur est sous pression.

La plus grande pression mesurée par nous à l'intérieur des chambres de désionisation est voisine de 30 atm. Dans la chambre d'expansion, la pression a toujours été trouvée égale à zéro.

Dans le récipient de base la pression maxime enregistrée a été de 20 atm. et elle est due surtout au mouvement de la tige mobile de contact qui agit comme un piston sur l'huile sousjacente (le recipient de base essayé statiquement résiste à 60 atm.).

Le comportement du disjoncteur peut être avantegeusement déduit de l'examen des oscillogrammes reproduits ci-inclus.

Le premier représente en partant du haut: tension et intensité des phases blanche, rouge et verte; indication des positions des contacts à chaque instant de la course, intensité dans la bobine de déclenchement et pression dans le récipient de base. L'autre oscillogramme, audessous du précédent représente l'allure de la tension d'arc prise au pôle situé sur la phase verte. La fig. 4 représente l'ouverture du courant magnétisant d'un transformateur. Les pressions à l'intérieur d'un pôle sont nulles; l'extinction est régulière et ne donne lieu à aucune surtension comme on peut le voir sur l'oscillogramme cathodique.

La figure 5 représente la coupure d'une intensité de 2.300 ampères, sous une tension de 13 KV. Mê-

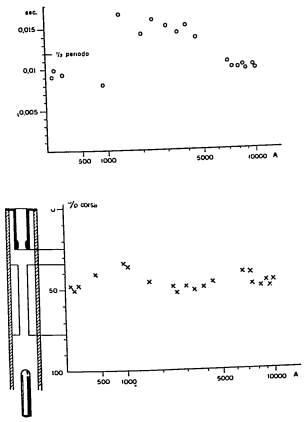


Fig. 3 - Diagramme d'essais du disjoncteur OPR 15.

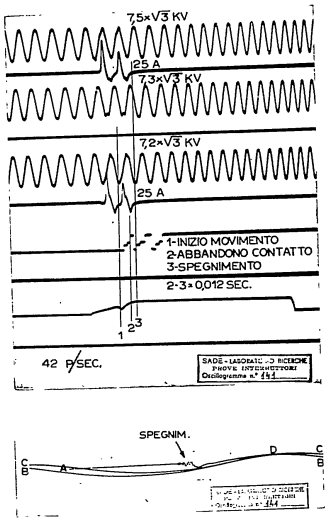


Fig. 4 - Diagramme de coupure de courants magnétisants.

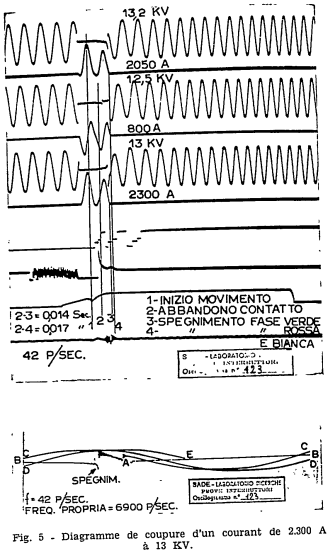


Fig. 5 - Diagramme de coupure d'un courant de 2.300 A à 13 KV.

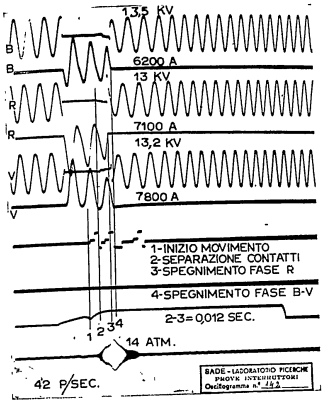
me dans ce cas les pressions sont négligeables; elles atteignent dans les chambres 10 atmosphères. On peut voir combien la tension d'arc est faible et par conséquent combien est petite l'énergie développée.

La très faible consommation d'huile et l'affaiblissement négligeable de ses qualités diélectriques le prouvent La coupure se fait dans une demi-période, bien que la fréquence propre de la station d'essais soit de 7.000 périodes environ par seconde.

La fig 6 représente la coupure d'un courant de 7.800 ampères sous une tension de 13,2 KV. Les pressions atteignent les valeurs de 24 et 14 atm. respectivement dans les chambres et dans la base. L'arc se maintient pendant une demi-période environ et là aussi la tension d'arc reste très faible. Au moment de la coupure, un souffle de gaz s'échappe par la soupape d'évacuation. La fig. 7 représente la coupure de la plus grande puissance disponible dans l'installation. On a atteint 11.500 ampères avec une tension de 13.500 V. Les caractéristiques de l'extinction se maintiennent sensiblement constantes malgré la variation de l'intensité, comme nous l'avons déjà vu dans les diagrammes précédents.

La pression dans les chambres atteint 30 atmosphères et celle dans le récipient de base 18 atm., valeurs bien éloignées des valeurs limites de résistance des matériaux employés.

On n'a pas constaté de projection d'huile à l'extérieur. Ayant vu le comportement du disjoncteur dans ces essais et examiné les oscillogrammes, nous sommes en mesure de supposer que nous sommes loin du maximum de pouvoir de coupure de l'appareil. Seul, le manque d'une plus grande puissance disponible nous a empeché de déterminer quel était vraiment le pouvoir limite de l'appareil. Etant données les faibles dimensions de l'appareil nous considérons comme prudent tou-



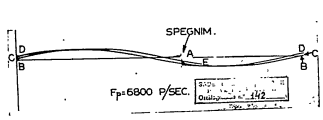
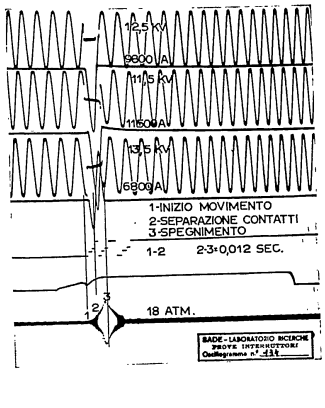


Fig. 6 - Diagramme de coupure d'un courant de 7.800 A à 13,2 KV.



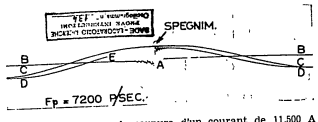


Fig. 7 - Diagramme de coupure d'un courant de 11.500 A à 13,5 KV.

tefois de ne garantir qu'un pouvoir de coupure de 10.000 ampères à la tension nominale.

Comme il est probable que dans quelques mois une installation d'essais à haute puissance sera réalisée, nous poursuivrons aussitôt sur le même type de disjoncteur un autre cycle d'essais pour voir si nos calculs et nos extrapolations sont exacts.

Une fois le cycle d'essais achevé, il a été procédé au démontage de l'appareil pour voir comment s'étaient comportés les contacts mobiles fixes et les chambres désionisantes. Dans la fig. 8 on peut voir une de ces dernières retirée de l'appareil et dans la fig. 9 les disques qui la composent. Au sommet de la chambre on aperçoit l'ouverture où reçoit le pressostat destiné à mesurer la pression dans la zone de l'arc.

Comme on le voit les disques sont en parfait état quelques uns cependant — ceux situés dans le premier tiers supérieur et qui ont subi l'action de tous le arcs — étaient recouverts d'un léger voile d'huile sale; nettoyés, ils apparaissent comme neufs.

Les contacts fixes aussi bien que les contacts mobiles ont été attaqués par l'arc ainsi qu'on peut le voir dans les figures 10 et 11; et ceci est dû au nombre exceptionnel (240.000) d'ampères totalisés dans les coupures. Ce nombre considérable d'essais sans révision a été pratiqué dans un but d'étude et il ne doit pas être pris comme base pendant le service. On conseille une révision des contacts et de l'huile après une série de coupures totalisant 50.000 ampères.

Conclusion

Comme conclusion de ce cycle d'essais on peut dire:

1°. Le pouvoir de rupture nominal a été largement prouvé avec une marge de sécurité telle, que

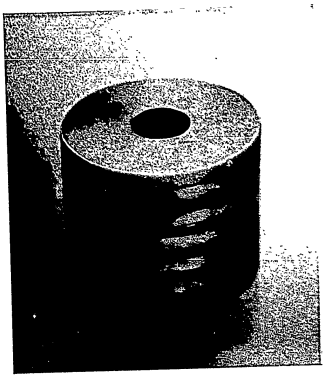


Fig. 8 - Chambre d'extinction.

Fig. 10 - Contact fixe d'un interrupteur OPR après une série de coupures pour 240.000 A.

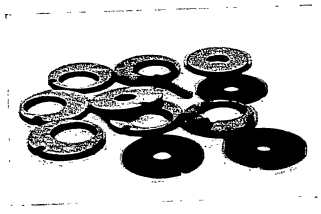


Fig. 9 - Eléments de chambre d'extinction

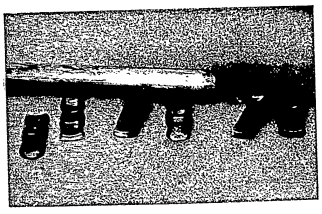


Fig. 11 - Contact mobile et éléments composant le contact fixe de la fig. 10.

l'appareil peut être utilisé en toute tranquillité dans les installations dont la puissance de court-circuit à la tension de 15000 V peut atteindre la dite valeur nominale.

2°. Bien que le disjoncteur ne contienne qu'une faible quantité d'huile (environ 1 litre par pôle) la longévité de ce liquide s'est montrée supérieure à toutes les espérances; de ce fait les frais de maintention sont très réduits par rapport aux autres disjoncteurs existant sur le marché, et dans cette voie, on a réalisé un progrès très notable.

C. . ne Grafiche STEDIV-PADOVA 521442

DIRECTION TECHNIQUE-COMMERCIALE ET USINES
A BATTAGLIA TERME - PADOVA (ITALIE)
TELEPH : PADOVA 25.689 - 26 003 - TELEGR OFFICINE BATTAGLIA TERME (ITALIE)

Centrale de Vaprio d'Adda - Cotè 30 kV, complètement équipé avec l'appareillage Galileo.

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DI BATTAGLIA TERME S.p.A.
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Appareillages électriques pour haute tension de tous types et puissance.

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Charpente metallique.

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interruttore a volume ridotto di olio
low-oil content circuit breaker
disjoncteur à faible volume d'huile

MOD. OGOR - OCER 80

RISULTATI DELLE PROVE ESEGUITE
NELLA STAZIONE DI ARNHEM (K. E. M. A.)
(COPIA DEL RAPPORTO DI PROVA HLA 7782 57)

RESULTS OF TESTS PERFORMED
IN THE PLANT AT ARNHEM (K. E. M. A.)
(COPY OF TEST REPORT HLA 7782 57)

RESULTATS DES ESSAIS EXECUTES
AU CENTRE DE ARNHEM (K. E. M. A.)
(COPIE DU COMPTE RENDU D'ESSAI HLA 7782 57)

0.

N.V. tot Keuring van Electrotechnische Materialen

TELEFOON 21441* ARNHEM UTRECHTSEWEG 310

REPORT OF PERFORMANCE N°. 7782-57

CLIENT Officine Elettromeccaniche Galileo di Battaglia Terme S.p.A. Padova (Italia)

MANUFACTURER Officine Elettromeccaniche Galileo di Battaglia Terme S.p.A. Padova (Italia)

APPARATUS TESTED a three pole low oil content circuit breaker (one pole tested)
66 kV 800 A 3- phase designated as OGOR80/OCER 80 Serial no prototype
constructed in accordance with the drawings and photographs sealed and attached hereto.

The tests have been made in accordance with British Standard 116:1952 and clients instructions.

The performance of the apparatus tested and observations made during the tests have been recorded in the Schedules of Test Results and Oscillograms.

THE DOCUMENTS CONSTITUTING THIS REPORT ARE:

Schedule of Test Results-Sheets Nos. 4 to 9 incl.
Drawings Nos. 313335
Photographs Nos. 37420, 37421, 37422, 37423
Diagrams Nos. 7782-57-01
Electro-magnetic-oscillograms Nos. 570830-02-05-06-07-08-09-10-11-12-13-15-16-17-18-20-21-22.

Cathode ray-oscillograms Nos. 570830-05-06-07-08-09-10-11-12-13-15-16-17-18-20-21-22.

TESTS

No load timing tests

Test No.570830-02 Make-Break test

Breaktests at 57 kV

Test No.570830-05-06-07 Tests with 1.35 kA
Test No.570830-08-09-10 Tests with 4.08 kA
Test No.570830-11-12-13 Tests with 8.10 kA

Break tests at 50 kV

Test No.570830-15-16 Tests with 13.1 kA
Test No.570830-20-21-22 Tests with 13.1 kA

Make-Break tests at 50 kV

Test No.570830-17 Test with 22.4 kA peak and 13.1 kA
Test No.570830-18 Test with 28.8 kA peak and 13.1 kA.

N.V. KEMA

ARNHEM, 4th December 1957

(Manager)

B 1926-1900-4-'56

A three phase Low Oil Content Circuit Breaker
Type OGOR 80 (OCER 80) 66 kV - 800 A

Test No.	Current kA	Natural frequency c/s	U	E	K
570830-05	1.35	2380	144	81.5	1.8
570830-06	1.35	2380	144	81.5	1.8
570830-07	1.36	2380	154	82.0	1.9
570830-08	4.18	4400	143	84.3	1.7
570830-09	4.00	4400	143	80.6	1.8
570830-10	4.06	4400	138	81.4	1.7
570830-11	8.10	4700	133	82.3	1.6
570830-12	8.10	4700	136	83.3	1.6
570830-13	8.10	4700	146	82.9	1.8
570830-15	13.0	5600	142	72.7	2.0
570830-16	13.1	5600	131	72.2	1.8
570830-17	13.1	5600	-	-	-
570830-18	13.1	5600	-	-	-
570830-20	13.1	5600	119	72.8	1.6
570830-21	13.0	5600	113	72.2	1.6
570830-22	13.1	5600	118	72.2	1.6

U = Overvoltage kV peak
E = Recovery voltage kV peak
K = $\frac{U}{E}$

SCHEDULE OF TEST RESULTS

Condition before tests:
Tests carried out single phase with one pole. Pole in new condition

Test and Oscillogram No.	Operation and Time-Interval	Test Quantities: Applied Voltage kV	Making Current Peak kA	Breaking-Current: Symmetrical Phase kA	Symmetrical Average kA	Asymmetrical kA	D. C. Component %	Recovery-Voltage: Phase-Values Per Phase kV	Phase-Values Average kV	Between-Phase Values Average kV	Between-Phase Values % of Rated Service-Voltage
AB	C	D	E	F	G	H	I	K	L	M	N
570830-05	B	57		1.35			20	57.5		66.4	100
570830-06	3 B	57		1.35			22	57.5		66.4	100
570830-07	3 B	57		1.36			20	58.1		67.2	102

Test and Oscillogram No.	Operation and Time-Interval	Performance data: Arc-Duration Loops	Arc-Duration Hundredths of a second	Length of Arc cm	Opening Time Hundredths of a second	Total-Break Time Hundredths of a second	Make-Time Hundredths of a second	Closing Coil Current A
AB	C	O	P1	P2	Q	R	S	Z
570830-05	B	5.8	5.9	26.0	6.1	12.0		
570830-06	3 B	6.0	6.1	27.0	6.1	12.2		
570830-07	3 B	5.5	5.6	23.0	6.1	11.7		

Test and Oscillogram No.	Air Pressure atm.	Physical Behaviour: Emission of Flame	Emission of Gas	Emission of Oil	Remarks
AB	X	T	U	V	W
570830-05	13.5	none	slight from vent	none	easy performance
570830-06	13.5	none	slight from vent	none	easy performance
570830-07	13.5	none	slight from vent	none	easy performance

Condition after tests

Breaker not inspected.

NOTE: Where phase values are given they are to be read

SCHEDULE OF TEST RESULTS

Condition before tests

Breaker in same condition.

Test and Oscillogram No.	Operation and Time-Interval	Test Quantities: Applied Voltage kV	Making Current Peak kA	Breaking-Current: Symmetrical Phase kA	Symmetrical Average kA	Asymmetrical kA	D. C. Component %	Recovery-Voltage: Phase-Values Per Phase kV	Phase-Values Average kV	Between-Phase Values Average kV	Between-Phase Values % of Rated Service-Voltage
AB	C	D	E	F	G	H	I	K	L	M	N
570831-08	B	57		4.18			12	59.5		68.6	106
570831-09	B 3'	57		4.00			9	57.0		65.9	100
570831-10	B 3'	57		4.06			9	57.5		66.4	100

Test and Oscillogram No.	Operation and Time-Interval	Performance data: Arc-Duration Loops	Arc-Duration Hundredths of a second	Length of Arc cm	Opening Time Hundredths of a second	Total-Break Time Hundredths of a second	Make-Time Hundredths of a second	Closing Coil Current A
AB	C	O	P1	P2	O	R	S	Z
570831-08	B	4.8	5.0	22.0	6.1	11.1		
570831-09	B 3'	5.1	5.4	23.0	6.1	11.5		
570831-10	B 3'	5.0	5.2	22.5	6.1	11.3		

Test and Oscillogram No.	Air Pressure atm.	Physical Behaviour: Emission of Flame	Emission of Gas	Emission of Oil	Remarks
AB	X	T	U	V	W
570831-08	13.5	none	moderate from vent	none	easy performance
570831-09	13.5	none	moderate from vent	none	easy performance
570831-10	13.5	none	moderate from vent	none	easy performance

Condition after tests

Breaker not inspected.

NOTE: Where phase values are given they are to be read

SCHEDULE OF TEST RESULTS

Condition before tests:

Breaker in same condition.

Test and Oscillogram No.	Operation and Time-Interval	Test Quantities: Applied Voltage kV	Making Current Peak kA	Breaking-Current: Symmetrical Phase kA	Symmetrical Average kA	Asymmetrical kA	D. C. Component %	Recovery-Voltage: Phase-Values Per Phase kV	Phase-Values Average kV	Between-Phase Values Average kV	Between-Phase Values % of Rated Service-Voltage
AB	C	D	E	F	G	H	I	K	L	M	N
570830-11	B	57		8.10			7	58.2		67.2	102
570830-12	B 3'	57		8.10			5	58.8		68.0	103
570830-13	B 3'	57		8.10			9	58.5		67.5	102

Test and Oscillogram No.	Operation and Time-Interval	Performance data: Arc-Duration Loops	Arc-Duration Hundredths of a second	Length of Arc cm	Opening Time Hundredths of a second	Total-Break Time Hundredths of a second	Make-Time Hundredths of a second	Closing Coil Current A
AB	C	O	P1	P2	O	R	S	Z
570830-11	B	5.0	5.2	23.5	6.2	11.4		
570830-12	B 3'	4.5	4.7	22.0	6.2	10.9		
570830-13	B 3'	5.8	6.0	28.0	6.4	12.4		

Test and Oscillogram No.	Air Pressure atm.	Physical Behaviour: Emission of Flame	Emission of Gas	Emission of Oil	Remarks
AB	X	T	U	V	W
570830-11	13.5	none	moderate from vent	trace from vent	easy performance
570830-12	13.5	none	moderate from vent	trace from vent	easy performance
570830-13	13.5	none	heavy from vent	slight from vent	slight jar

Condition after tests

Breaker inspected. Fixed and moving contacts moderately burnt . Photograph 37420. Oil moderately carbonised.

NOTE Where phase values are given they are to be read

SCHEDULE OF TEST RESULTS

Condition before tests:

Breaker fitted with new fixed and moving contacts. Clean oil. Breaker otherwise in same condition.

Test and Oscillogram No.	Operation and Time-Interval	Test Quantities: Applied Voltage kV	Making Current Peak kA	Breaking-Current: Symmetrical Phase kA	Symmetrical Average kA	Asymmetrical kA	D. C. Component %	Recovery-Voltage: Phase-Values Per Phase kV	Phase-Values Average kV	Between-Phase Values Average kV	Between-Phase Values % of Rated Service-Voltage
AB	C	D	E	F	G	H	I	K	L	M	N
570830-20	B	50		13.1		16.4	53	51.5		59.5	90
570830-21	3' B	50		13.0		16.3	53	51.0		59.0	89
570830-22	3+ B	50		13.1		16.5	54	51.0		59.0	89

Test and Oscillogram No.	Operation and Time-Interval	Performance data: Arc-Duration Loops	Arc-Duration Hundredths of a second	Length of Arc cm	Opening Time Hundredths of a second	Total-Break Time Hundredths of a second	Make-Time Hundredths of a second	Closing Coil Current A
AB	C	O	P1	P2	O	R	S	Z
570830-20	B	5.3	5.4	24.5	6.8	12.2		
570830-21	3' B	5.0	5.1	21.5	6.8	11.9		
570830-22	3' B	5.2	5.3	22.5	6.7	12.0		

Test and Oscillogram No.	Physical Behaviour: air Pressure atm.	Emission of Flame	Emission of Gas	Emission of Oil	Remarks
AB	X	T	U	V	W
570830-20	13.5	none	heavy from vent	slight from vent	slight jar
570830-21	13.5	none	heavy from vent	slight from vent	slight jar
570830-22	13.5	none	heavy from vent	slight from vent	slight jar

Condition after tests: Breaker inspected. Fixed and moving contacts moderately burnt. Photograph 37422. Arc control device slightly eroded. Photograph 37423. Oil moderately carbonised. Breaker could be closed and tripped by remote control after test. Breaker is able to make, carry and break its rated current of 800 A at 66 kV.

NOTE Where phase values are given they are to be read

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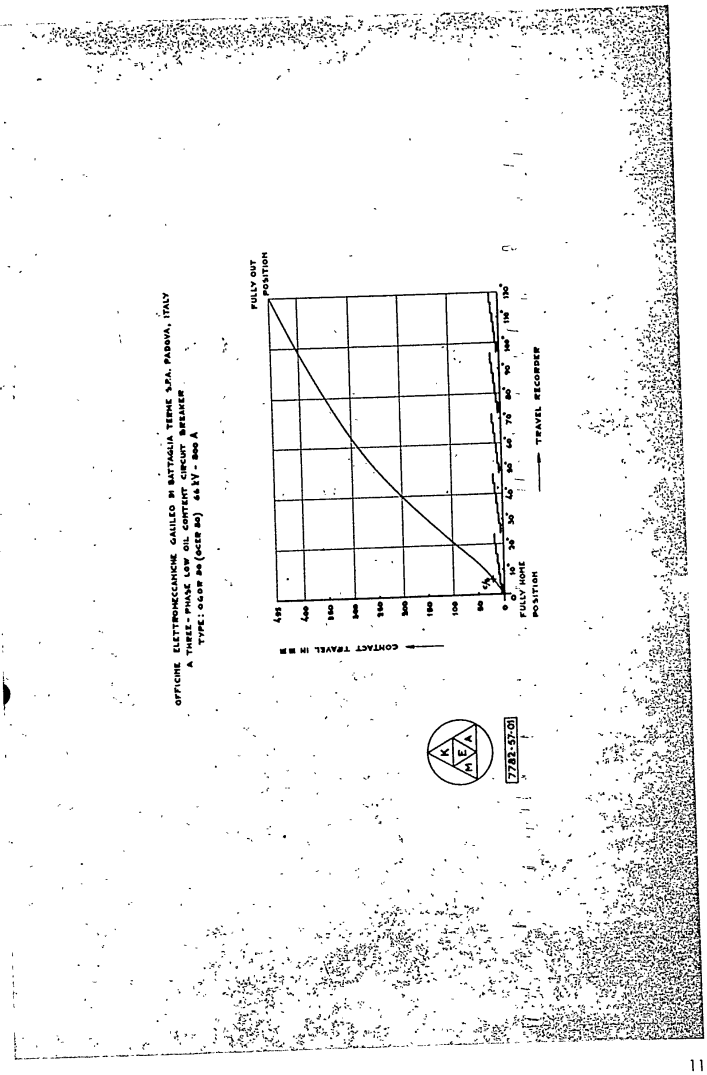
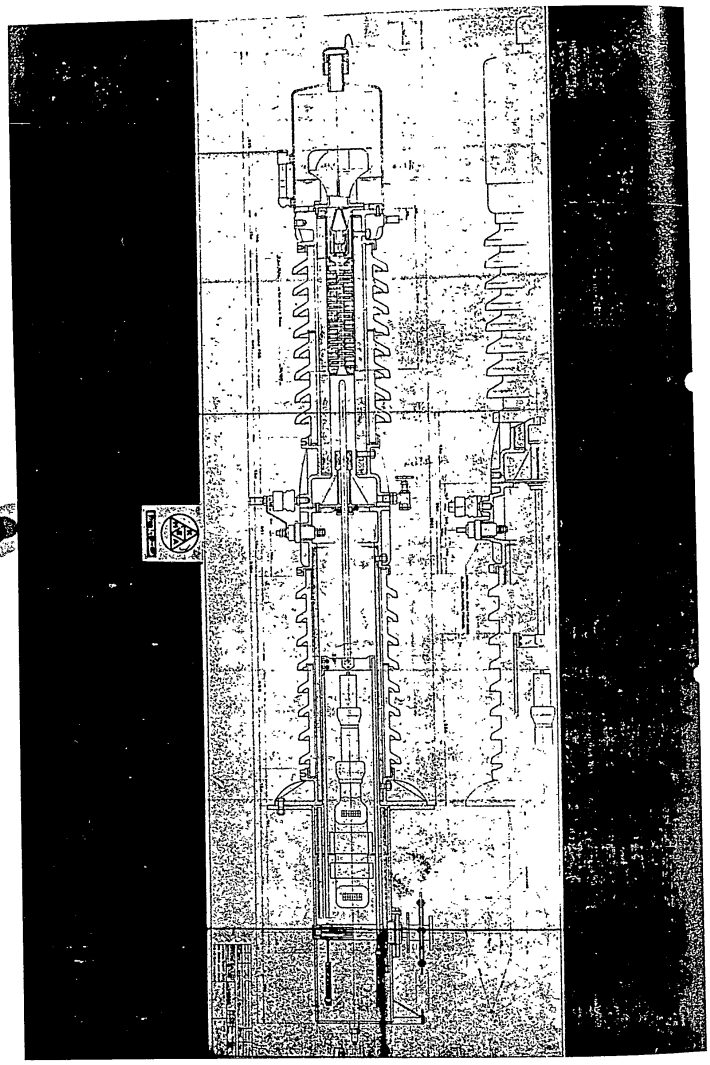
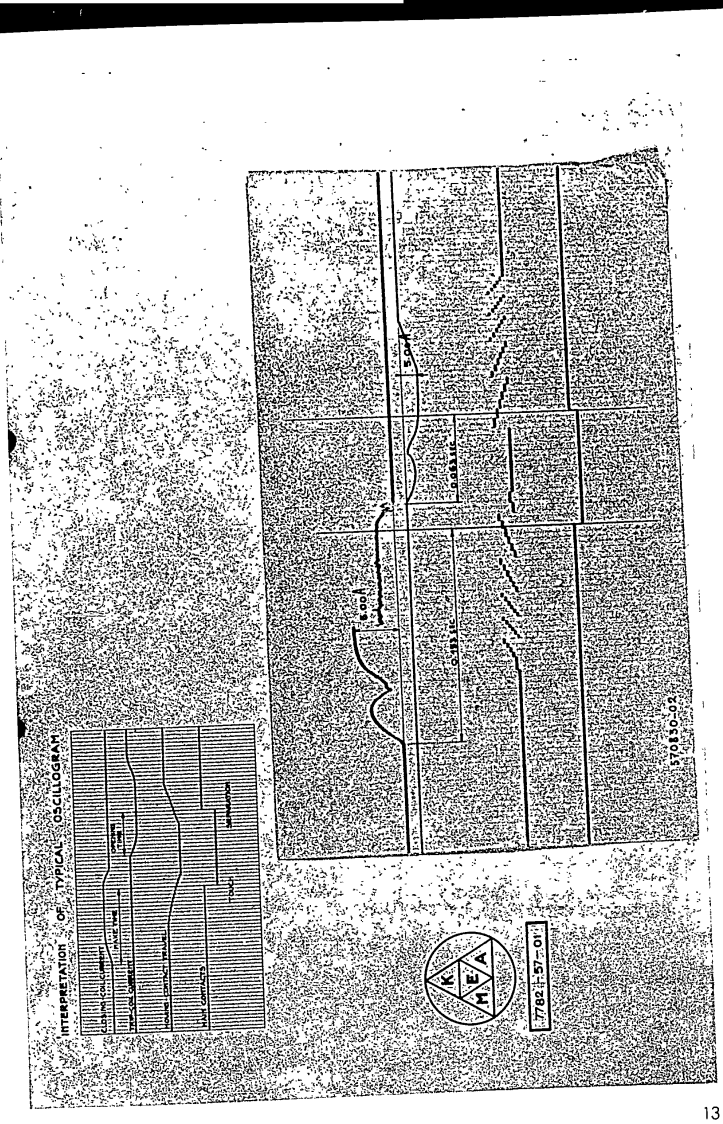
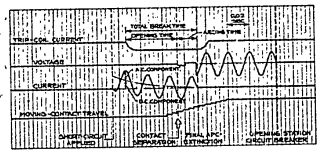






INTERPRETATION OF TYPICAL OSCILLOGRAM



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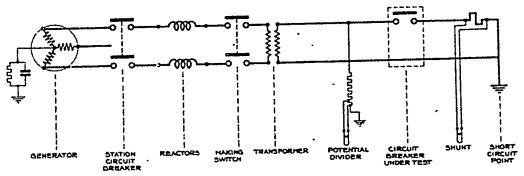

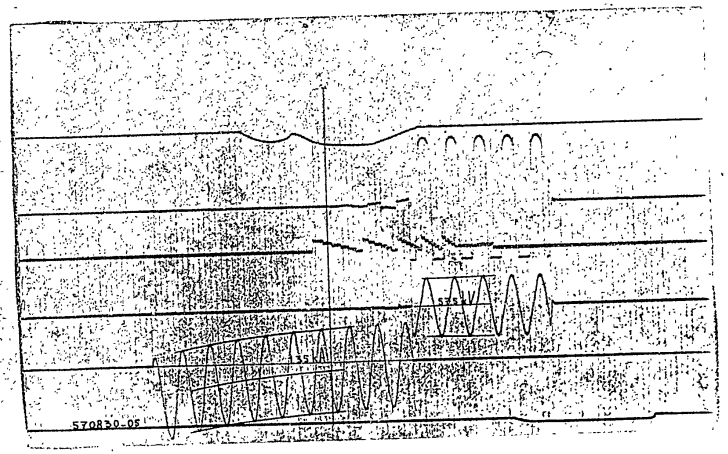

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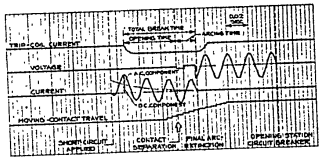

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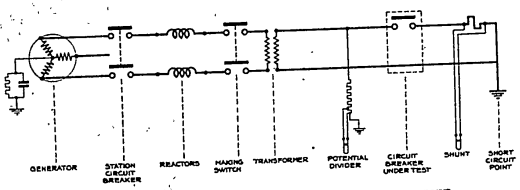

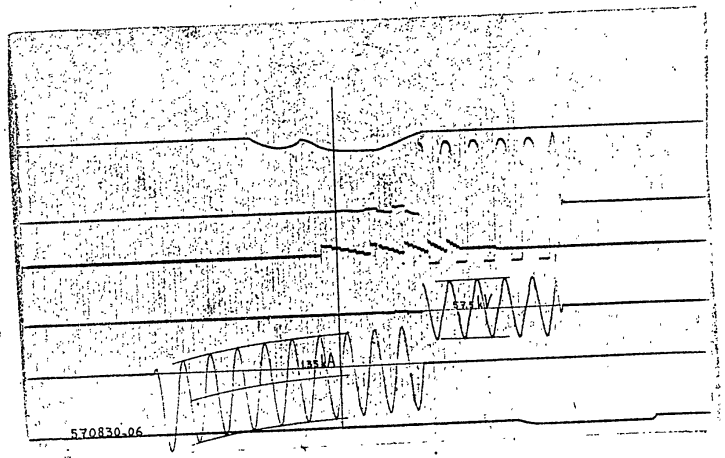

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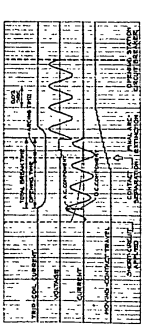

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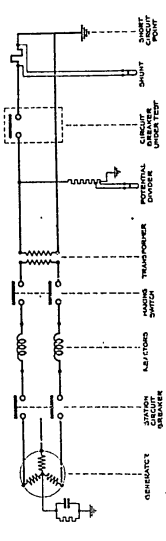

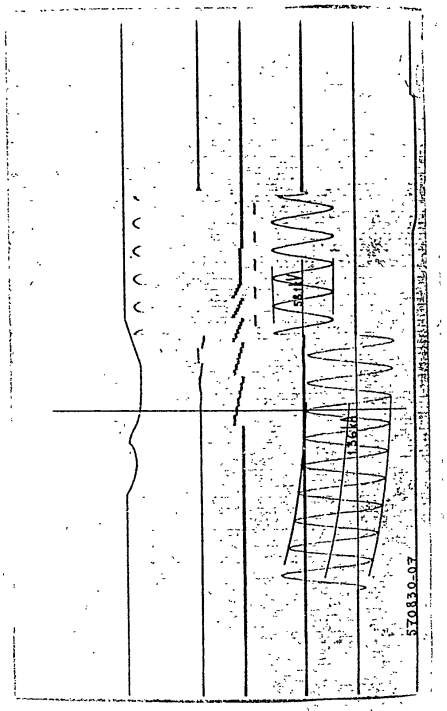

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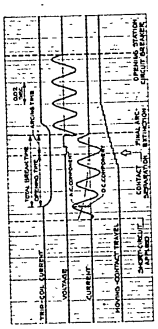

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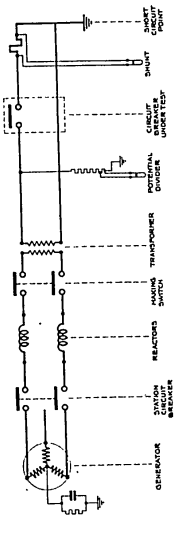

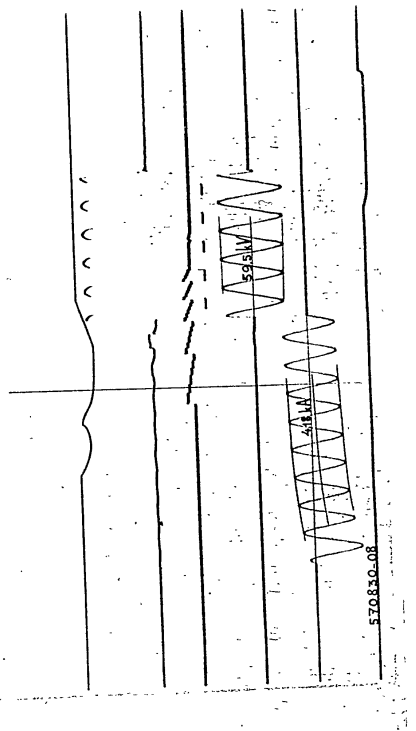

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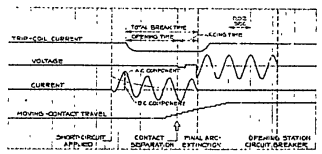

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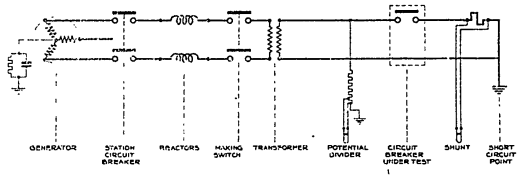

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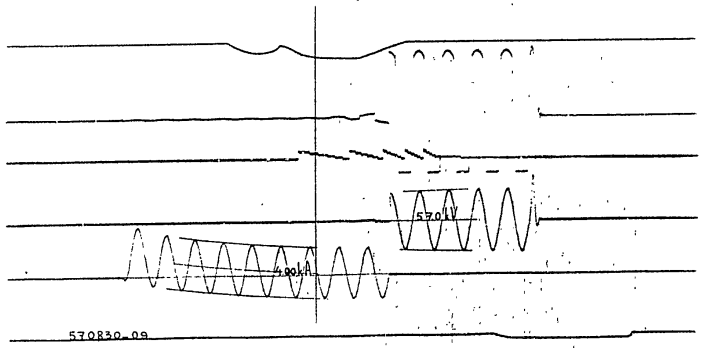

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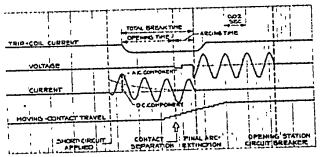

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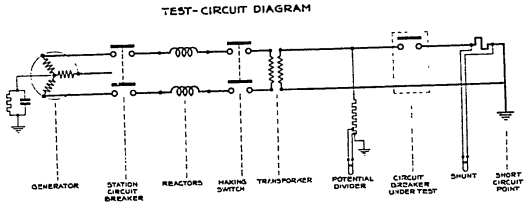

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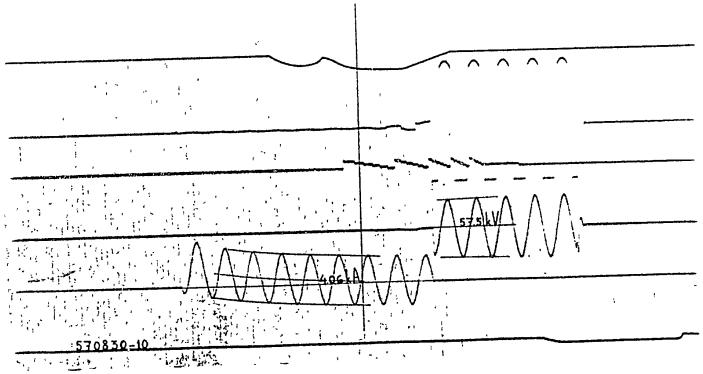

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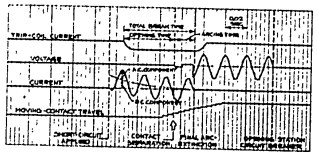
INTERPRETATION OF TYPICAL OSCILLOGRAM



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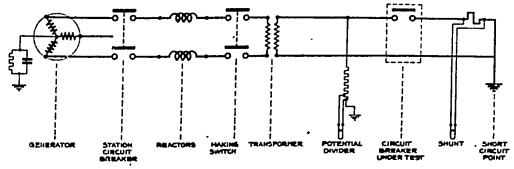

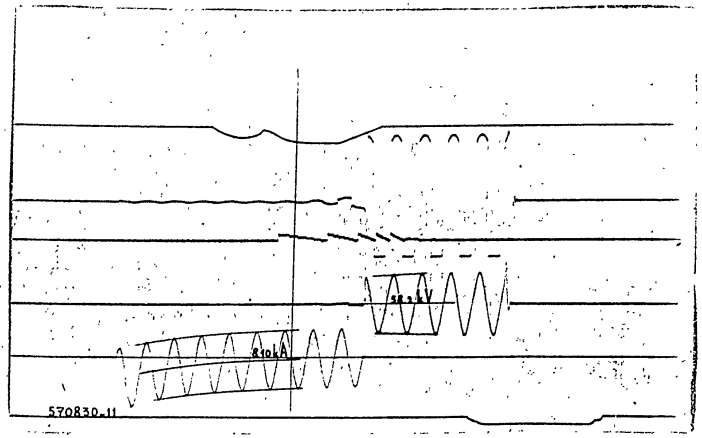

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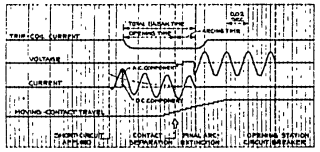

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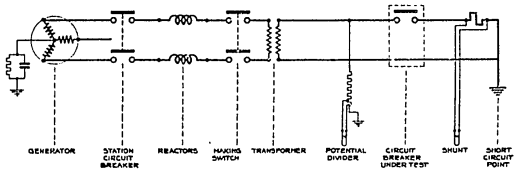

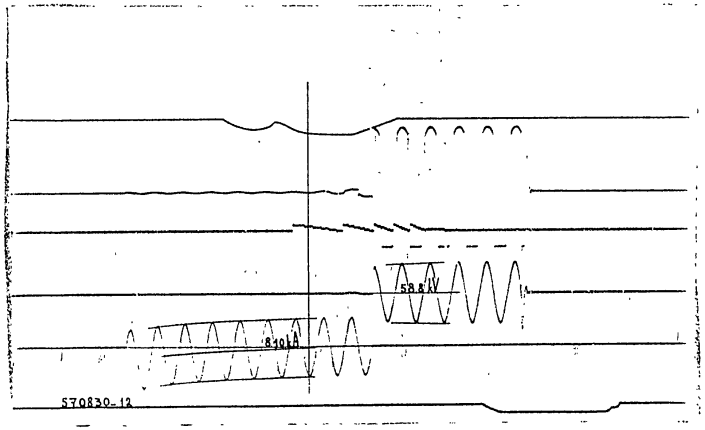

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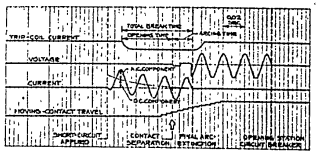

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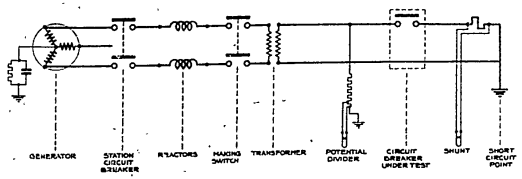

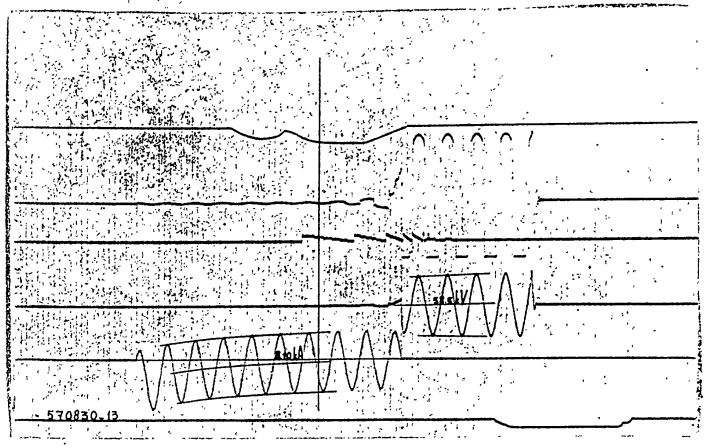

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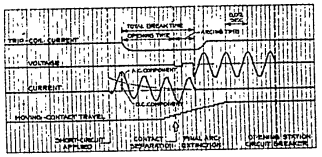

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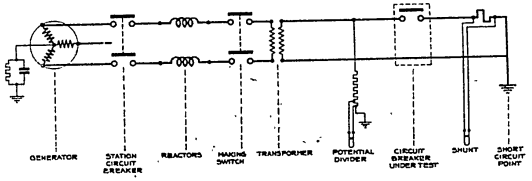

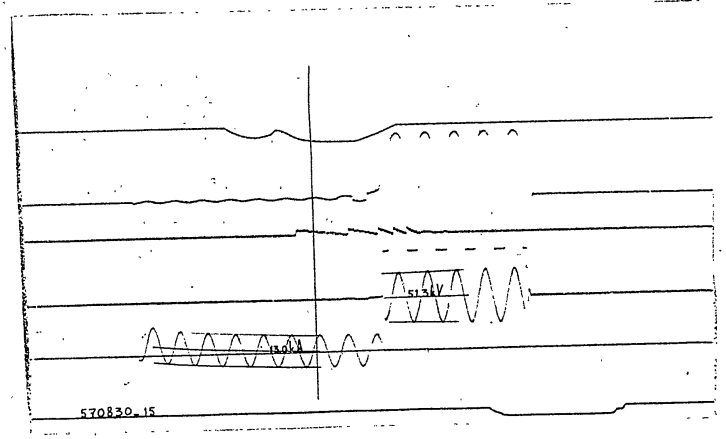

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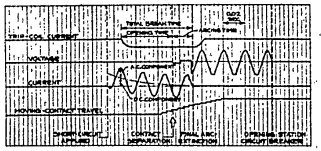

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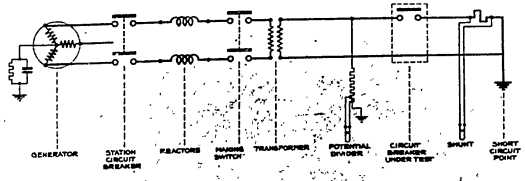

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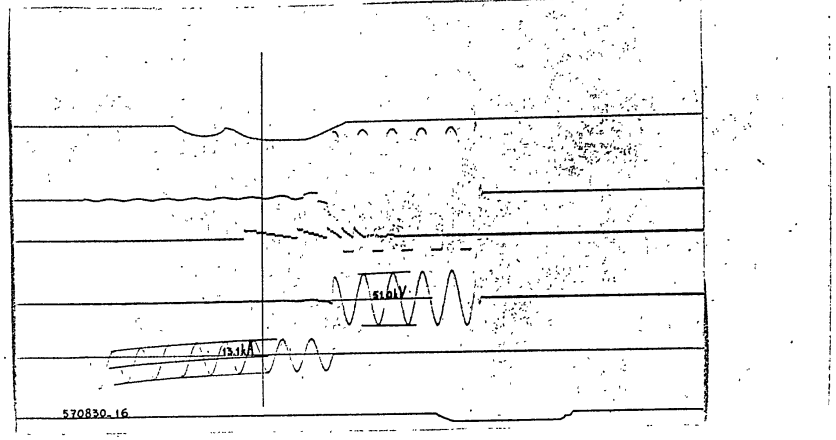

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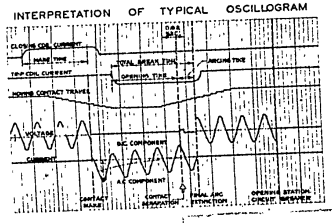

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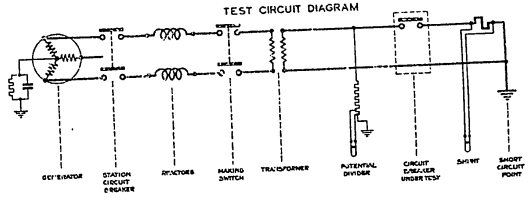

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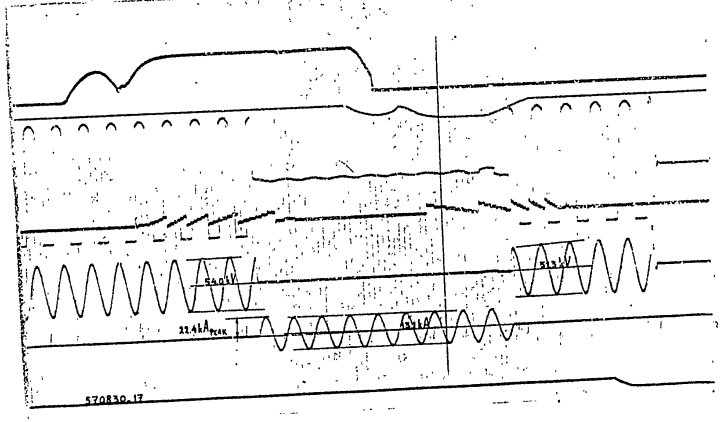

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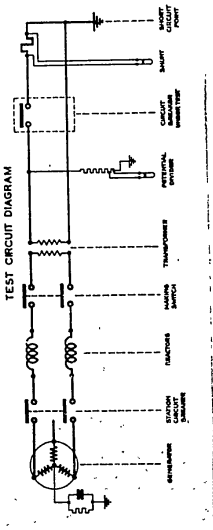

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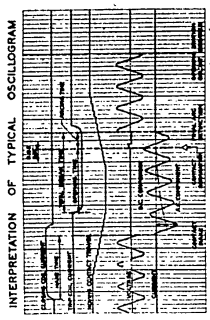

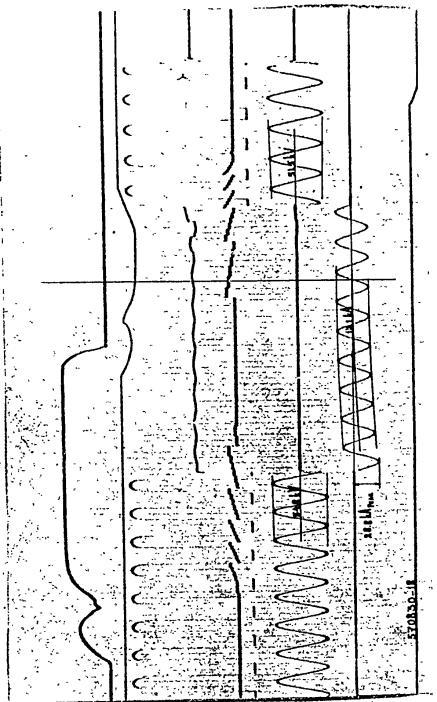

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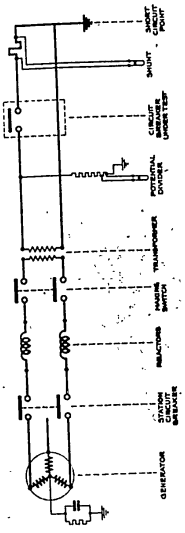

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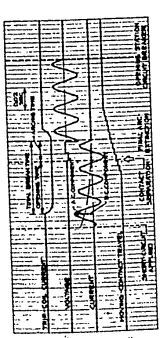

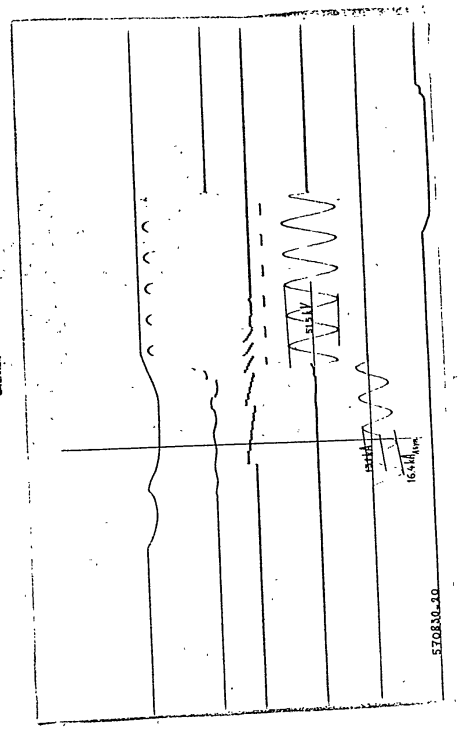

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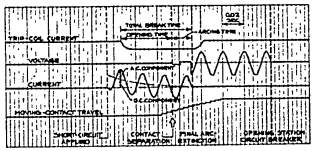

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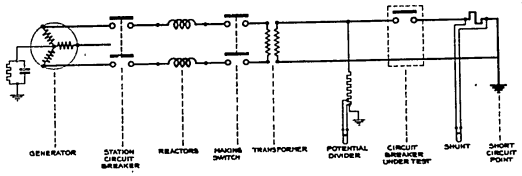

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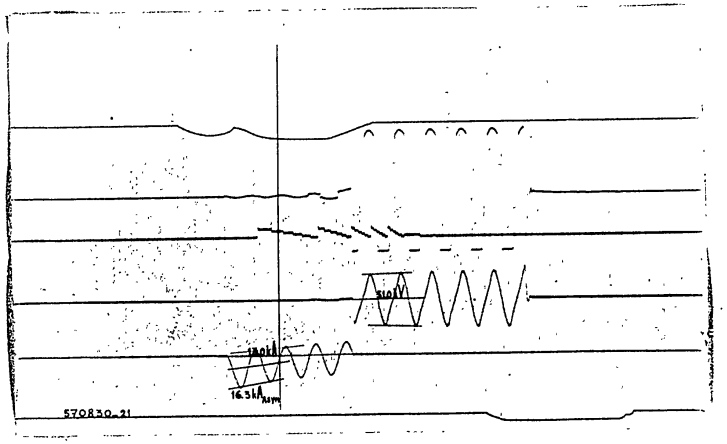

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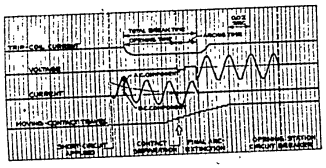

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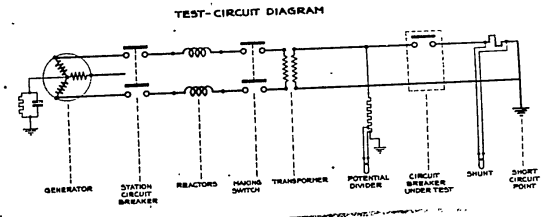

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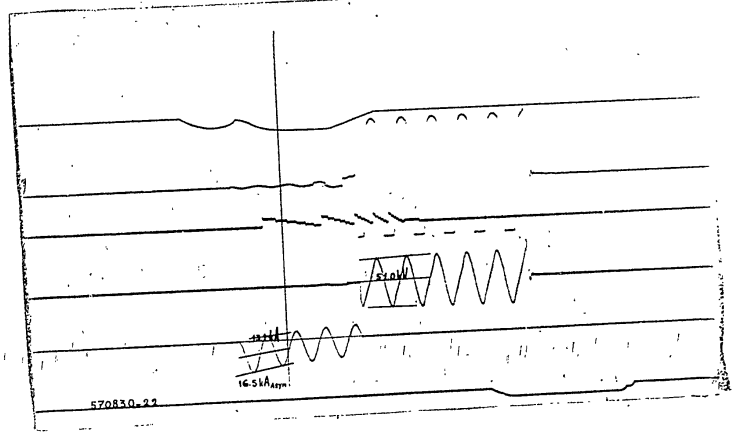

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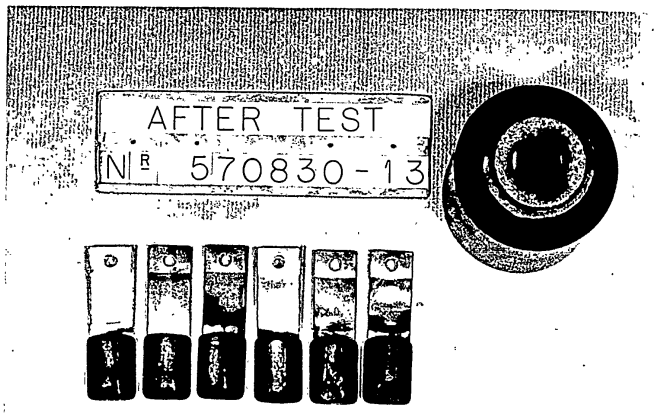

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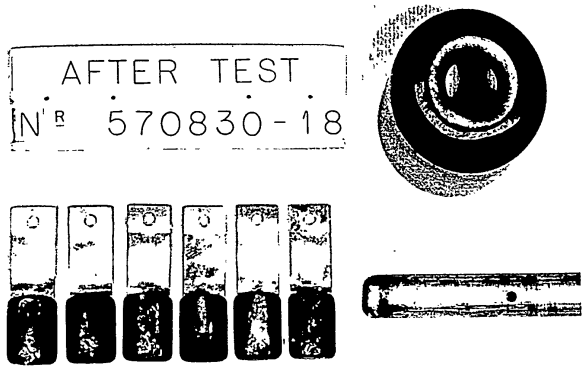

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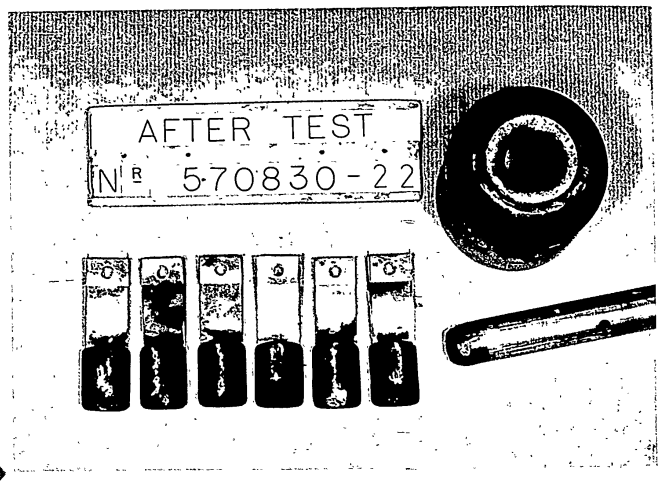

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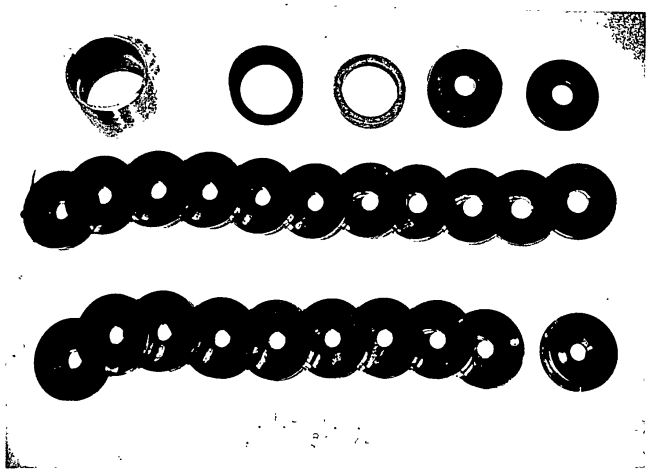
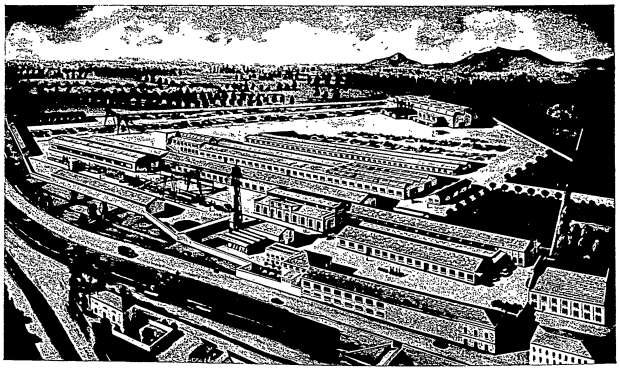


37423

OFFICINE
ELETTRO
MECCANICHE
GALILEO
DI BATTAGLIA TERME S.p.A.

HIGH VOLTAGE ELECTRICAL APPLIANCES

REDACTION: PUBLICITY DEPARTEMENT - OFFICINE ELETTROMECCANICHE GALILEO



Birds Eye View of the Works

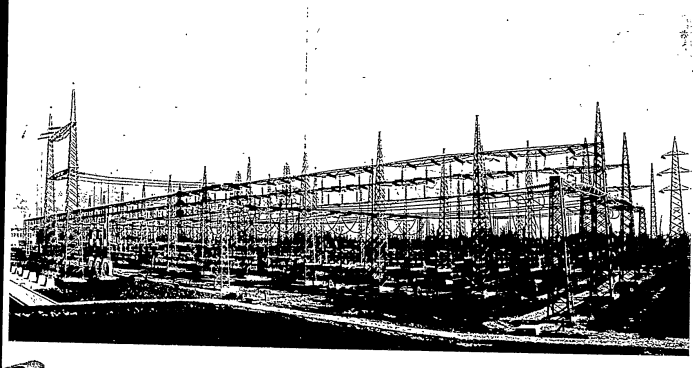
OFFICINE ELETTRO MECCANICHE GALILEO
IN BATTAGLIA TERME S.p.A.

CAPITAL L. 700.000.000 (SUBSCRIBED)
WORKS AT BATTAGLIA TERME-PADOVA (ITALY)
TELEPHONE: PADOVA 34-340
TELEGRAMS: OFFICINE BATTAGLIA TERME-ITALY

"GALILEO" ELECTRICAL APPLIANCES

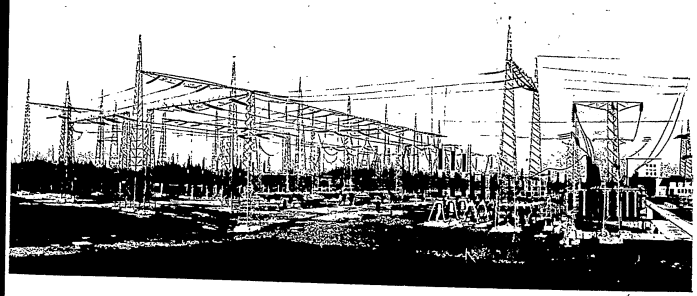
OFFERS AND DETAILS
PLEASE ENQUIRE TO:
UFFICIO COMMERC. DELLE OFF. ELETTR. GALILEO
VIA P. CASTALDI, 24 - MILAN - (ITALY)
TELEPHONE: MILAN 265370
TELEGRAMS: TECOSCARPA - MILAN (ITALY)

Sub-station
of Scorzè (Venice)
equipped throughout
whit « Galileo » Electrical Appliances



150 kV Side

275 kV Side



Throughout a full century of activity, the Officine Elettromeccaniche Galileo have always adhered strictly to scientific principles in the manufacture of products which have thereby achieved a name synonimous with quality.

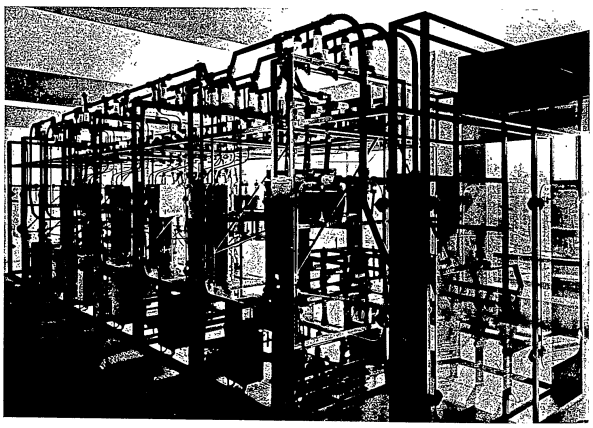
This organization, which at an early stage became specialized in the manufacture of goods ancillary to industry, would not fail to turn its attention to the production of electrical equipment, and with notable success.

World War II, however, called a halt to further development in this direction, at least, for peace time applications. Work has been taken up again and with the application of newly established criteria the name of «Galileo» now ranks among those of specialistsof international repute in the world of switchgear.

The outstanding features of the low-oil content and the pneumatically controlled circuit breakers, the isolating switches, measuring transformers and whatsoever other equipment manufactured by this organization, are recognized and appreciated by the leading electricity supply companies.

During the early stages in production, the first examples of equipment produced were subjected to rigorous and severe tests. Circuit breakers, for instance, were tested for maximum breaking capacity under practical conditions in some of the largest testing laboratories in Europe and on the extensive network so courteously placed at the disposal of the manufacturers by the Società Adriatica di Elettricità.

80 kV Outdoor sub-station equipped with « Galileo » Circuit Breakers



15 kV Distribution panels in sub-station - Central Italy

ALTERNATING CURRENT CIRCUIT BREAKERS

The operation of alternating current circuit breakers is based on the breaking of the arc at zero current value and the prevention of any restriking of the arc by rapid deionization and cooling of the space between the breaker contacts.

The deionization systems in vogue today are. mainly:

a) rapid cooling and removal of the ionized gas by a jet of compressed air (timed to operate at zero current value) which re-establishes the dielectric strength of the insulating medium;

b) drawing of the arc by means of a slide contact which plunges into oil filled extinction chambers. The evaporation of oil causes heat to be extracted from the arc and also an increase in volume of gas. The expansion of gas generates a pressure in the extinction chambers which causes a jet of gas to blow across the path of the arc (at zero current value) thus breaking up the continuity of the ionized column.

The selection of one or other of the above systems is influenced by a number of specific and often subjective considerations which may be stated, briefly, as follows.

The rapid pneumatic circuit breakers ensures extinction of the arc in approximately a half cycle, and may therefore be regarded as a suitable type of breaker for reclosure, but its actuating system and maintenance are costly. In hig voltage work, single opening is usually discarded in favour of a number of openings in series; whilst this is relatively easier mechanically, it is less safe owing to the possible unequal distribution of potential over the many contacts.

The pneumatic breaker, however, is so sensitive to network frequency that an increase in the latter causes a considerable falling off in breaking capacity. Designers have therefore found it necessary to adopt, as a corrective measure, the temporary connection of resistors which are thrown in parallel with the arc during its breaking period.

Designed to cope with the maximum current breaking capacity, the air jet will therefore operate at a constant pressure. If the circuit breaker is called upon to break relatively small currents, the over abundant force of the air jet will indeed effect a very rapid extinction which may not occur, however, at the instant of zero current value, and can thus give rise to voltage surges in the network. This type of circuit breaker, nevertheless, ensures maximum safety against wreckage, and it is this very desirable feature which makes it eminently suitable for indoor installation.

The low oil content circuit breaker is slower in action, effecting arc extinction in two or three consecutive half cycles, but it is not sensitive to change of network frequency. In this type of circuit breaker restriking of the arc alter passage of the current through zero value is prevented by the action of the extinction chambers aud the velocity of the moving contact.

In «Galileo» circuit breakers the action of the

extinction chambers and the velocity of the moving contacts are, proportional, within certain limits, to the magnitude of the current broken. It can therefore be stated that the low oil content circuit breaker in self regulating in action, a characteristic wich obviates violent and indiscriminate suppression of the arc and attendant surges in voltage. This type of circuit breaker is equally suitable for outdoor or indoor installation and in the latter situation the volume of oil is so small as to present no danger in case of wreckage. Il will be appreciated that once the inherent mechanical problems have been solved, a single breaking of the arc is far better than a number of breaks in series. In fact, the unequal distribution of potential brought about by arc extincton in one of many chambers can quite easily provoke external arc formation which in turn will ignite the inflammable mixture of gases ejected by the circuit breaker and thus cause great damage.

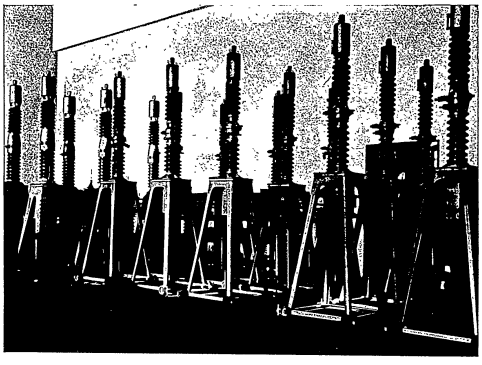


Fig. 1 Single Pole units of type OGO / OCE 60 Circuit Breakers 60 kV - 400 A 600 MVA.

CIRCUIT BREAKERS MOD. OGO/OCE - OGOR/OCER - OGOD/OCED - OGORD/OCERD

«FOR OUTDOOR INSTALLATION»

These types of circuit breakers differ only in their current breaking capacity and therefore in the dimensioning of the active portion of the column. The service voltage range extends from 30 kV to 275 kV.

The main features are single opening of the circuit and the special design of the series of extinction chambers. The merits of single as opposed to multiple openings in series have already been discussed and to ensure efficient interruption of the arc across a single pair of contacts, the moving contact should travel with a high velocity without causing undue stress in the actuating ad controlling mechanism.

To this end a pantograph velocity multiplier has been embodied in the construction.

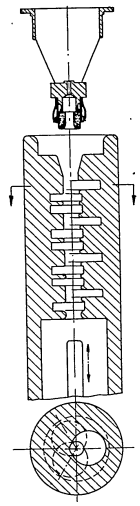


Fig. 2 - Section through Extinction Chamber.

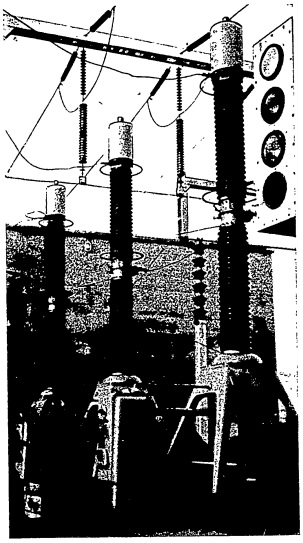


Fig. 3 - Type OGORD/OCERD 223 circuit breaker - 220 kV - 800 A - 5000 MVA.

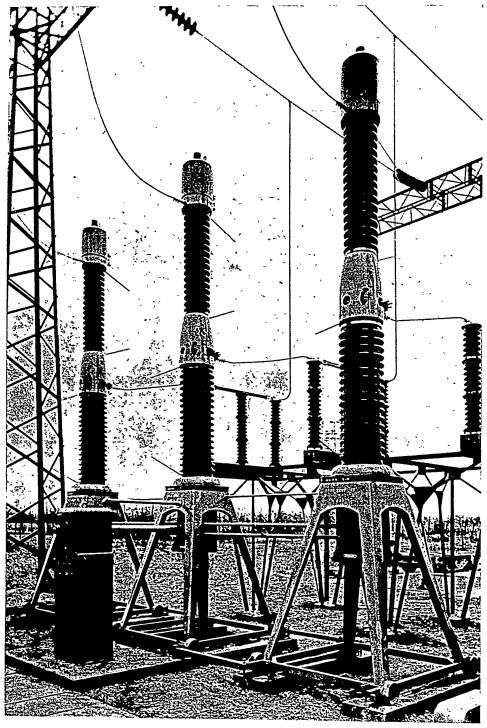


Fig 4 - Type OGOD/OCED 150 circuit breaker - 150 kV 500 A - 2000 MVA.

The extinction chamber is made up of a number of smaller chambers situated laterally to the direction of the arc. They are situated on equidistant and parallel planes and are each given an equal and successive angular displacement as shown in Fig. 2.

The moving contact draws and maintains the arc in an axial position in the central chamber. In this position the arc is enveloped by a stream of gas moving towards the fixed contact, having no other way of escape.
The gas cannot penetrate into the space occupied by the arc, when the current is heavy, owing to opposing pressure, but in the central zone the arc assumes the form of thin ionized filament which must be broken during the instant of zero current value, and moreover, must be prevented from restriking.
This is achieved by regenerating non ionized conditions around the arc in a very simple manner. The extinction chambers, which contain oil having high insulating properties even at periods of maximum current, permit its mixture with the ionized column at the moment of zero current value, during which the pressure is also at a minimum.
This mixing with gases generated by the arc (hydrogen, etc.) promotes highly favourable conditions for the regeneration of a deionized atmosphere just where it is required.
With deionization and the selection of a suitable velocity of travel of the moving contact, it has been possible to obtain a considerable reduction in energy dissipated by the arc

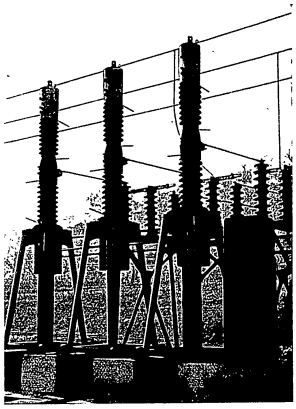


Fig. 5 - Type OGOR/OCER 80 circuit breaker for 80 kV - 600 A 1500 MVA.

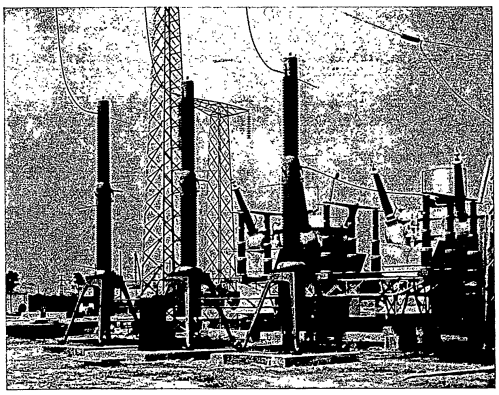


Fig. 6 - Type OGOR/OCER 275 circuit breaker for 275 kV - 1000 A - 3750 MVA.

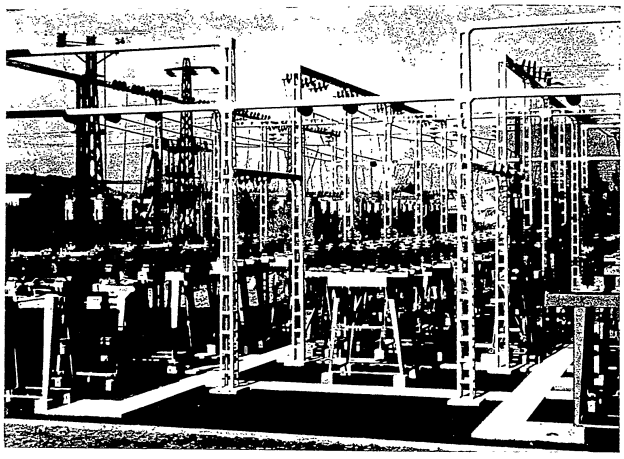


Fig. 7 - 45 kV Outdoor Substation equipped with « Galileo » circuit breakers and isolating switches.

and a consequent diminution in oil consumption down to 1/12 - 1/40 of the consumption in earlier types of circuit breakers. The lower portion of the circuit breaker accommodates a current transformer which can be supplied with single or triple core according to the requirements of the user.

These circuit breakers can be supplied for operation under pneumatic or electric control. On the latter case control would be by solenoid, if on direct current, and by motor on alternating current.

OUTDOOR CIRCUIT BREAKERS - MOD. OGOS/OCEU AND OGE/OE

These types are designed for outdoor operation at 15 - 20 - 30 - 45 kV and 400 A nominal current. They are similar to Mod. OGO/OCE circuit breakers but are provided, in addition, with box bases which are connected together with a tube carrying the actuating rod controlling the moving contacts.

The operating mechanisms are all contained in the base, immersed in oil and completely protected against outside weather conditions. The oil contained in the active part may be drawn from a special discharge tap.

In Mod. OGOS/OCEU the maximum breaking capacity ranges from 400 to 500 MVA, whilst in Mod. OGE/OE it is from 250 to 310 MVA.

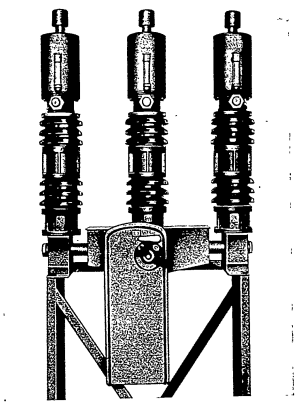


Fig. 8 - Type OGOS/OCEU 15 circuit breaker for 15 kV 400 A - 400 MVA.

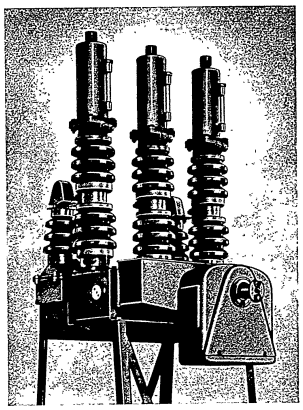


Fig 9 - Type OGE/OE 15 circuit breaker for 15 kV 400 A - 250 MVA.

INDOOR CIRCUIT BREAKERS - MOD. OGI/OC

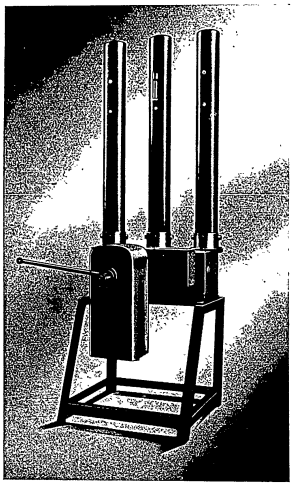


Fig. 10 - Type OGI OC 30 circuit breaker for 30 kV 400 A 500 MVA.

Mod. OGI/OC circuit breakers are similar to those previously described, with the exception of certain modifications rendered necessary by indoor installation. In order to save space, each single pole unit is insulated with an outside tube of bakelite which covers all metallic parts under potential and enables the safe distance between each unit to be reduced considerably.

As no current transformers are incorporated within the base, these have to be installed separately.

The application of any type of direct acting relay is, however, possible.

Designed for service voltages ranging from 15 kV to 80 kV, this type of circuit breakers lends itself for application to heavy duties. For example, type OGI/OC 15 circuit breakers can carry up to 1600 A nominal current with maximum breaking capacity of 600 MVA.

Connecting two type OGI/OC 15 circuit breakers in parallel will raise the nominal current to 2500 A.

The quantity of oil required varies from 30 kg. in types for lower service voltages, to 95 kg in type OGI/OC 80.

INDOOR CIRCUIT BREAKERS - MOD. OGP/OPR

The main body is a bakelite cylinder having a silumin expansion chamber at the upper extremity and the usual box at the lower end containing the actuating mechanism for moving contact. Interruption is effected by the downward movement of the contact through the extinction chamber as in types previously described.

Service voltages range between 12 kV and 30 kV and nominal current 400 A. The maximum breaking capacity, which ranges between 125 and 310 MVA, has been determined by direct tests.

Although requiring only one litre of oil per pole, these circuit breakers require very little maintenance. The application of any type of direct acting relay is possible with these circuit breakers.

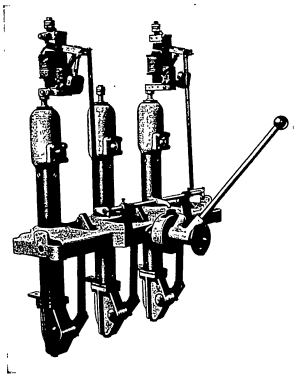


Fig 11 - Type OGP/OPR 12 Circuit breaker for 12 kV 400 A - 125 MVA.

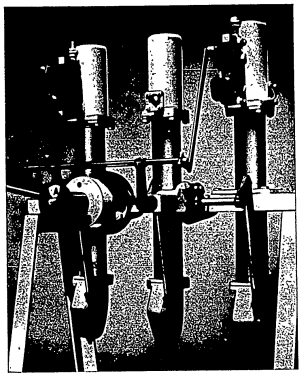


Fig. 12 - Type OGP/OPR 15 Circuit breaker for 15 kV 400 A - 250 MVA.

INDOOR CIRCUIT BREAKER FOR HEAVY DUTY - MOD. OGB/CO

These circuit breakers are oil immersed and are designed for heavy currents at 1 kV to 6 kV. They are particulary suitable for industrial application and where switching operations occur at very frequent intervals. The nominal current can have any value up to 4000 A. Interruption occurs in free oil through robust arc breaking contacts of design common to all types of circuit breakers irrespective of capacity.

Current carrying contacts are self adjustable and vary in number according to nominal current.

Maximum current and low voltage relays are applicable to this type.

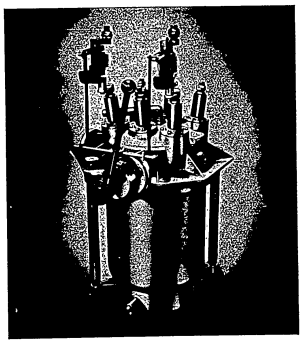


Fig. 13 - Type OGB/CO 6 Circuit breaker - 6.000 V - 630 A - 300 MVA.

INDOOR AND OUTDOOR CIRCUIT BREAKERS - MOD. OGBR/COR AND OGBT/COT

These types are of exceptionally heavy construction and are suitable for duty where frequent interruptions of heavy current circuits occur and when the short circuit current is of a very high order.

The are provided with multiple main contacts having independent elements proportioned to the nominal current carried, which in these types can reach 3000 A, and a set of auxiliary high capacity contacts in extinction chambers which ensure minimum generation of gas and very little oil consumption over two or three half-cycles. Equally suitable for indoor or outdoor installation, these circuit breakers must be operated under electric or pneumatic control. Closure by hand can be effected only under normal load but not under short circuit conditions. Opening by hand, however, is possible also under short circuit condition.

In Mod. OGBT/COT the circuit breakers are housed in a single tank, whilst in Mod. OGBR/COR each single pole element is provided with its own tank

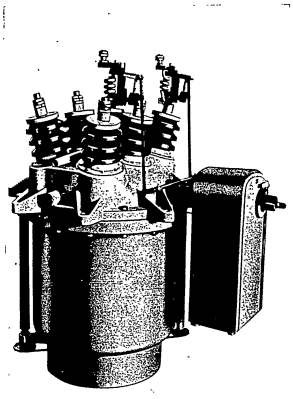


Fig. 14 - Type OGBR/COR 15 circuit breaker - 15 kV - 3000 A - 750 MVA.

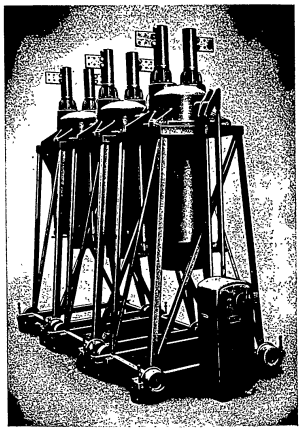


Fig. 15 - Type OGBT/COT 15 circuit breaker - 15 kV - 4000 A - 1300 MVA.

AIR-BLAST CIRCUIT BREAKERS MOD. OGPN/PN

Up to recently, Officine Elettromeccaniche Galileo have concentrated upon the construction of low-oil content circuit breakers only but in view of the insistent demands for circuit breakers of the air operated type, finally decided to undertake the design and ultimate production of pneumatically controlled air blast circuit breakers. After a series of prolonged and rigorous mechanical and electrical tests, types OGPN/PN 15 - 20 - 30 were eventually perfected and included in the production programme.

The design conceived approaches that of a knife pattern insolating switch with a means of producing a blast of compressed air at the precise moment of opening. The similarity will be apparent from the illustration which shows an indoor pattern medium capacity circuit breaker type OGPN 15.

It will be noted that the moving contact of each pole consists of a copper rod of circular section mounted at one end of a radial knife arm which is hinged at the other end. The fixed contact is embodied in a blast head having an aperture through which a powerful jet of compressed air is projected the moment the moving contact begins to open. An automatic blocking device prevents operation of the circuit breaker unless the air pressure in the reservoir vessels is adequate to ensure arc extinction in the case of operation due to circuit. Circuit breakers of this type for service voltages up to 220 kV are now at an advanced experimental stage.

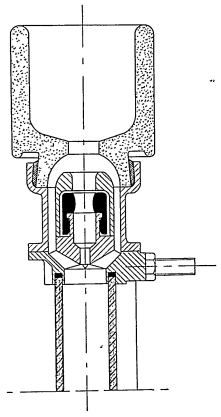


Fig. 16 - Section through blast head of type OGPN/PN circuit breaker.

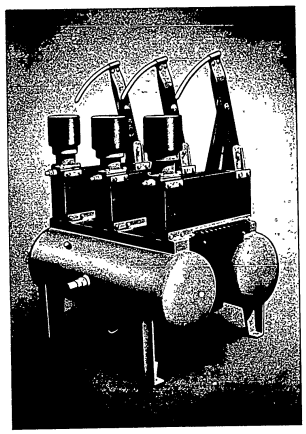


Fig. 17 - Type OGPN/PN 15 circuit breaker - 15 kV - 400 A - 400 MVA.

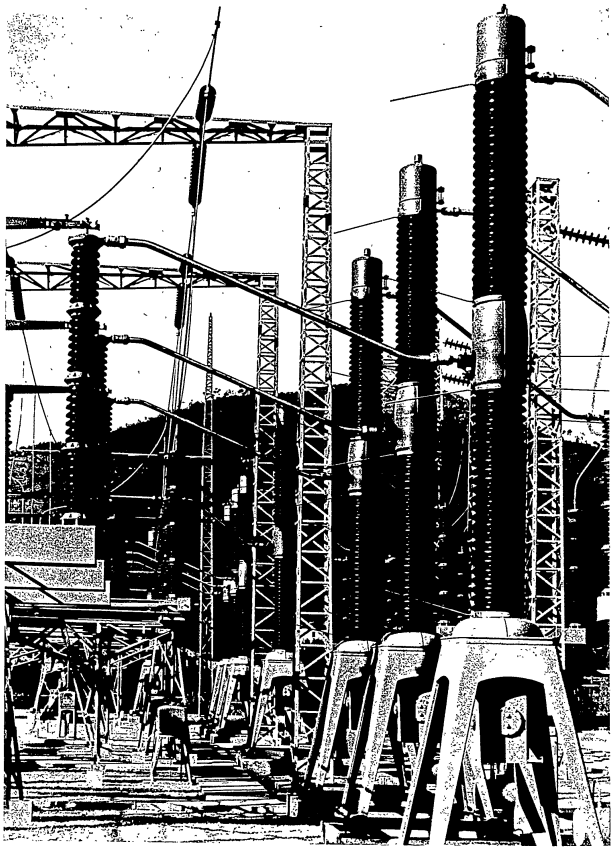


Fig. 18 - Type OGORD/OCERD 220 circuit breakers and isolating switches for 220 kV installed in an outdoor substation in Central Italy.

The assembly of mechanical parts by means of which a circuit breaker is made to open or close is known as circuit breaker control gear, or more briefly, control gear.
Except in the case of air blast circuit breakers, for which a supply of air under pressure is indispensable and without which it is essential that they should not open, it is most important that any circuit breaker in the closed position should provide its own actuating power for opening, so as to be completely independent of any external source of auxiliary energy which may be liable to failure.

Control gear must then provide means of accumulating the required energy during the process of closure and must store it in potential form until released for the opening of the circuit breaker.

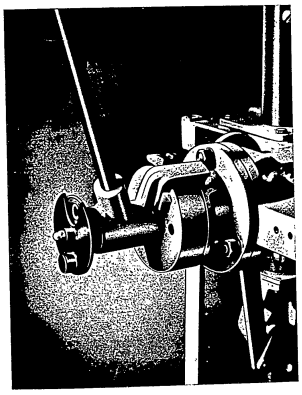


Fig. 19 - Hand Control.

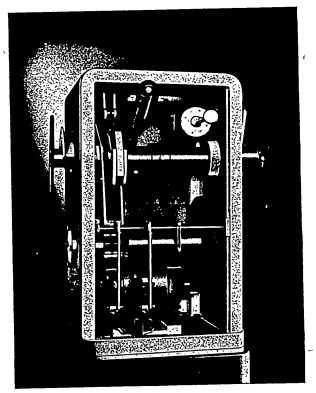


Fig. 20 - A. C. Motor Control.

In high voltage switchgear the means of accumulating and storing the necessary energy usually takes the form of a spring. Control gear may therefore be briefly described as consisting of the following essential devices:
a) a mechanical system which, on being supplied with energy from an external source and through appropriate transmission, brings the

contact to the closed position and laods at the same time the circuit breaker springs.

b) a device which holds the contact in the closed position, usually in the form of a catch, which can be released by tripping gear to effect opening of the circuit breaker.

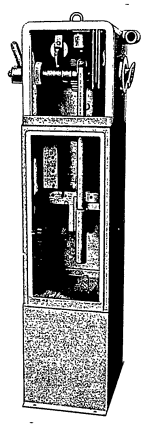


Fig 21 D. C. Solenoid Control.

In control gear manufactured by Officine Elettromeccaniche Galileo, opening of the contacts is performed by springs released by trip coil energized with d. c. or a. c. and having small consumption (300 - 400 W).

Closure is always effected directly and without the interposition of springs; in fact, it is inadvisable to employ springs leoded by motor, either d. c. or a. c., even if the energy absorbed is small as the violent impact of closure under spring action would after a time render the action uncertain.

Control gear is usually classified according to the nature of the, external energy supplied, viz:

1) Hand Control.
2) A. C. Motor Control.
3) D. C. Solenoid Control.

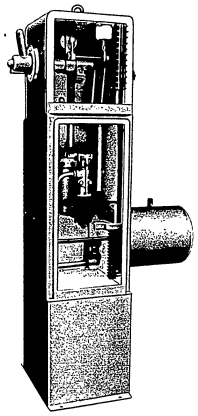


Fig 22 - Pneumatic Control.

4) Pneumatic Control.

1) Hand control is used on circuit breakers operating on voltages under 20 kV (Fig. 19). Opening may be effected by hand by moving the operating lever in the opposite direction to closure, or remotely by trip coils. Indoor switchgear may be also operated through direct acting over load and no-volt relays.

2) A. C. motor control is adaptable to installations where power of this nature is available (fig. 20). An induction motor, suitably geared, completes closure of the circuit breaker after which a release mechanism, in the form of a clutch, frees the motor to prevent it being under load when rotor has come to rest. The output of the motor ranges from 0.9 to 2.5 kW.

3) D. C. solenoid control utilizes the magnetic force exerted by a large solenoid on a moving nucleus (fig. 21). The power absorbed by this type of control varies from 5 to 15 kW according to circuit breaker capacity. Release, to open, can be effected, if desired, by hand through a trip, lever.

4) In Pneumatic control, closure is effected by the admission (through a magnetic valve) of compressed air to a servo cylinder and piston (fig. 22).

To avoid the costly installation of a centralized compressed air plant, Officine Elettromeccaniche Galileo have designed a self contained unit which consists of a standard pneumatic control gear unit complete with compressor mounted on reservoir for each circuit breaker. This type of gear is suitable for circuit breakers, up to 150 kV service voltage, operating with normal single closure.

For rapid reclosure on single poles, the latter are furnished with individual control pillars which are each fitted with self contained air reservoir vessel fed from a larger vessel associated with its compressor.

Each unit absorbs 5 kW and it may be installed in the proximity of the circuit breaker or on a truck. In both types of pneumatic control described above the compressor is brought into operation by means of a pressure switch. All types of control up to present described are provided with means for hand closure. In pneumatically controlled circuit breakers, ho wever, hand closure is used only for out of service adjustments ad tests. Hand closure when under service voltage carries the grave risk of irreparable damage to the circuit breaker unless effected with great strength and decision.

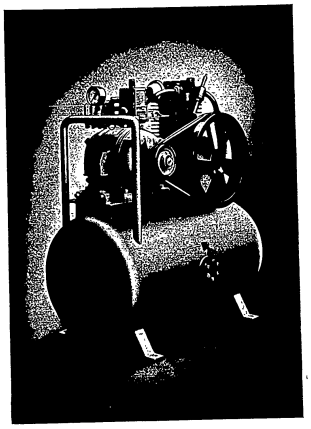


Fig. 23 - Self contained compressor unit for pneumatic control.

The control pillar can be installed either on top of the circuit breaker, to the left or right when facing the three single pole units, or in front of the middle pole.

MEASURING TRANSFORMERS

The design and construction of current and voltage transformers requires particular care in view of their importance in measuring and protective systems. Moreover, the commercial production of this class of equipment is also subject to certain economic influences which demand maximum exploitation of available material and minimum time for construction, calibration and test. Then there are technical considerations which are conditioned by the requirements of the many classes of accuracy and, of course, by an assurance of reliability and continuity of service.

The principal breakdowns to which instrument transformers are subject are:

1) perforation of insulation due to over voltage, or surges;

2) breakdowns due to excessive dynamic stresses caused by short circuits.

Breakdowns of this nature usually result in the destruction of the transformer and ignition of the oil contained, in more or less abundant quantity, by all types. Risk of fire in indoor installation is in consequence always present.

Officine Elettromeccaniche Galileo have undertaken to examine closely the design of all types of measuring transformers manufactured today and have set themselves the problem of producing transformers of high precision which are at the same time safe from the point of view of fire risk.

The required precision is obtained by the correct proportioning of copper and iron, selecting for the latter special silicon alloy steel having very low loss and high permeability.

Should the construction of the transformer necessitate a reduction of either copper or iron content, a simple correcting system is embodied which guarantees constancy of error for each value of primary current.

In selecting a method of insulation it was decided to exclude any form of oil immersion and to adopt impregnated paper as the insulating medium which offers the greatest advantages.

The dielectric strength of impregnated paper is very great and is not subject to decrease with age as evidenced by the results of extensive research reported in CIGRE 46 and by the long experience of cable manufacturers. Furthermore it has been possible to very easily obtain a good distribution of electrical stress within the insulating medium and around the insulator by means of special screens and metal rings.

The whole of the potential stress is borne by the impregnated paper and for this reason the distances between windings and casing are minimum, and the quantity of free oil therefore very small. Its sole function is to maintain the paper in a well impregnated condition. Risk of fire is therefore reduced to negligible proportions.

Efficacy of insulation and guaranteed durability depend upon efficient treatment, drying and impregnation with the object of replacing with oil the moisture content of the paper.

A measure of the efficiency of treatment is the angle of dielectric loss when the transformer is considered as a condenser with dielectric represented by the insulation between primary and secondary windings. The smaller the angle, the less is the quantity of moisture contained in the paper and the smaller the probability of breakdown with age.

One important advantage among many that accrue by the employment of paper insulation is the rigid anchorage that it affords the windings and conductor terminal leads which prevents their deformation even under the most violent of short circuit stresses.

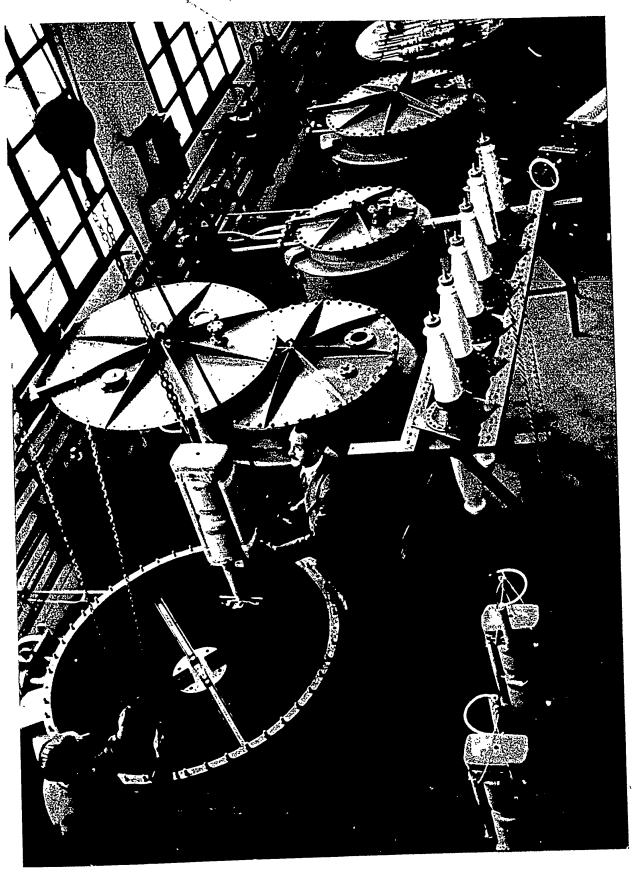


Fig 24 - Autoclave Building.

CURRENT TRANSFORMERS

The primary windings of all « Galileo » current transformers are in two coils which connected in series or parallel give two ratios, one of which is double the other. Other ratios are obtainable by tappings on secondary windings. -

TYPES EMPLOYED IN CIRCUIT BREAKERS

All circuit breakers for service voltages exceeding 30 kV have a current transformer incorporated in the base of each single pole unit. For this application, where minimum overall dimensions without loss of accuracy is desired, transformers are constructed with special shaped core and windings and separate error correction device.
In Mod. OGO/OCE - OGOR/OCER - OGOD/OCED - OGORD/OCERD circuit breakers the current transformer may have several secondary windings and cores varying from 1 to 3 with which it is possible to feed several circuits possessing different characteristics in respect of accuracy and burden, such instruments, protective relays etc.
In type OGBR/COR 15 and OGBT/COT 15 circuit breakers, 3000 A nominal, the current transformers are of the type having toroid care.

OUTDOOR AND INDOOR MOD. CT/TA

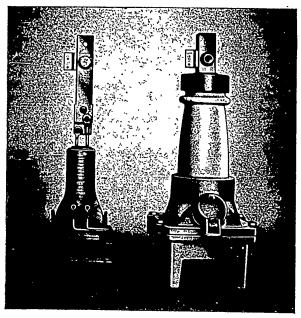
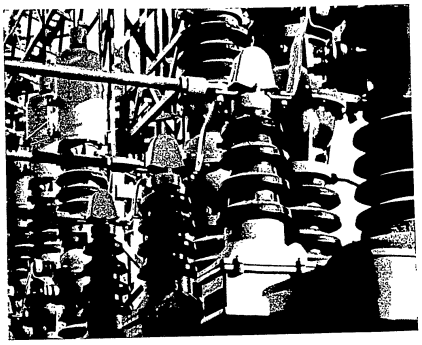


Fig 25 - Type CT/TA Current Transformer 15 kV - 25 - 50/5, 42 - 50 c. p. s. Class P 30 VA Class Q 75 VA.

The primary current in this type may reach 3000 A with burdens at P and Q accuracies of 30 VA and 75 VA respectively at the lower voltages and 600 A with burdens at P and Q accuracies of 50 VA and 150 VA respectively at the higher service voltages.
The main feature of this type is that it containts a minimum quantity of oil as is shown in Fig. 25 which illustrates a type CT/TA current transformer with and without casing and bushing. This type is safe in respect to fire risk.
It is available in two versions, i. e., either for indoor or outdoor installation differing only in the provision of insulator bush and other minor accessories necessary to prevent the entry of rain the case.
Whilst the type illustrated in Fig. 25 is for

Fig 26 Current transformers type CT/TA 30 connected to OGO/OCE circuit breakers in service.



indoor use, Fig. 26 shows the same type for outdoor service. They are provided with simple link connection on primary terminals giving a choice of two ratios.

INDOOR MOD. CTD/TAS

This type has been designed for application in situations where the presence of free oil is prohibited.
The primary insulation consists of paper impregnated with varnish and after it is dried. Insulation is further improved by a layer of bakelized paper over the secondary winding. With this method of insulation it is possible to use these transformers on service voltages up to 30 kV (86 kV test for 1 minute).

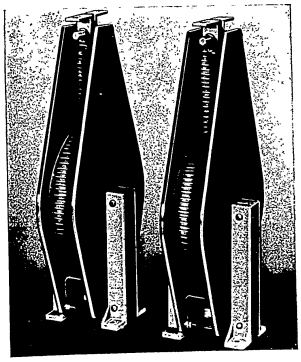


Fig. 27 - Type CTD/TAS 30 current transformers - 30 kV - 40 80/5, 42 - 50 c. p. s. Class P 20 VA Class Q 50 VA.

INDOOR MOD. CTP/TAP AND CTDP/TADP

These transformers are of the bar type, single or double according to primary current, for service voltages up to 30 kV. The insulation consists of bakelite tubes and therefore there is no free oil.

Mod. CTDP/TADP and CTP/TAP can have one or two cores, it is thus possible to feed simultaneously instrument and relay circuits requiring different values of accuracy.

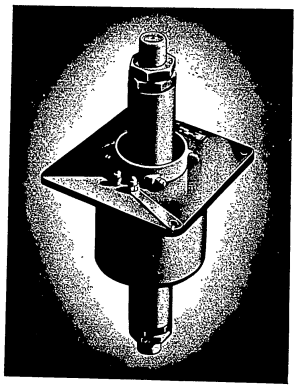


Fig 28 - Type CTP/TAP 15 current transformer 15 kV - 2003/5-5, two core - (1°) P 50 VA - (2°) Q 50 VA.

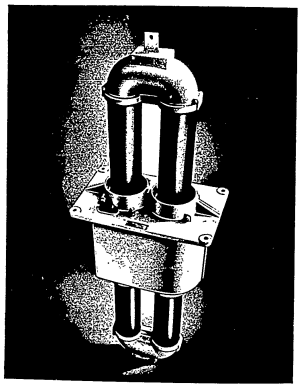


Fig. 29 - Type CTDP/TADP 30 current transformer - 30 kV - 750/5-5 - two core - (1°) class P 50 VA class Q 123 VA - (2°) class Q 50 VA.

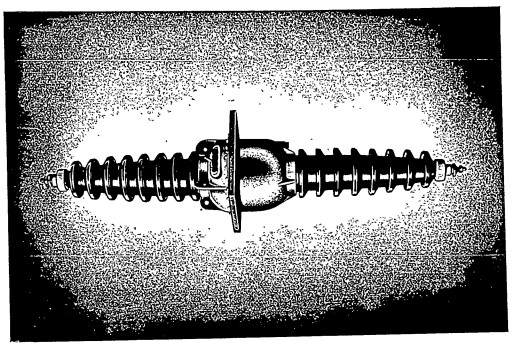
INDOOR MOD. CTLV/TABT

These transformers are air insulated and suitable for service voltages up to 600 V They are specially designed for use with electricity meters where the load is too heavy for direct passage through current coils.

OUTDOOR AND INDOOR MOD. CTOP/TAPO

In this type are combined a current transformer and insulator bushing. The transformer is insulated with impregnated paper and is suitable for service voltages up to 80 kV. It may be mounted in vertical or horizontal position but only in the former position is the provision of double ratio on primary possible

Fig 30-Type CTOP/TAPO 80 Current transformer - 80 kV 80/5, class P 60 VA Class Q 150 VA.



Upon request this type of transformer can be supplied with two or more cores and a similar number of secondary circuits having predetermined characteristics.

OUTDOOR MOD. CTO/TAE

These current transformers are for high and very high voltages and consequently for outdoor installations.
They may have as many as three cores feeding indipendent secondary circuits. They generally have two transformation ratios and the ratio changing device is the same as is used in the transformers mounted in the base of the circuit-breakers.
For voltages exceeding 100 kV the insulator consists of a bakelite tube on wich porcelain insulating jackets are mounted: this makes the tranformers particularly strong.

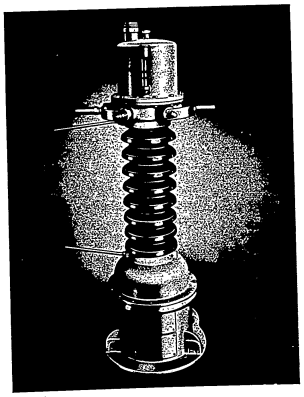


Fig. 31 - Type CTO/TAE 80 Current transformer - 80 kV - 200 - 400/5-5 - first core class P 75 VA, second core class P 75 VA - N = 10.°

OUTDOOR MOD. VTO/TVE - VTOS/TVES AND TVT/AR

As is the case with Mod. CTO/TAE transformers, this Mod. has been developed to meet the requirements of outdoor substation. One end of the primary winding is connected to earth.
The burdens extend from 75 VA - 120 VA to 220 VA - 350 VA far class P and Q accuracies respectively, in each case, being more than two fold in the special Mod. VTOS/TVES.
The TVT/AR having a pole connected to earth, represent an other type of voltage transformer for high and ultra high voltages. It is designed in orther to particularly it is guaranted for the impulse withstand test with wave 1/50 micros.
Its accuracy class may be the S as well as the P or Q.
The burden is greater then that of the Mod. VTO/TVE as it may be considered correspondent to that of the VTOS/TVES.

Fig 32 - Type VTO/TVE 150 voltage transformer - 150 kV 150.000/$\sqrt{3}$/100/$\sqrt{3}$ - Class P 200 VA, class Q 300 VA.

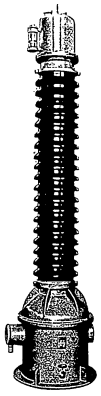


Fig 33 - Type TVT/AR 150 voltage transformer - 150 kV 150.000/$\sqrt{3}$/100/$\sqrt{3}$ - Class P 350 VA - Class Q 650 VA.

INDOOR AND OUTDOOR MOD. VT/TV

These transformers are suitable for the measurement af voltage between phases.
They can be manufactured for any ratio and the burdens extend from 60 VA - 100 VA for lower voltages to 300 VA - 500 VA for the higher voltages in class P and Q accuracies respectively, in each case. The quantity of oil contained in these transformers is very small as is evident from figs. 34 and 35 which illustrate outdoor types.
Multiple ratios, usually two, are available in this type.

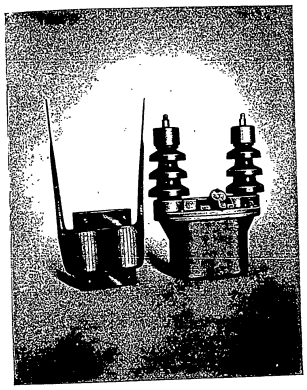


Fig. 34 - Type VT/TV 15 Voltage transformer - 15 kV, 1500/1000 V - Class P 60 VA Class Q 130 VA.

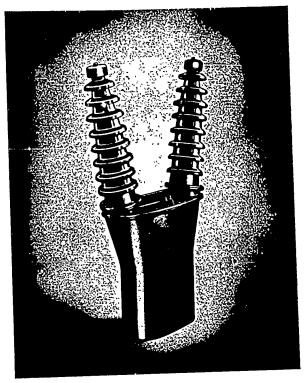


Fig. 35 - Type VT/TV 80 Voltage transformer - 80 kV - 6000/1000 Class P 300 VA, Class Q 500 VA.

INDOOR AND OUTDOOR MOD. 3VTG/3TVT

This type represents a range of three phase voltage transformers, for service voltages up to 80 kV, which are provided with earth leakage indicator. They consist of a three phase transformer with symmetrical core placed over a single phase transformer which has one end of its winding earthed. With each unit it is possible to measure the voltage between each phase and between each phase and neutral, whether earthed or not, of a three phase system; also the voltage between earth and a neutral point that is not earthed, so that the secondary voltages correspond exactly to the voltages generated by the alternators. Measurement is contemporaneous and indipendent of phase voltages with respect to earth even in the case of an earth fault.
These transformers however, provide a path to earth for static changes and may be left in circuit continuously even if the primary of one of its phases is earthed — without undue electrical stress between the turns of its windings.

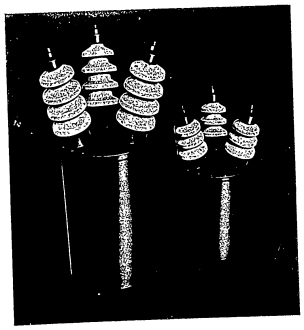


Fig 36 - Type 3 VTG13 TVT 30 voltage transformers - 30 kV; 30000/100; Class P 100VA - Class Q 180 VA and type 3 VTG13 TVT 15 for 15 kV, 10000/100, Class P 80 VA Class Q 130 VA.

ISOLATING SWITCHES

The essentials of an isolating switch are; certainty of contact and ease of operation.
It is now known that the passage of current between two plane surfaces occurs at a number of points only and that it is a function of the contact pressure. It is therefore useless to base the design of an isolating switch on the surface dimensions of the contact and far better to consider the certainty afforded by a point form of contact. Moreover the latter will remain efficient over a lapse of time because at every operation the contact automatically cleans itself by rubbing action
Control is by hand and remote: in the latter case electric or electropneumatic control is available. In all types it is possible to provide earthing links on the insulator pillar complete with operating gear and mechanical interlocking safety device between line and earth.

DOUBLE PILLAR ISOLATING SWITCHES MOD. S2N - S2R

These isolating switches are of simple construction and require very little effort for operation. They are available in two types: WITH TWO ROTATING PILLARS, for service voltages from 45 to 150 kV and current capacities up to 600 A, and HINGED isolating switches for 10 to 80 kV and 5000 A.
In the former switches the contacts are spherical and capable of exerting great pressure, which is adjustable, and is provided by a large spring contained between the two halves of the contact. These section switches can be very easily operated under conditions of snow and ice incrustation; the two pillars feature renders cleaning and maintenance very easy, which is a great advantage in industrial localities and situations near the sea where atmospheres are smoke and salt laden.
Spherical contacts are also employed in the hinged knife switch and are contained in the blades; a powerful spiral spring applies a strong pressure.

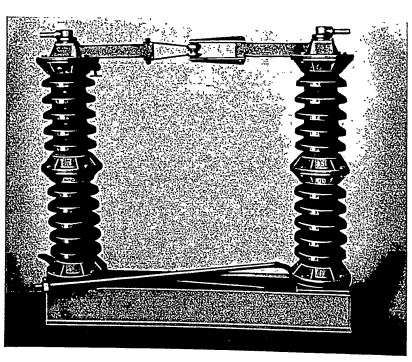


Fig 37 MOD S2N Isolating Switch - 80 kV 400 A.

ISOLATING SWITCH WITH CENTRAL ROTATING PILLAR MOD. S3N - S3R - S3SN - S3SR

There are two variations of this type available. One type furnished with spherical contacts as previously described, and the other having an articulated rotating arm. In the latter type, operation is rendered easier and with less effort owing to the articulated contact, which in the open position is held at an angle to the arm by a spring, coming into closed position before the rotation of the pillar is complete.
There is also a greater cleaning action due to the action of the moving contact which makes a partial rotation around the fixed position and at the same time advances until it takes a final position coincident with the axis of the rotating arm.
The former type is suitable for service voltages ranging from 15 to 220 kV and the latter for 80 - 275 kV.

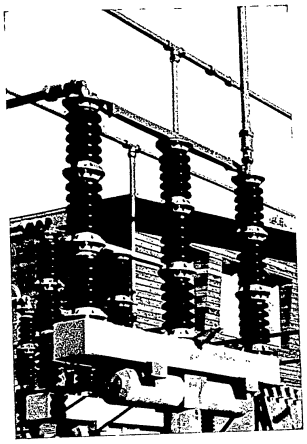


Fig. 38 - Isolating switch Type S3N 150 for 150 kV.

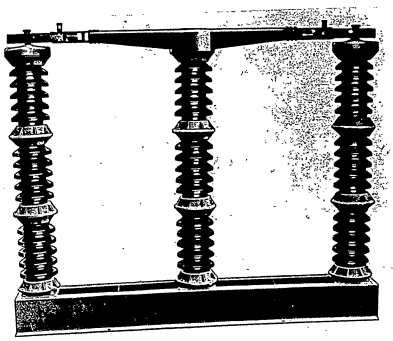


Fig 39 - Isolating switch Type S3SN 150 for 150 kV.

SUPPORTING AND PASS-THROUGH INSULATORS

Within these insulators are special screens and rings wich distribute the potential and thus prevent breakdown of the impregnated paper insulation between the live conductor and the earthing ferrule, they also increase flash over voltage. These insulators are supplied for application on outdoor/indoor or indoor/indoor walls. The latter can be installed in vertical position and for service voltages up to 150 kV 1000 A nominal.

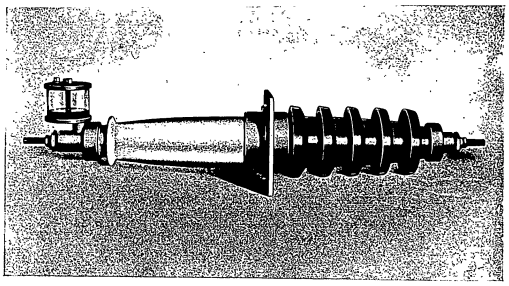


Fig. 40 - Indoor and outdoor pass-trough insulator for 45 kV 400 A.

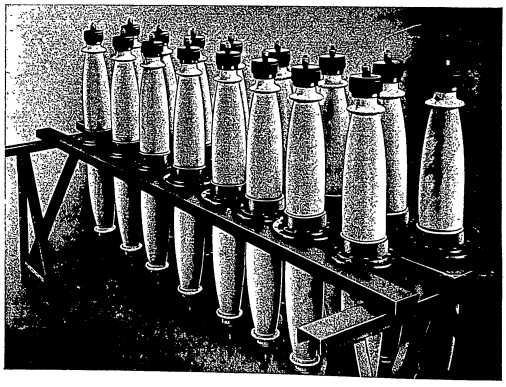


Fig. 41 - Indoor vetical pass-trough insulator for 60 kV 400 A.

PASS - THROUGH INSULATOR FOR TRANSFORMERS MOD. PT

These are of porcelain and particularly suitable for use in large power transformers. They are installed and removed externally without requiring the removal of the transformer cover and have no metallic part situated inside the transformer tank under potential.

The latter feature renders easier the problem of transformer insulation and afford a saving of internal space.

The conductor from transformer windings should be insulated, preferably with oil impregnated paper, to a diameter slightly less than the aperture in the porcelain, and the end firmly soldered to a terminal provided with the insulator.

These insulators may be filled with the oil contained in the tank if the conservator is placed at a sufficiently high level, or with separate oil if conservator level is too low.

Service voltages under which these insulators will operate range up to 220 kV, and they may be supplied in white or brown porcelain as may be requested.

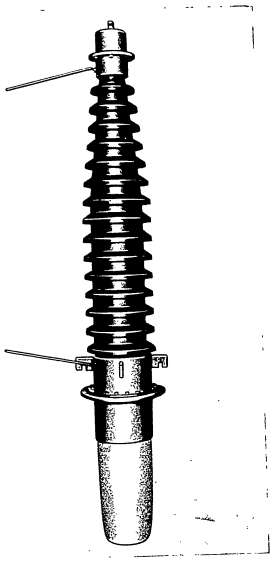


Fig 42 - 150 kV Pass - through transformer insulator.

SWITCHBOARDS AND CONTROL PANELS

Officine Elettromeccaniche Galileo are well equipped for the manufacture of Switchboards, distribution and control panels, etc of any type for the smaller industries or large super generating stations and sub-stations.

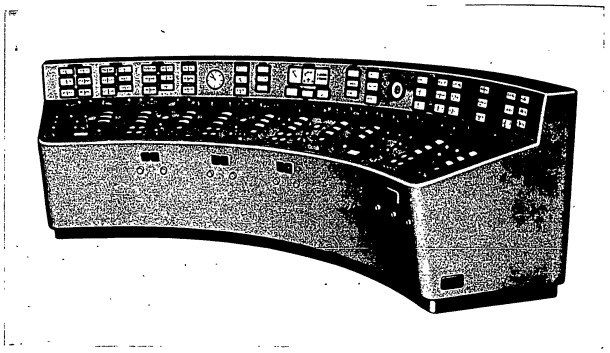


Fig 43 - Control panels for Hydro electric station.

Traditional precision and an extensive experience acquired over long years are guarantees of the quality of the product.

OFFICINE ELETTROMECCANICHE GALILEO DI BATTAGLIA TERME - S. p. A.

GENERAL DATA OF THE ELECTRICAL APPLIANCES

CIRCUIT BREAKERS

Rated voltage KV	For indoor installation	For outdoor installation	Rated current A	Breaking capacity A	Breaking capacity MVA
1	OGB/CO		2500 e 4000	20000	35
3	OGB/CO		400 ÷ 1600	20000	100
6	OGB/CO		630	30000	300
12	OGP/OPR		400	6000	125
15	OGP/OPR		400 ÷ 630	10000	250
15	OGBR/COR	OGBR/COR	630 ÷ 3000	30000	750
15	OGBT/COT	OGBT/COT	630 ÷ 4000	40000	1000
15	OGI/OC		400 ÷ 1600	16000	400
15	OGPN/PN		400 ÷ 630	15400	400
15		OGOS/OCEU	400 ÷ 1600	16000	400
15		OGE/OE	400	10000	250
20	OGP/OPR		400	8000	280
20	OGI/OC		400 ÷ 630	12000	400
20	OGPN/PN		400 ÷ 630	11500	400
20		OGOS/OCEU	630	12000	450
20		OGE/OE	400	8000	280
30	OGP/OPR		400	6000	310
30	OGI/OC		400 ÷ 630	10000	500
30	OGPN/PN		400 ÷ 630	7700	400
30		OGOS/OCEU	400	10000	500
30		OGE/OE	400	6000	310
30		OGO/OCE	400	10000	500
30		OGOR/OCER	630	13400	700
45	OGI/OC		400 ÷ 630	6500	500
45	OGPN/PN		400 ÷ 630	7700	600
45		OGOS/OCEU	400	7700	600
45		OGO/OCE	400	8000	600
45		OGOR/OCER	630	12800	1000
60	OGI/OC		400	5000	500
60	OGPN/PN		400 ÷ 630	7250	750
60		OGO/OCE	400	6000	600
60		OGOR/OCER	630	11500	1200
80	OGI/OC		400	4350	600
80		OGO/OCE	400	6000	800
80		OGOR/OCER	630	10800	1500
110		OGORD/OCERD	800	13000	2500
120		OGOD/OCED	500	7200	1500
150		OGOD/OCED	500	7700	2000
150		OGORD/OCERD	800	11600	3000
220		OGORD/OCERD	800	13000	5000
275		OGOR/OCER	1000	7900	3750

DOUBLE PILLAR ISOLATING SWITCHES 45 TO 150 KV
ISOLATING SWITCHES WITH CENTRAL ROTATING PILLAR 15 TO 275 KV
HINGED ISOLATING SWITCHES 10 TO 80 KV
MONO-ISOLATING SWITCHES
SUPPORTING AND PASS-THROUGH ISOLATORS 15 TO 275 KV
SWITCHBOARDS AND CONTROL PANELS

T ... burdens of the CTP/TAP are depended upon the transformation ratio.
... indicated burdens of the current transformers are the usual ones for only a core.
F ... e current transformers the secondary rated current is 5 or 1 Amps.

CURRENT TRANSFORMERS

Rated voltage KV	For indoor installation	For outdoor installation	Rated current A	Burdens VA in P
10	CTP/TAP	CTP/TAP	700 ÷ 4000	
10	CTDP/TADP		30 ÷ 700	30
15	CTP/TAP	CTP/TAP	700 ÷ 4000	
15	CTDP/TADP		30 ÷ 700	30
15	CT/TA	CT/TA	5 ÷ 3000	40
15	CTD/TAS		5 ÷ 800	20
15	CTOP/TAPO	CTOP/TAPO	5 ÷ 500	40
20	CTP/TAP	CTP/TAP	700 ÷ 4000	
20	CTDP/TADP		30 ÷ 700	30
20	CT/TA	CT/TA	5 ÷ 3000	40
20	CTD/TAS		5 ÷ 800	20
20	CTOP/TAPO	CTOP/TAPO	5 ÷ 1500	40
30	CTP/TAP	CTP/TAP	700 ÷ 4000	
30	CTDP/TADP		30 ÷ 700	30
30	CT/TA	CT/TA	5 ÷ 3000	40
30	CTD/TAS		5 ÷ 800	20
30	CTOP/TAPO	CTOP/TAPO	5 ÷ 500	40
45	CT/TA	CT/TA	5 ÷ 600	40
45	CTOP/TAPO	CTOP/TAPO	5 ÷ 500	40
45		CTO/TAE	5 ÷ 1000	50
60	CT/TA	CT/TA	5 ÷ 600	50
60	CTOP/TAPO	CTOP/TAPO	5 ÷ 1500	50
60		CTO/TAE	5 ÷ 1000	70
80	CT/TA	CT/TA	5 ÷ 500	50
80	CTOP/TAPO	CTOP/TAPO	5 ÷ 1500	50
80		CTO/TAE	5 ÷ 1000	70
120		CTO/TAE	5 ÷ 1000	70
150		CTO/TAE	5 ÷ 1000	70
220		CTO/TAE	5 ÷ 1000	70
275		CTO/TAE	5 ÷ 1000	70

VOLTAGE TRANSFORMERS

Rated voltage KV	For indoor installation	For outdoor installation	Rated current A	Burdens VA in P
15	VT/TV	VT/TV		50
15	3VTG/3TVT	3VTG/3TVT		80
20	VT/TV	VT/TV		60
20	3VTG/3TVT	3VTG/3TVT		80
30	VT/TV	VT/TV		120
30	3VTG/3TVT	3VTG/3TVT		150
45	VT/TV	VT/TV		120
45	3VTG/3TVT	3VTG/3TVT		200
45		VTO/TVE		100
60	VT/TV	VT/TV		200
60	3VTG/3TVT	3VTG/3TVT		300
60		VTOS/TVES		75
60		VTOS/TVES		300
80	VT/TV	VT/TV		300
80	3VTG/3TVT	3VTG/3TVT		300
80		VTO/TVE		75
80		VTOS/TVES		500
80		TVT/AR		200
120		VTO/TVE		200
120		VTOS/TVES		500
120		TVT/AR		350
150		VTO/TVE		200
150		VTOS/TVES		500
150		TVT/AR		350
220		VTO/TVE		180
220		VTOS/TVES		350
220		TVT/AR		400
275		VTO/TVE		180
275		VTOS/TVES		350

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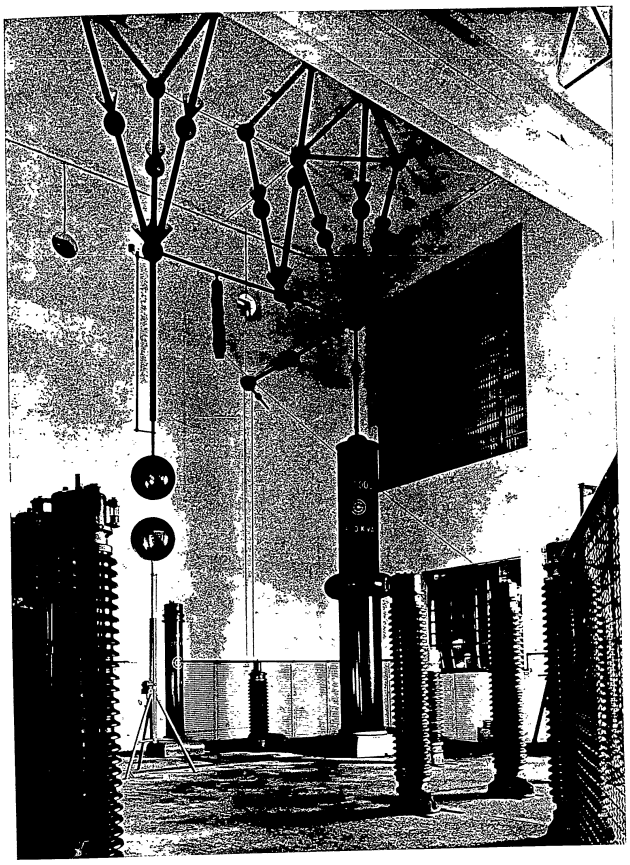

HIGH VOLTAGE TEST STAND - OFFICINE ELETTROMECCANICHE GALILEO

EDIZIONE UFFICIO PUBBLICITÀ DELLE OFFICINE ELETTROMECCANICHE GALILEO

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A

CATALOGO ILLUSTRATIVO DELLA PRODUZIONE DI CARPENTERIA METALLICA

ILLUSTRATING CATALOGUE OF THE PRODUCTION OF IRON FRAMEWORKS
ILLUSTRIERTER KATALOG DER HERSTELLUNG VON EISENRAHMENWERKEN
CATALOGUE ILLUSTRATIF DE LA PRODUCTION DE CHARPENTE METALLIQUE
CATALOGO ILUSTRATIVO DE LA PRODUCCION DE LAS TERLICERIAS DE HIERRO

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S p A

SEDE IN MILANO - CAP. L. 500.000.000 - STABILIMENTO A BATTAGLIA TERME - PADOVA - TEL. PD 25689 - 26003 - TELEGR. OFFICINE BATTAGLIA T.

LTD CO - CAPITAL: LIRE 500.000 000 WORKSHOPS AT BATTAGLIA TERME PADOVA (ITALY) - TELEPHONE: PADOVA 25689 - 26003 - GRAMS: OFFICINE BATTAGLIA T - ITALY
A G - KAPITAL LIRE 500 000 000 - WERKSTAETTE IN BATTAGLIA TERME - PADOVA (ITALIEN) - FERNRUF: PADOVA 25689 - 2643 - TELEGR: OFFICINE BATTAGLIA T - ITALIEN
S P A - F SOCIAL: LIRES 500.000 000 ETABLISSEMENT IN BATTAGLIA TERME - PADOVA (ITALIE) - TELEPHONE: PADOVA 25689 - 26003 - TELEGR OFFICINE BATTAGLIA T - ITALIE
S A - CAPITAL LIRAS 500.000.000 - TALLERES EN BATTAGLIA TERME - PADOVA (ITALIA) TELEFONO PADOVA 25689 - 26003 - TELEGR OFFICINE BATTAGLIA T - ITALIA

PRODUZIONE DEL REPARTO CARPENTERIA:

GRU A PONTE, A CAVALLETTO, GIREVOLI, ECC.
PARATOIE PIANE, CIRCOLARI, A VENTOLA, A SETTORE, ECC.
PONTI FISSI E GIREVOLI, STRADALI E FERROVIARI
SERBATOI, CAPRIATE, TRAMOGGIE, TRASPORTATORI, ECC.

E OGNI

PRODUCTION OF THE FRAMEWORKS DEPARTEMENT:

BRIDGES CRANES, GANTRY CRANES, SLEWING CRANES, ETC.
WHEEL, HINGED, SECTOR, CIRCULAR, VINCIAN GATES, ETC.
ROAD AND RAILROAD BRIDGES
TANKS, TRUSSES, HOPPERS, CONVEYORS, ETC.
AND WHATEVER CONSTRUCTION OF MEDIUM MECHANICAL AND IRON FRAMEWORKS

HERSTELLUNG AUS DER RAHMENWERKASTEILUNG:

LAUF, BOCH, PORTALDREHKRAENE. U. S. W.
SCHUETZEN, SEKTORSCHUETZEN, SCHUETZEN MIT KLAPPE
EISENBAHN UND STRASSENEISENBRUECKEN
BEHAELTER, GEWOELBBOEGEN, TRICHTER, FOERDERER, U. S. W.
UND IRGENDEINE HERSTELLUNG VON EISENRAHMENWERKEN

PRODUCTION DU RAYON DES CHARPENTES:

PONT-GRUES, GRUES A VOLEE, A CHEVALET, ETC.
VANNES-WAGON, VANNES SEGMENT, CLAPETS, ETC.
PONT ROUTIERS ET DES CHEMINS DE FER
RESERVOIRS, FERMES, TREMIES, TRANSPORTEURS, ETC.
ET QUELLE QUE SOIT AUTRE CONSTRUCTION DE CHARPENTE METALLIQUE

PRODUCCION DEL DEPARTAMENTO DE TERLICERIAS:

GRUAS DE PUENTE, DE CABALLETE, GIRATORIAS, ETC.
COMPUERTAS LLANAS, DE CHARNELAS, DE SEGMENTO, ETC.
PUENTES CARRETEROS Y FERROVIARIOS
TANQUES, ARMAZONES DE TEJADOS, TOLVAS, ETC.
Y CUALQUIER OTRA CONSTRUCCION DE TERLICERIA METALICA

THE READINGS OF THE ILLUSTRATIONS ARE ON THE BACK OF EVERY LEAF

DIE ERKLAERUNGEN DER ILLUSTRATIONEN SIND IN JEDER HINTERSEITE FINDBAR

LES EXPLICATIONS DES ILLUSTRATIONS SE TROUVENT DANS LE VERSO DE CHAQUE PAGE

LAS LEYENDAS DES LAS ILLUSTRACIONES SE EN CUENTRAN EN LA PLANA POSTERIOR DE CADA HOJA

STRDIV.-PADOVA 531300

GRU

CRANES
KRAENE
GRUES
GRUAS

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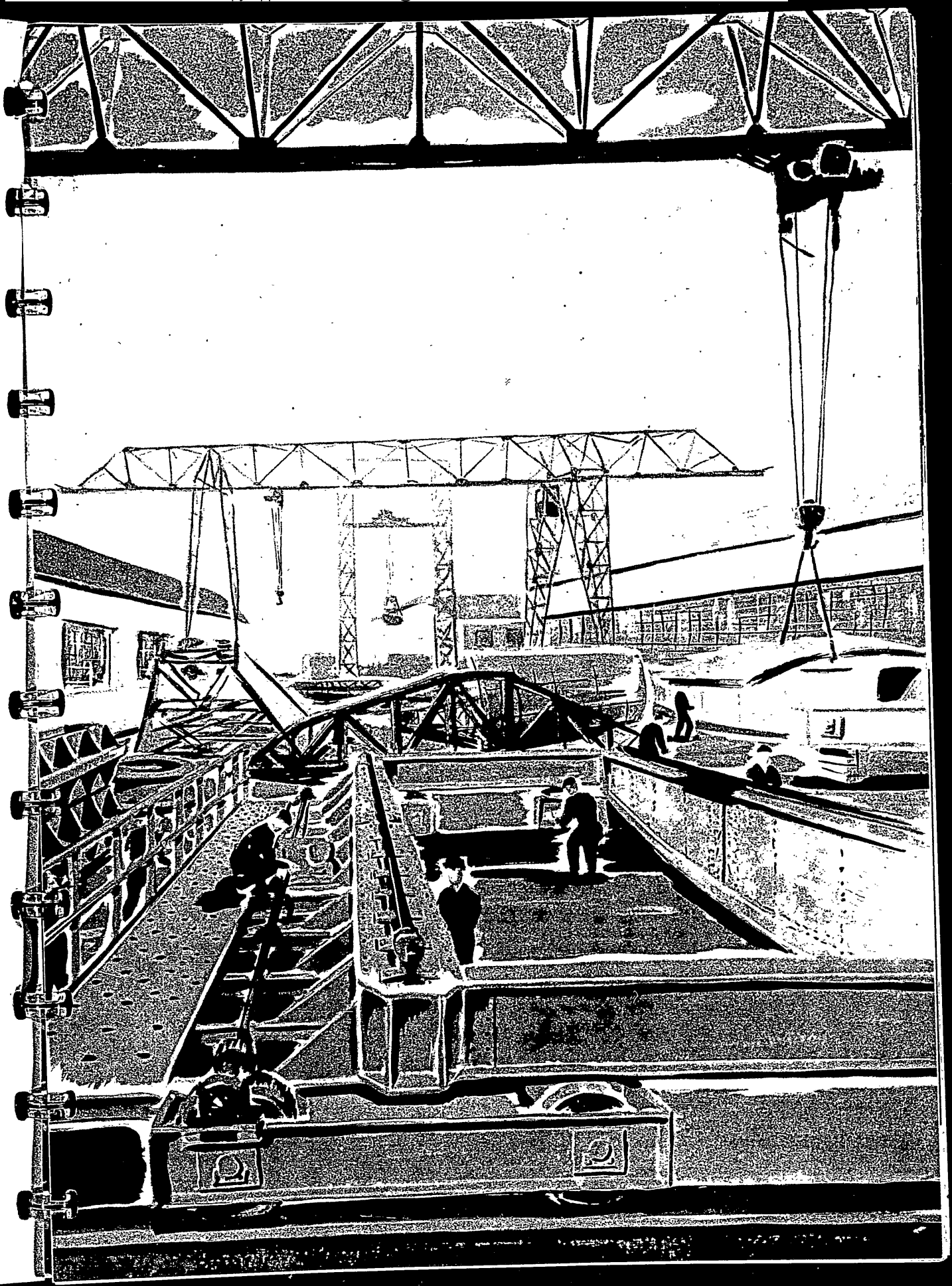

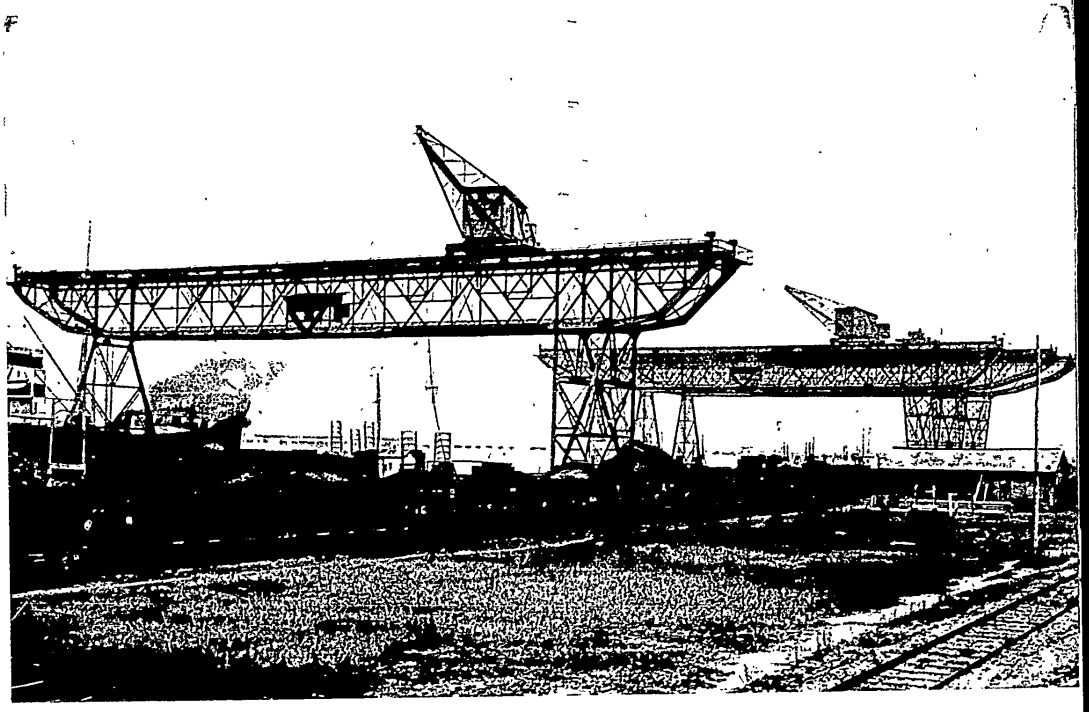

Scaricatori per carbone - portata 5 tonn - scartamenio
del ponte m. 42 - porto industriale
di Venezia - Marghera

Coal unloaders - Capacity 5 tons
Bridge gauge m. 42
Industrial port of Venice - Marghera

Entladenvorrichtungen für Kohle - Tragfähigkeit 5 Tonnen
Spannweite der Brücke m 42
Industrieller Hafen von Venedig - Marghera

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Ecartment du pont m. 42
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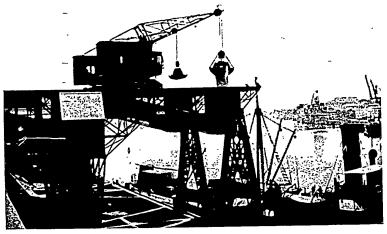
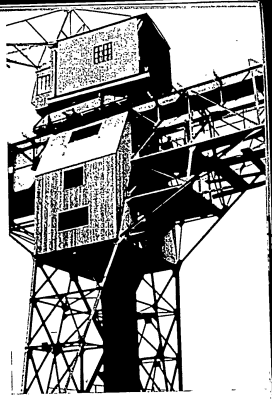
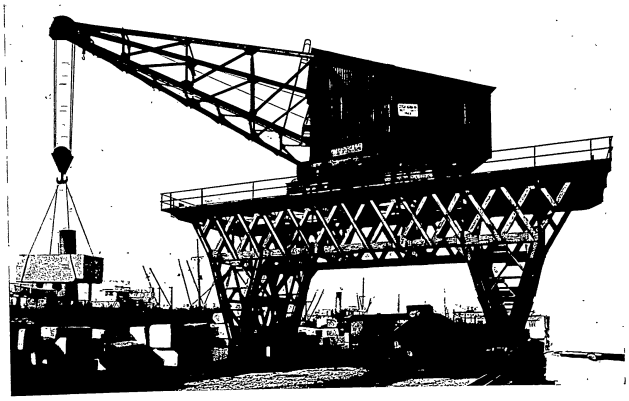
Descargadores para carbón - Capacidad 5 ton.
Via del puente m. 42
Puerto industrial de Venecia - Marghera





Scaricatore di sale - portata 5 tonn.
produzione oraria 60/80 tonn
porto di Venezia

Scaricatore per massi
portata 30 tonn
porto di Venezia



Salt unloader Capa...
Output per hour 60 ...
Port of Venice

Entladenvorrichtung ... Tragfähigkeit 5 Tonnen
Stundenleistung 60/80 Tonnen
Hafen von Venedig

Déchargeur de sel - Tonnage 5 tonnes
Rendement horaire 60/80 tonnes
Port de Venise

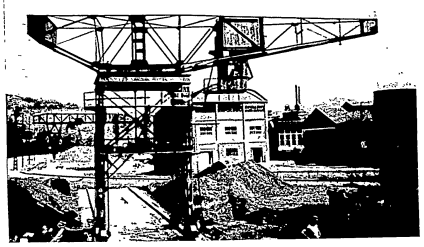
Descargador de sal - Capacidad 5 ton.
Producto horario 60/80 ton
Puerto de Venecia

Massive stones unloader
Capacity 30 tons
Port of Venice

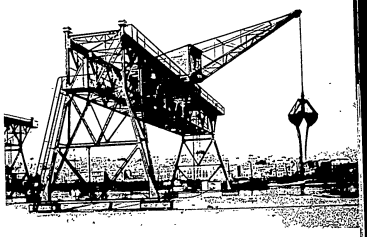
Steinblöckeentladenvorrichtung
Tragfähigkeit 30 Tonnen
Hafen von Venedig

Déchargeur de rochers
Tonnage 30 tonnes
Port de Venise

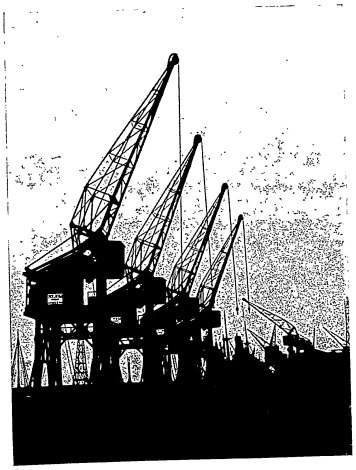
Descargador de bloques de piedra
Capacidad 30 ton
Puerto de Venecia



Gru girevole su portale
con benna da 4 tonn.
stabilimento di Cengio (Savona)



Gru su cavalletto scorrevole
con benna - portata 5 tonn.
porto di Cagliari



N. 10 gru a volata mobile
da 1,5/3 tonn.
porto di Venezia

Crab portal slewing crane
Capacity 4 tons
Workshop in Cengio (Savona)

Portaldrehkran mit Greifer
Tragfähigkeit 4 Tonnen
Werkstatt in Cengio (Savona)

Grue roulante sur portique pivotante
Tonnage 4 tonnes
Usine de Cengio (Savona)

Grúa giratoria de pórtico con cubeto
Capacidad 4 ton.
Taller de Cengio (Savona)

Travelling gantry crab crane
Capacity 5 tons.
Port of Cagliari

Fahrbarer Bockkran mit Greifer
Tragfähigkeit 5 Tonnen
Hafen von Cagliari

Grue mobile sur chevalet avec benne
Tonnage 5 tonnes
Port de Cagliari

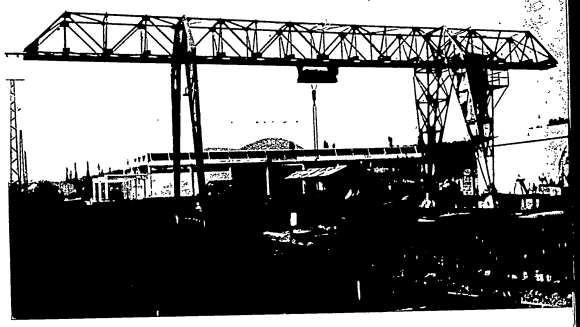
Grúa corredera sobre caballete con cubeto
Capacidad 5 ton.
Puerto de Cagliari

10 mobile jib cranes
Capacity 1,5/3 tons
Port of Venice

10 bewegliche Kräne mit Ausleger
Tragfähigkeit 1,5/3 T
Hafen von Venedig

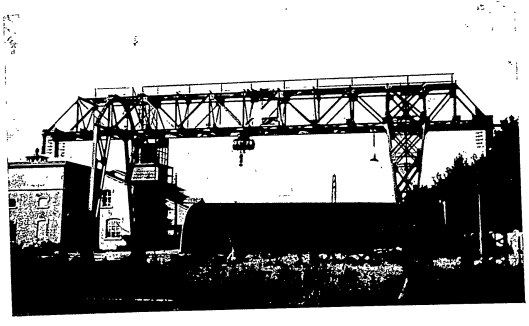
10 grues à volee mobile
Tonnage 1,5/3 tonnes
Port de Venise

10 grúas de brazo móvil
Capacidad 1,5/3 ton
Puerto de Venecia



Gru a cavalletto da 6 tonn. per servizio officina
traslazione con due motori in albero elettrico
scartamento m 17

Gru a cavalletto per le FF. SS.
portata 6 tonn - scartamento m 14



Gantry crane - capacity
gauge m. 17 - for workshop
travelling by two motors on one electric shaft

Portalkran - Tragfähigkeit 6 tonnen
Spannweite m. 17 - für Werkstätte
fahrbar durch zwei Motoren in einer elektrische Welle

Grue à chevalet de 6 tonnes
écartement m. 17 - pour usine
mûe par deux moteurs sur arbre électrique

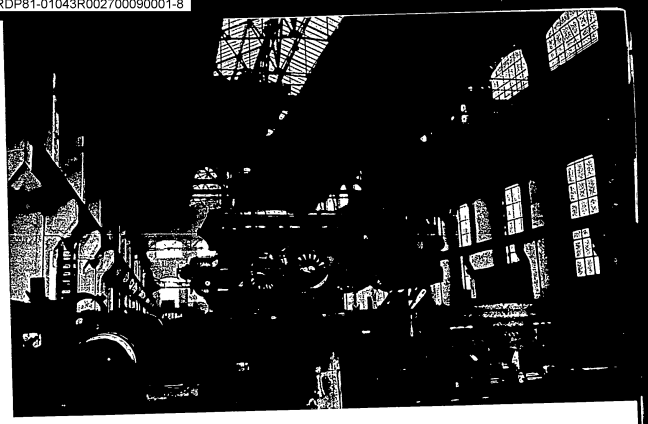
Grúa de caballete de 6 ton
vía m. 17 - para taller
corredere por dos motores sobre árbol eléctrico

Gantry crane for the Italian State Railways
capacity 6 tons - Gauge m. 14

Portalkran für die Italienische Staatseisenbahnen
Tragfähigkeit 6 Tonnen Spannweite m. 14

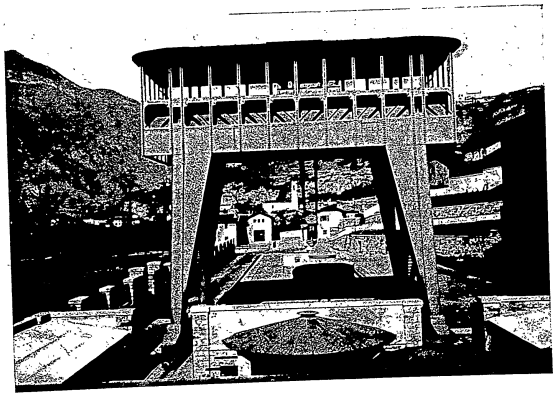
Grue pour les chemins de fer italiens
écartement m. 14

Grúa para ferrocarriles italianos
vía m. 14



Ricostruzione gru a ponte per sollevamento locomotive
portata 120 tonn. scartamento m. 20
2 ponti, 4 carrelli
comandi indipendenti e simultanei in albero elettrico

Gru a portale scorrevole per centrale in pozzo
portata 110 tonn.
centrale di Cividate (Bergamo)



Reconstruction of a bridge c... ...ting locomotives
Capacity 120 tons - Gauge m. 20
2 bridges, 4 trolleys
indipendent and simultaneous controls in an electric shaft

Wiederaufbau von einem Brückenkran für Hebung der Lokomotiven
Tragfähigkeit 120 tonnen - Spannweite m. 20
2 Brücken, 4 Laufkatzen
unabhängige und gleichzeitige Steuerungen in elektrischer Welle

Reconstruction de pont grue pour soulèvement de locomotives
Tonnage 120 tonnes - écartement m. 20
2 ponts, 4 wagons
commandes indépendantes et simultanées sur arbre électrique

Reconstrucción de grúa puente para izaje de locomotoras
Capacidad 120 ton. - vía m. 20
2 puentes, 4 carros
mandos independientes y simultáneos en árbol eléctrico

Gru a ponte da 20 + 5 tonn.
per i telefoni di stato di Montevideo (Uruguay)
scartamento m. 17,5

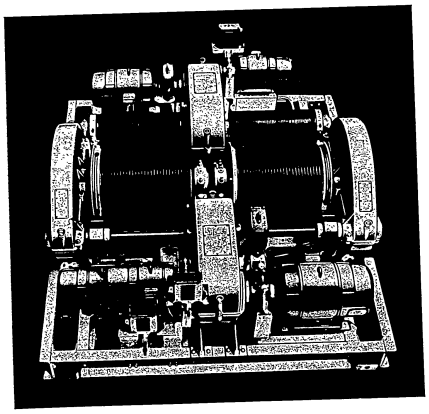
Travelling portal crane for underground power house
Capacity 110 tons
Power plant of Cividale, Bergamo

Fahrbarer Portalkran für unterirdische elektrische Zentrale
Tragfähihkeit 110 tonnen
Elektrische Zentrale von Cividale, Bergamo

Grue sur portique mobile pour centrale électrique en puits
Tonnage 110 tonnes
Centrale électrique de Cividale, Bergamo

Grúa corredera de pórtico para central eléctrica subterránea
Capacidad 110 ton
Central eléctrica de Cividale, Bergamo

Il carrello



[illegible] tonnes
[illegible]

[illegible] Tonnen
[illegible] Staatstelephone
[illegible] (Uruguay)

Pont grue de 20/5 tonnes
écartement m. 17,5 - pour les Téléphons de l'Etat
Montevideo (Uruguay)

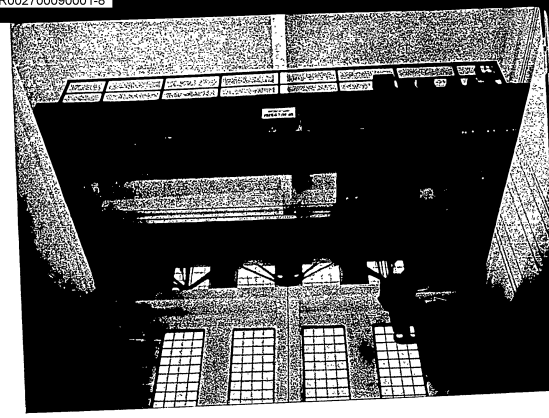
Puente grúa de 20/5 ton.
vía m. 17,5 - para los Teléfonos del Estado
Montevideo (Uruguay)

The trolley

Die Laufkatze

Le wagon

El carro



Gru a ponte da 80 tonn.
scartamento m. 12
sottostazione elettrica di Scorzè (Venezia) (foto Ferruzzi)

Gru a ponte da 75 tonn.
nella sala alternatori della centrale
di Agordo (Belluno) - scartamento m. 9

Bridge crane, capacity [illegible] tons
gauge m. 12
Electric substation [illegible]

Brückenkran Tragfähigkeit [illegible] Tonnen
Spannweite m. 12
Elektrische Understation von Scorzè (Venedig)

Pont grue de 80 tonnes
écartement m. 12
Sous station électrique de Scorzè (Venise)

Grúa puente de 80 ton.
vía m. 12
Estación subsidiaria eléctrica de Scorzè (Venecia)

Bridge crane, capacity 75 tons
in the alternators room of the central power house of Agordo (Belluno)
Gauge m. 9

Brückenkran, Tragfähigkeit 75 tonnen
in dem Wechselstromerzeugerraum bei der elektrischen Zentrale von Agordo (Belluno)
Spannweite m. 9

Pont grue de 75 tonnes
dans le salon des alternateurs de la Centrale électrique de Agordo (Belluno)
écartement m. 9

Grúa puente de 75 ton.
en la cámara de los alternadores de la Central eléctrica de Agordo (Belluno)
vía m. 9

Gru elettrica a ponte da 125/25 tonn.
scartamento m. 18,67 - Riva (Milano)

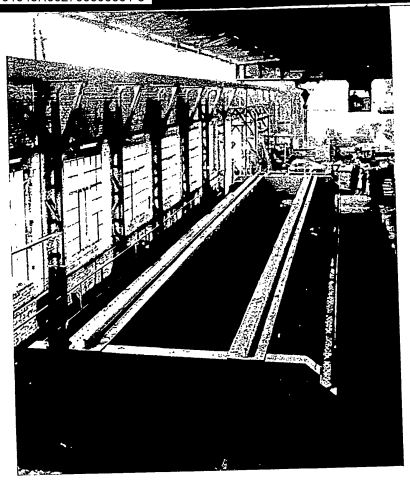
Gru elettrica a ponte da 25 tonn.
scartamento m. 18,67 - Riva (Milano)

Elektr... ...
Capac... ...
Riva - Milano

Elektrischer ... ...spannweite m. 20
Traglast ...
Riva - Milano

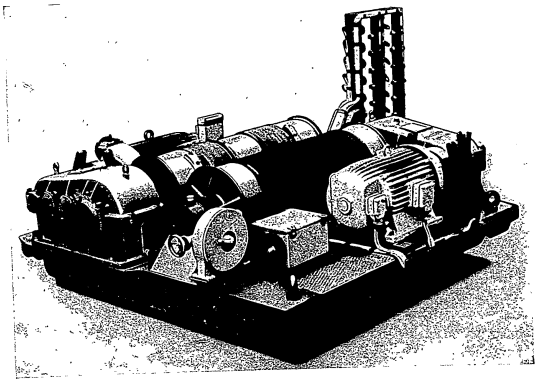
Pont grue électrique
tonnage 125/25 tonnes - écartement m 20
Riva Milano

Puente grua eléctrica
capacidad 125/25 ton. - Claro m 20
Riva - Milano



Gru a ponte da 7,5 tonn.
per tubificio
scartamento m. 26,5
facente parte di una fornitura di n 42 gru di vario tipo costruite per le acciaierie e tubificio di Sisak (Jugoslavia)

Carrello per benna da 2,4 mc
portata 8 tonn.
per acciaierie di Sisak (Jugoslavia)



Electric Bridge Crane
Capacity 25 tons - Gauge 20 m.
Riva - Milano

Elektrischer Laufkran
Tragfähigkeit 25 tonnen - Spannweite m. 20
Riva - Milano

Pont grue electrique
tonnage 25 tonnes - écartement m. 20
Riva - Milano

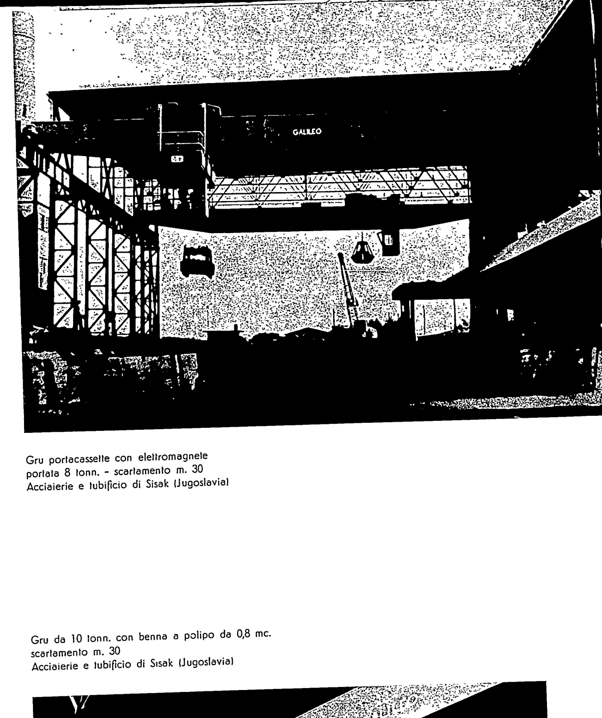
Puente grua eléctrica
capacidad 25 ton. - Claro m 20
Riva - Milano

Bric [illegible]
capac [illegible] 42 cranes [illegible] various types
partaking [illegible] e and steel works of Sisak (Jugoslavia)
manufactur [illegible]

Brucke [illegible]
Tragfahigke [illegible] 5 [illegible] en - Spannweite m. 26,5
teilnehmend an einer [illegible] ejerung von 42 Kränen verschiedener Art
fur das Rohren - und Stahlwerk von Sisak (Jugoslawien) gebaut

Pont grue pour une usine de tuyaux
Tonnage 7,5 tonnes - ecartement m. 26,5
part a une fourniture de 42 grues de differents types
construites pour l aciérie et usine de tuyaux de Sisak (Yugoslavie)

Grúa puente para fábrica de canos
capacidad 7,5 ton - via 26,5 m.
parte de un suministro de 42 gruas de varios tipos
para las elaboraciones de acero y fábrica de canos de Sisak (Yugoeslavia)



Gru portacasselte con elettromagnete
portata 8 tonn. - scartamento m. 30
Acciaierie e tubificio di Sisak (Jugoslavia)

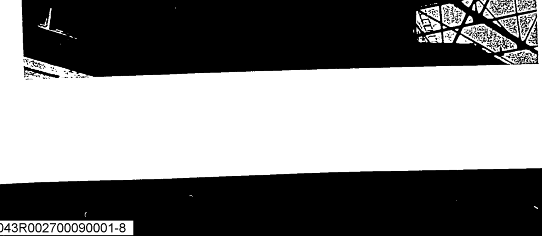
Grab bucket trolley for 2,4 cubic meters
Capacity 8 tons
for the steel works of Sisak (Jugoslavia)

Korbwagen, gehalt m³ 2,4
Tragfähigkeit 8 tonnen
für das Stahlwerk von Sisak (Jugoslawien)

Wagon pour benne de m³ 2,4
tonnage 8 tonnes
pour les aciéries de Sisak (Yougoslavie)

Carro para cubeto de 2,4 metros cúbicos
capacidad 8 ton
para las e [illegible] acraciones de acero de Sisak (Yugoeslavia)

Gru da 10 tonn. con benna a polipo da 0,8 mc.
scartamento m. 30
Acciaierie e tubificio di Sisak (Jugoslavia)

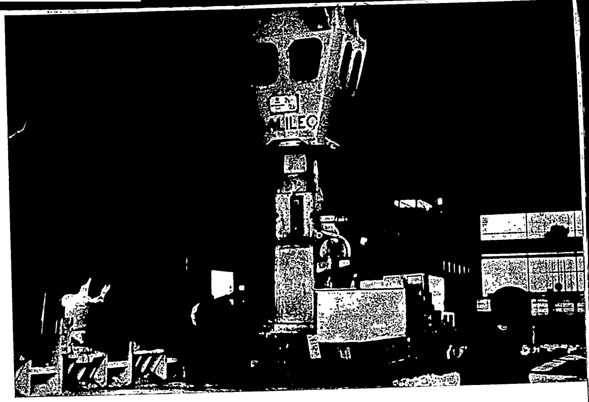


[illegible] ng magnet
[illegible] ak (Jugoslavie)

[illegible] eger und Greifermagnet
[illegible] Spurweite: 30 m.
Stahl [illegible] k von Sisak (Jugoslawien)

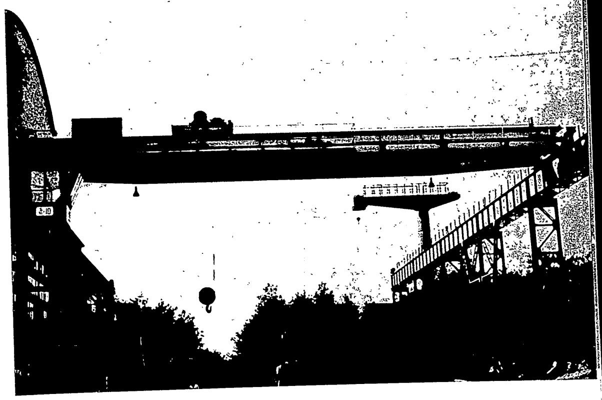
Crue porte caisse avec solénoide
Charge: 8 tonnes écartement: 30 m.
Aciéries et usines de tubes a Sisak (Yugoslavie)

Grua levantacajones con electroiman
Capacidad: 8 ton. - luz: 30 m.
Fabrica de acero y de tubos en Sisak (Jugoslavia)



Caricatrice da 2,5 tonn. per forno M. S.
con carrello ausiliario da 7,5 tonn.
Acciaierie e tubificio di Sisak (Jugoslavia)

Gru a ponte da 10 tonn. - Scartamento m. 22,5
Acciaierie e tubificio di Sisak (Jugoslavia)



Crane with 0,8 m³ grab
span: 30 m
Steelworks and pipe mill of Sisak (Jugoslavie)

Kran mit Polyp-Greifer (0,8 m³)
Spurweite: 30 m.
Stahl und Roehrenwerk von Sisak (Jugoslawien)

Grue avec benne pieuvre pour 0,8 m³
ecartement 30 m
Acieries et usines de tubes a Sisak (Yugoslavie)

[illegible] ron [illegible] beta de 0,8 m³

[illegible] acero y de tubos en Sisak (Jugoslavia)

... hearth Furnace
... mt span
... (Jugoslavie)

... Martin Siemens Ofen
... nn - Spurweite 18,5 m.
... von Sisak (Jugoslawien)

Grue chargeuse de 2,5 tonnes pour four Martin Siemens
avec chariot auxiliaire de 7,5 tonnes - écartement : 18,5 m.
Aciéries et usines de tubes à Sisak (Yugoslavie)

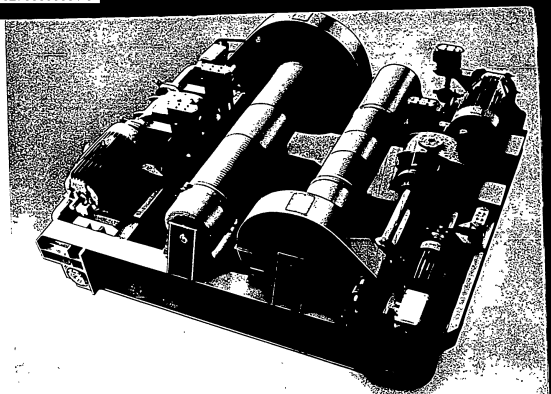
Cargadora de 2,5 toneladas para horno Martin-Siemens
con carro auxiliario de 7,5 ton luz : 18,5 m.
Fabrica de acero y de tubos en Sisak (Jugoslavia)

Bridge crane capacity 10 tons - span 22,5 mt.
Steelworks and pipe mill of Sisak (Jugoslavie)

10 Tonn Brueckenkran - Spurweite 22,5 m.
Stahl und Roehrenwerk von Sisak (Jugoslawien)

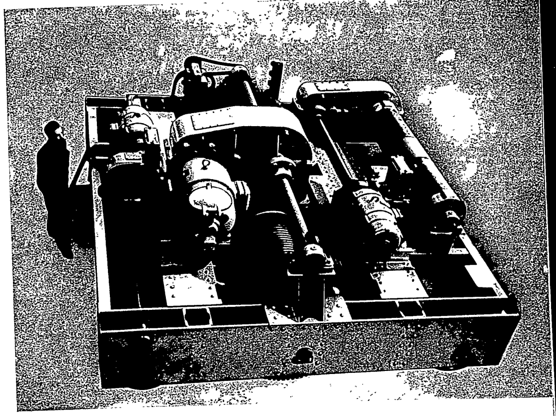
Pont grue de 10 tonnes - écartement : 22,5 m.
Aciéries et usines de tubes à Sisak (Yugoslavie)

Puente grua de 10 toneladas - luz : 22,5 m.
Fabrica de acero y de tubos en Sisak (Jugoslavia)



Carrello tipo chiuso
per gru da fonderia
portata 40 + 15 tonn.

Carrello per gru
da 90 + 10 tonn.
per la Centrale di S. Bartolo (Messico)

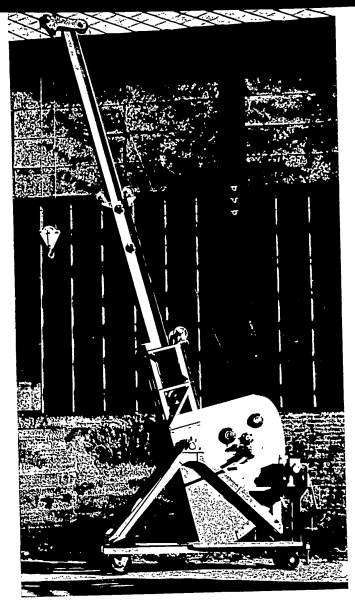


[illegible] ...nelzhutlekran

[illegible] grue

Wagon [illegible] grue de fonderie
[illegible] 40-15 tonnes

Carro modelo cerrado para grua de fundición
capacidad 40-15 ton



Gru a cannocchiale - portata 1 tonn.
altezza massima di sollevamento : m 6
su ruote gommate

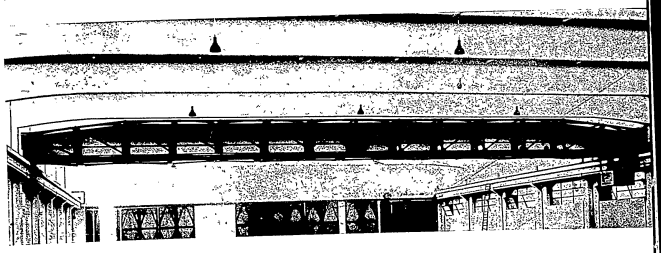
Trolley for crane
capacity 90-10 tons
for the central power house of S. Bartolo (Mexico)

Laufkatze fur Kran
Tragfähigkeit 90-10 tonnen
fur die elektrische Zentrale von S. Bartolo (Mexico)

Wagon pour grue
de 90 10 tonnes
pour la Centrale electrique de S. Bartolo (Mexique)

Carro para grua
de 90-10 ton
para la Central electrica de S. Bartolo (Mexico)

Gru a ponte con carrello scorrevole tra le travi
portata 6/9 tonn - scartamento m. 32-37-40
Aereonautica d' Italia Torino - Marina di Pisa e Firenze



PARATOIE

GATES
SCHUETZEN
VANNES
COMPUERTAS

...capacity 1 ton
...upon tyre wheels

Fernrohrkran Tragfähigkeit 1 T
maximales Aufwinden m. 6 auf pneumatischen Rädern

Grue à télescope tonnage 1 tonne
maximum de soulèvement m 6 montée sur roues avec pneus

Grúa telescópica - capacidad 1 ton.
izaje máximo m. 6 sobre ruedas con neumáticos

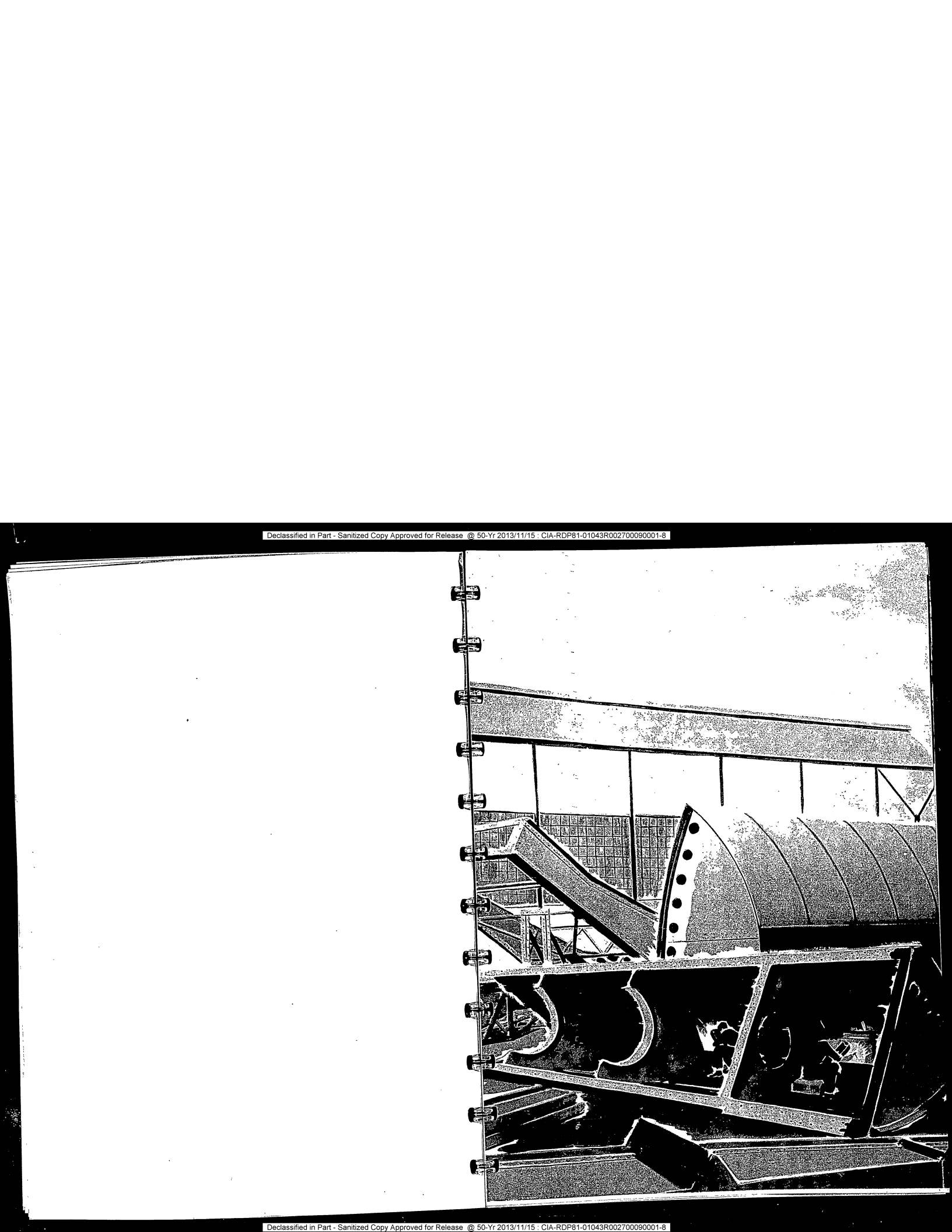
Bridge crane with trolley travelling amidst the girders
capacity 6-9 tons - gauge m. 32-37-40
Aeronautica d Italia (Torino) Marina di Pisa and Florence

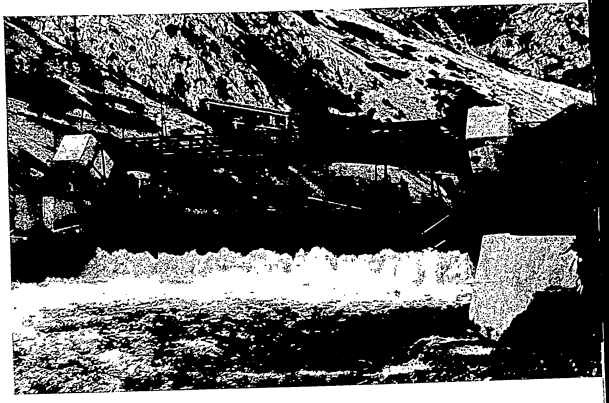
Brückenkran mit Laufkatze fahrbar zwischen die Träger
Tragfähigkeit 6-9 T. - Spannweite m. 32-37-40
Aero...nautica d Italia (Torino) Marina di Pisa und Florenz

...wagon mouvant parmi les poutres
...ares - écartement m 32-37-40
...elle (Torino) Marina di Pisa et Florence

...carro corredero entre las vigas
...ia m 32-37-40
...(Torino) Marina di Pisa y Florencia

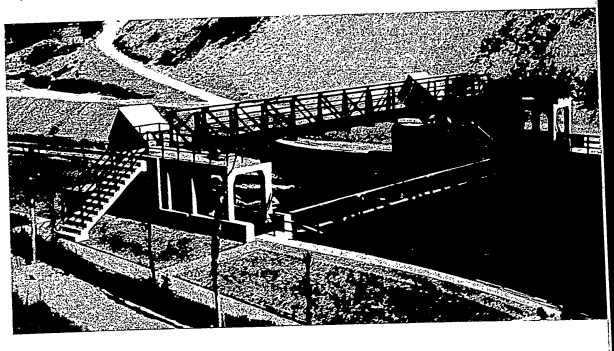
OFFICINE ELETTROMECCANICHE GALILEO





Paratoia automatica a settore
sul II° salto del Pescara
luce = m. 24 x 3,3 (foto Buttarit

La paratoia vista da monte



Pescara

Automatische Segmentabsperrschiebe
über den zweiten Stromschnellen des Pescara
Abmessungen: m. 24 x 3,3

Vanne segment automatique
sur le deuxième rapide du Pescara
Dimensions: m. 24 x 3,3

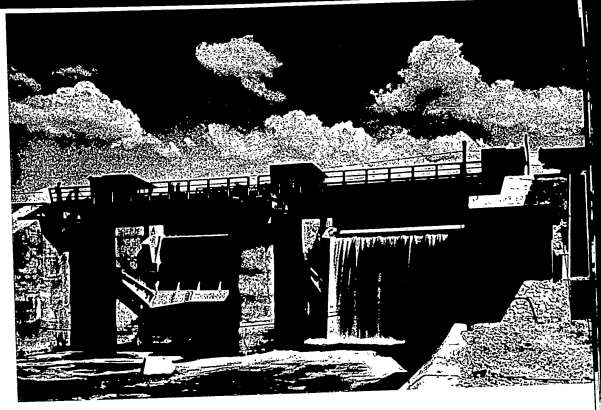
Compuerta automática de sector
sobre el segundo salto del rio Pescara
Medidas: m. 24 x 3,3

The gate seen from upstream

Die Absperrschiebe aus berwarts gesehen

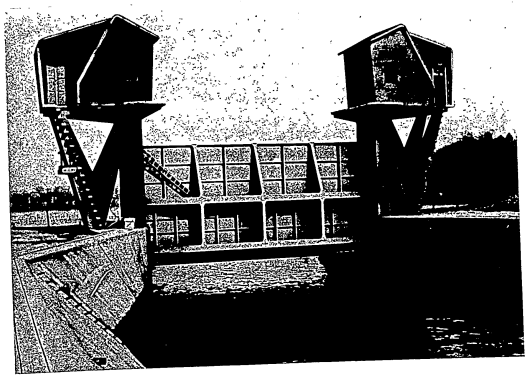
la vanne vue d'en-amont

la compuerta vista desde aguas arriba



Impianto del Basso Nera - Centrale di Orte
n. 2 paratoie automatiche a settore con ventola automatica
luce = m. 14 x 7,25 + 1,8
panconature e carroponte per panconi

Impianto del Basso Nera - Centrale di Orte
paratoia piana sul canale di presa - luce = m. 13 x 6,25



... river
... nged gate

... werk von Orte
... Sektor Schuetze mit automatischer Klappe
... 1,8 m
... Winderwerksbruecke

Centrale de Orte sur le Nera
n. 2 barrages à secteur avec volets automatiques
ouverture: 14 x 7,25 + 1,8
Batardeaux et treuil

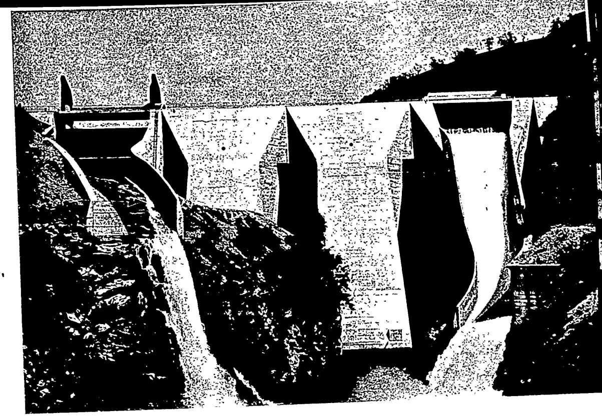
Instalación hidroelectrica del Rio Nera - Central de Orte
n. 2 compuertas automaticas de segmento, con portillo bascular automatico
Anchura: 14 x 7,25 + 1,8 m.
Ataguyas y torno de elevación

Power plant of Orte on the Nera river
Sliding gate across the intake canal
13 mt wide; 6,25 mt. high

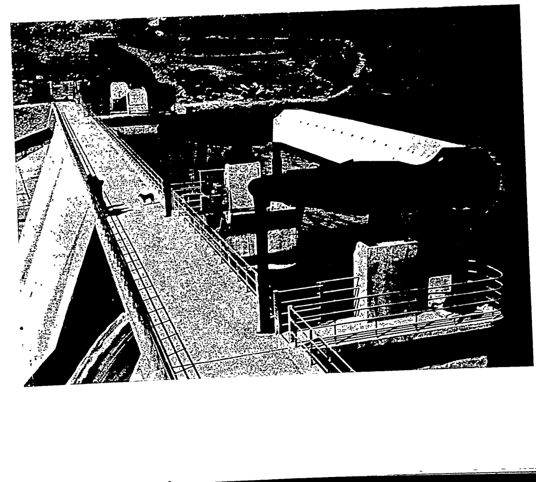
Gleitschuetz in der Entnahmenanlage
von Basso Nera (E. W von Orte)
Breite 13 m. Hoehe 6,25 m.

Central de Orte sur le Nera
Vanne glissière dans le canal d'amenée
Ouverture: 13 x 6,25 m

Instalación Hidroelectrica del Rio Nera
Central de Orte Compuerta plana en la toma
Anchura: 13 x 6,25 m.



Impianto del Ladhon (Grecia)
n. 2 paratoie a ventola automatica
luci = m. 16,5 x 4,8 e m. 14 x 3



Power plant of Ladhon (Greece)
two automatic hinged gates
16,5 mt. wide ; 4,8 mt high and 14 mt. vide ; 3 mt. high

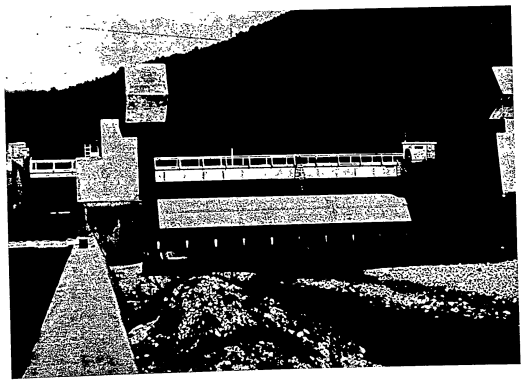
Anlage bei Ladhon (Griechenland)
zwei automatischen Klappen
Breite 16,5 m. - Hoehe 4,8 m. und Breite 14 m. - Hoehe 3 m

Barrage de Ladhon (Grèce)
2 vannes automatiques à volets
Ouvertures : 16,5 x 4,8 et 14 x 3 m.

Instalación hidroelectrica del Ladhon (Grecia)
dos compuertas de portillo automatico
Anchures : 16,5 x 4,8 y 14 x 3 m.

Sbarramento sul Volturno
n. 5 paratoie automatiche a settore
luce = m. 25 x 3,75 cad.

Una delle paratoie



[illegible] gates
[illegible] high

Anlage [illegible]
fuenf [illegible] Sektor-Schuetze
Oeffnung [illegible]5 x 3,75 m.

Barrage sur le Volturno
cinq vannes segment automatiques
ouverture : 25 x 3,75 m

Instalación hidroelectrica del Volturno
cinco compuertas automaticas de segmento
anchura : 25 x 3,75 m.

One sector gate

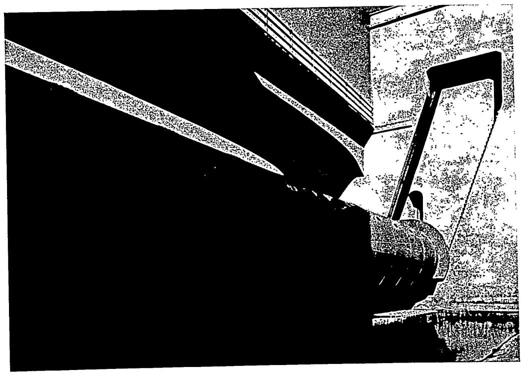
Ein sektor-Schuetz

Une vanne-segment

Una compuerta automatica

Sbarramento sul Gorzone (Rovigo)
n. 2 paratoie a settore luce = m. 12 x 4
paratoia cilindrica - luce = m. 24 x 4
porte a vento per conca di navigazione

La paratoia cilindrica



Barre … Gorzone (Rovigo)
… x 4 m.) and cylindrical gate (24 x 4 mt.)
… lock

… Rovigo)
… uetze (12 x 4 m.) und zylindrische Schuetz (24 x 4 m.)
… der Schiffahrtschleuse

Barrage sur le Gorzone (Rovigo)
deux vannes segment (12 x 4 m.) et vanne cylindrique (24 x 4 m.)
Porte busquées pour ecluse de navigation

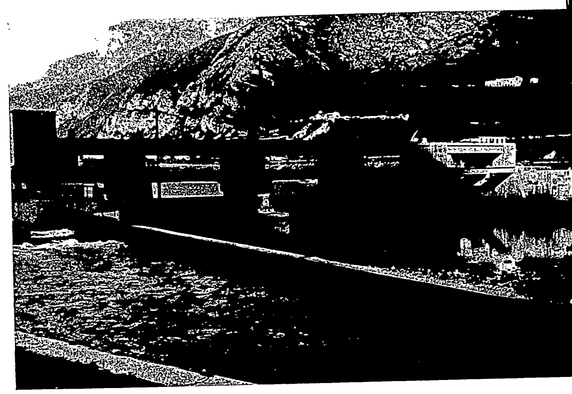
Instalación hidroelectrica del Gorzone (Rovigo)
dos compuertas de segmento (12 x 4 m.) y compuerta cilindrica (24 x 4 m.)
Puertas de espolón para esclusa de navegación

The cylindrical gate

Die zylindrische Schuetz

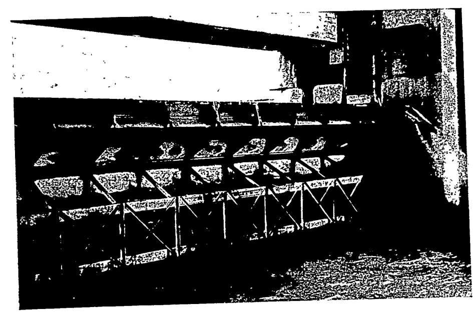
La vanne cylindrique

La compuerta cilindrica



Sbarramento a Bassano del Grappa
n. 4 paratoie piane scorrevoli su ruote; due di esse sono in due elementi di cui quello superiore a ventola
luce = m. 6 x 4,6

Particolare struttura a ventola



two parts,
shaped

Grappa
uber Rädern,
o der hoher Teil fächerförmig
m 6 x 4,6

Barrage à Bassano del Grappa
Quatre vannes-wagon, glissantes sur roues,
en deux eléments, dont le supérieur à éventail
Dimensions: m. 6 x 4,6

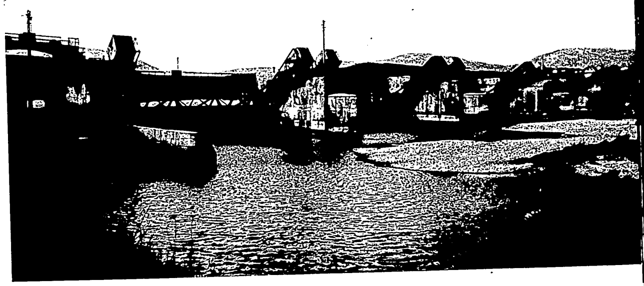
Barrera en Bassano del Grappa
Cuatro compuertas llanas, correderas sobre ruedas,
en dos elementos, y el de arriba en forma de abanico
Medidas: m 6 x 4,6

Structure and fantail detail

Bauart und Fächer: Einzelheit

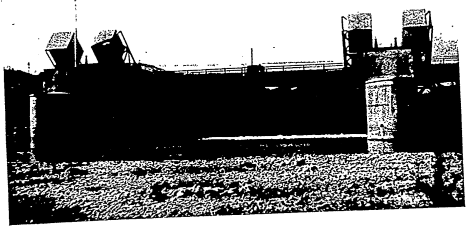
Détail de la structure et de l'éventail

Detalle de la estructura y del abanico



N 5 paratoie automatiche a settore
struttura a traliccio
luce = m. 25 x 2,7
impianto IV° salto sul Pescara

Una delle paratoie

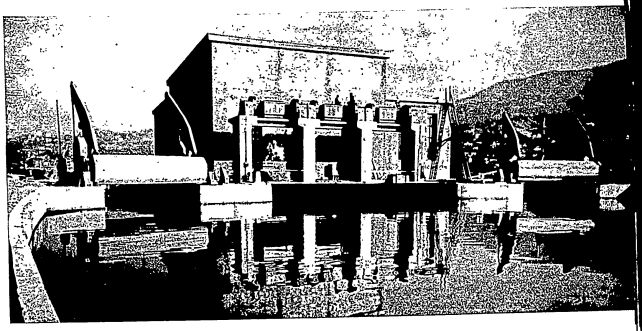


Five sector automatic gates
trelliswork - Size : m 25 x 2,7
Plant on the fourth rapids of the Pescara

Fünf automatische Sektorschützen - Netzwerk
Abmessungen : m. 25 x 2,7
Anlage über den vierten Stromschnellen des Pescara

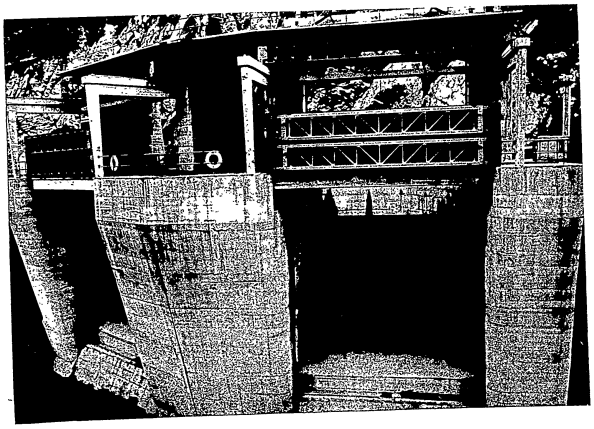
Cinq vannes-segment automatiques
structure à treillis - Dimensions : m. 25 x 2,7
Travaux sur le quatrième rapide du Pescara

Cinco compuertas automáticas de sector
estructura en forma de terliz - Medidas : m. 25 x 2,7
Planta del cuarto salto del río Pescara



Bacino di carico della centrale di S. Mauro (Torino)
n 3 paratoie piane scorrevoli su ruote a discesa per gravità - luce = m. 4,3 x 7,5
n 2 paratoie a ventola automatica - luce = m. 6 x 3 (Publifoto)

Scarico superficie diga di Pieve di Cadore (Belluno)
n. 2 paratoie piane con ventola automatica - luce m 9 x 6,6
n 2 panconature con gru a ponte per la manovra

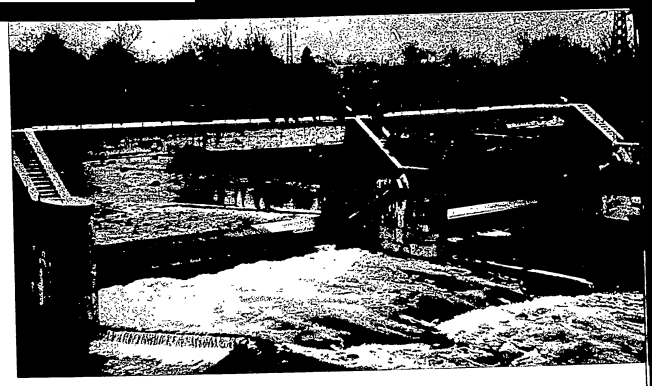


...ver house at S. Mauro (Turin)
...ty, gravity - Size: m. 4,3 x 7,5
... automatic fantail, sized m 6 x 3

...tale bei S. Mauro (Turin)
...schieben, über Rädern fahrbar, Niedergang durch Schwere: Abmessungen: m. 4,3 x 7,5
...automatischem Fächer - Abmessungen: m. 6 x 3

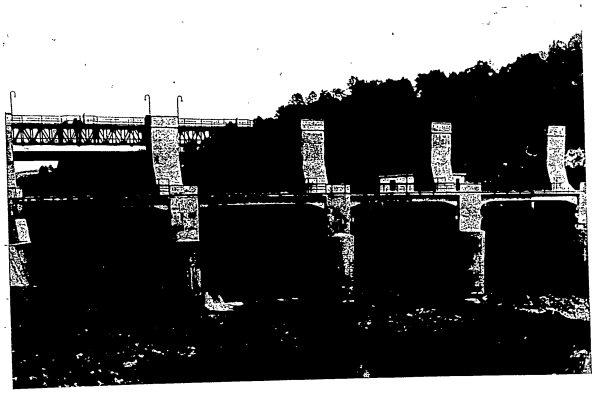
...de la centrale de S. Mauro (Turin)
...vannes wagon glissantes sur roues, à descente par gravité - Dimensions: m 4,3 x 7,5
...et deux à éventail automatique - Dimensions: m. 6 x 3

Cuenca de la central de S. Mauro (Turin)
Tres compuertas llanas correderas sobre ruedas, bajada por fuerza de gravedas - Medidas: m. 4,3 x 7,5
y dos otras de abanico automático - Medidas: m. 6 x 3



Paratoie a settore
luce = m. 23 x 1,7
impianto di Campore Alto (Cuorgnè)

Impianto del Garigliano
n. 3 paratoie piane a carrelli ed una a ventola automatica
luce = m 15 x 7



Water level discharge of the dam at Pieve di Cadore (Belluno)
Two wheel-gates with automatic fantail - Size: m 9 x 6,6
Two platforms with bridge cranes for operation

Wasserflächenabfluss des Wehrs bei Pieve di Cadore (Belluno)
Zwei ebene Absperrschieben mit automatischem Fächer - Abmessungen: m 9 x 6,6
Zwei Plattformen mit Brückenkrane für die Bewegung

Décharge superficiel de la digue de Pieve di Cadore (Belluno)
Deux vannes-vagon avec éventail automatique - Dimensions: m. 9 x 6,6
Deux jétées avec ponts grues pour les manoeuvrer

Descargo superficial de la barrera de Pieve di Cadore (Belluno)
Dos compuertas llanas con abanico automático - Medidas: m. 9 x 6,6
Dos superficies con puente grúes para las maniobras

Sector gates - Size m 23 x 1,7
Plant of Cuorgnè (Campore Alto)

Sektorschutzen - Abmessungen: m. 23 x 1,7
Anlage bei Campore Alto (Cuorgnè)

Vannes-segment - Dimensions: m 23 x 1,7
Travaux de Campore Alto (Cuorgnè)

Compuertas de sector - Medidas: m. 23 x 1,7
Planta de Campore Alto (Cuorgnè)

Sbarramento sul Piave a Soverzene (Belluno)
n. 3 paratoie automatiche a settore
luce = m 12 x 3,9

Garigliano River plant
Three carriage wheel-gates and one
with automatic fan - Size m 15 x 7

Anlage von Garigliano
Drei laufrollen schützen und eine
mit automatischem Fächer - Abmessungen: m. 15 x 7

Travaux du Garigliano
Trois vannes-wagon à bogies et une
à éventail automatique - Dimensions: m. 15 x 7

Planta del rio Garigliano
Tres compuertas llanas de coches corridos
y una de abanico automático - Medidas: m. 15 x 7

Paratoia a ventola automatica
luce = m. 12 x 3
impianto di Mori (Trento)

Barrage on the Piave river at Soverzene (Belluno)
Three automatic sector gates
Size m. 12 x 3

Wehr [illegible] Soverzene (Belluno)
[illegible] Segmentschützen
[illegible] x 3,9

[illegible] Soverzene (Belluno)
[illegible] automatiques
12 x 3,9

[illegible] Piave en Soverzene (Belluno)
[illegible] automatiques de secteur
Medidas m 12 x 3,9

Hinged gate with upper counterweights and rocking lever
Size m. 12 x 3
Plant at Mori (Trento)

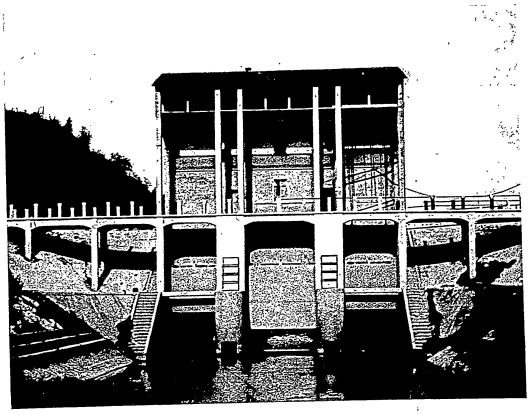
Automatische fächerförmige schütze
Abmessungen m. 12 x 3
Anlage von Mori (Trento)

Clapet avec contrepoids supérieur et balanciers
Dimensions m. 12 x 3
Travaux de Mori (Trento)

Compuerta sobre charnelas con contrapeso alto basculante
Medidas m. 12 x 3
Planta de Mori (Trento)

Paratoia automatica a settore
luce = m 18 x 4,5
Spigno Monferrato (Bormida)

Impianto di Bocca Usciana (Firenze)
n. 1 paratoia piana di luce = m 5,2 x 9,65 in due elementi
n 2 paratoie piane di luce = m 4 x 4,65 (foto Calugi)

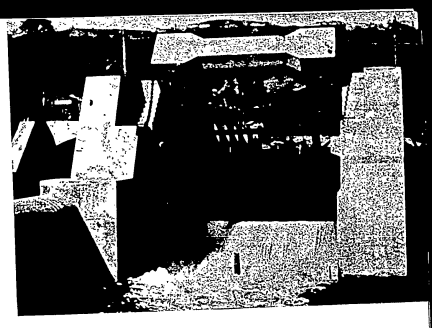


Sector automatic gate
size m 18 x 4,5
Spigno Monferrato (Bormida)

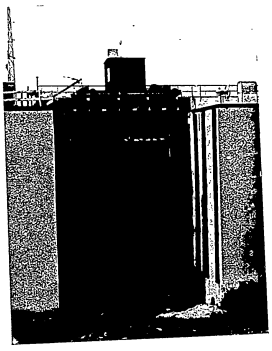
Automatische Sektorschütze
Abmessungen: m 18 x 4,5
Spigno Monferrato (Bormida)

Vanne-segment automatique
dimensions: m. 18 x 4,5
Spigno Monferrato (Bormida)

Compuerta automática de sector
medidas m 18 x 4,5
Spigno Monferrato (Bormida)



Paratoia automatica a settore
luce = m. 8 x 3,5
Juntura (Nelo)



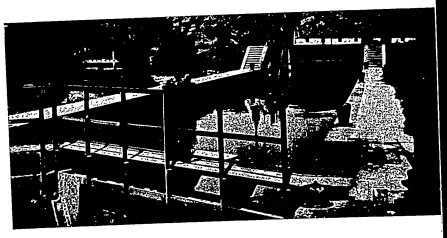
Paratoia piana traslabile con camera pneumatica di alleggerimento - luce = m 10,8 x 13,5
conca sul Mincio a Governolo (Mantova)

Bocca Usciana plant (G. C. of Florence)
One wheel-gate, sized m 5,2 x 9,65 and formed of two elements
Two wheel gates, sized m 4 x 4,65

Anlage Bei Bocca Usciana (G C von Florenz)
Eine schütze, abmessungen m. 5,2 x 9,65, in zwei Teilen beteilt
Zwei schützen, abmessungen m 4 x 4,65

Travaux de Bocca Usciana (G. C. de Florence)
Une vanne-wagon de m. 5,2 x 9,65, en deux éléments
Deux vannes-wagon de m 4 x 4,65

Planta de Bocca Usciana (G C. de Florencia)
Una compuerta llana de m 5,2 x 9,65 en dos partes
Dos compuertas llanas de m 4 x 4,65



Conca di navigazione a Battaglia Terme (Padova)
porte vinciane
luce = m 7,2 x 10

Sector [illegible] gate
Size m 8 x [illegible] (Neto)

Autom[illegible] [illegible] Schuetze
Abmes[illegible] [illegible] Juntura (Neto)

Vanne se[illegible] [illegible] que
Dimens[illegible] [illegible] Juntura (Neto)

Compue[illegible] [illegible] ca de sector
Medidas m 8 x 3,5 Juntura (Neto)

Transferable wheel-gate with lightening pneumatic chamber
Water basin on the Mincio river at Governolo (Mantova)
Size: m. 10,8 x 13,5

Verschiebbare Schuetze, mit pneumatische Entlas ungskammer
Wasser bassin über dem Mincio bei Governolo (Mantua)
Abmessungen: m 10,8 x 13,5

Vanne-wagon movable, avec chambre pneumatique d' allègement
Bassin sur le Mincio à Governolo (Mantoue)
Dimensions: m. 10,8 x 13,5

Compuerta llana displazable con cámara neumática de aliviamiento
Cuenca sobre el río Mincio en Governolo (Mantua)
Dimensiones: m 10,8 x 13.5

Navigation basin at Battaglia Terme (Padua)
Vincian gates sized m 7,2 x 10

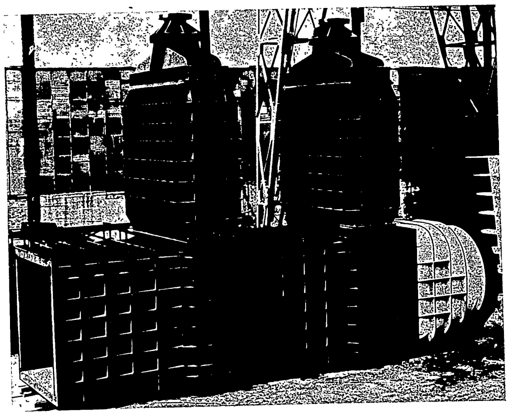
Schiffarrtschleusenkammer bei Battaglia Terme (Padua)
Leonardos Türen m 7,2 x 10

Bassin de navigation à Battaglia Terme (Padoue)
Portes Léonardesques de m 7,2 x 10

Cuenca de navegación en Battaglia Terme (Padua)
Esclusas de m. 7,2 x 10

Conca di navigazione a Buoro sul Gorzone (Rovigo)
per natanti da 300 tonn.
porte a vento luce = m. 7,5 x 4

N. 2 paratoie a saracinesca con comando oleodinamico
per lo scarico di esaurimento della diga di Piantelessio
luce = m. 2 x 2 - carico: 52 tonn.



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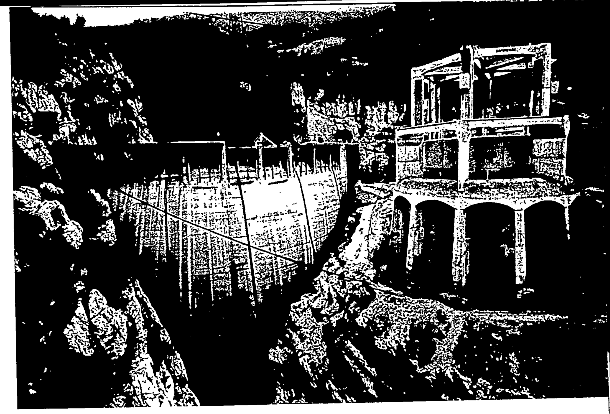
Navig[illegible] Gorzone river
for sh[illegible] high
gates [illegible]

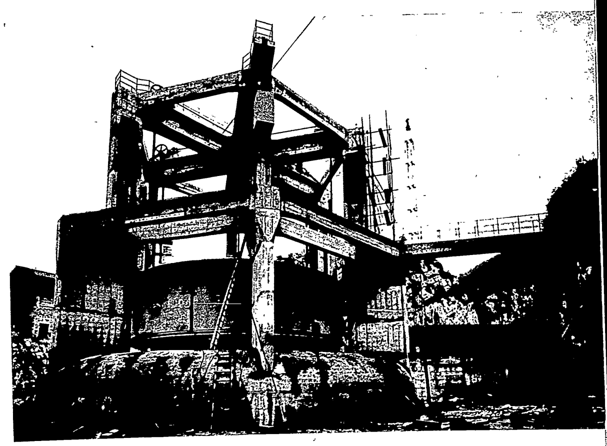
Sch[illegible] Buoro (Gorzone)
[illegible]
Stemm[illegible] 7,5 x 4 m

Ecluse de navigation preès de Buoro sur le Gorzone
pour bateux de 300 tonnes
Portes busquées-ouverture : 7,5 x 4 m

Esclusa de navegación sobre el Rio Gorzone
para barcos de 300 ton.
puertas de espolón - anchura : 7,5 x 4 m.



Impianto di Barcis (Pordenone)
paratoia circolare scarico superficie
diametro m 13 - altezza m. 3,7 (foto Ferruzzi)

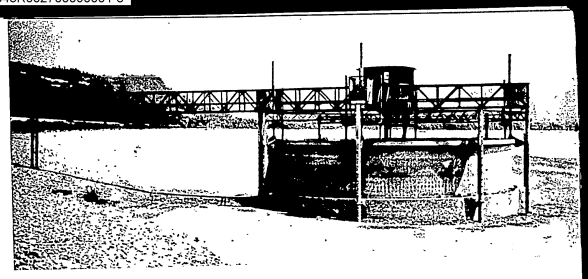


Two hydraulic operated sluice gates
for discharging the reservoir of Piantelessio
Opening : 2 x 2 mt. - load : 52 tons

Zwei hydraulisch angetriebene Absperrschieber
fuer die Entleerung des Stausee von Piantelessio
Oeffnung : 2 x 2 m. - Last : 52 Tonn.

Deux ecluses à commande hydraulique
pour la vidange de fond du bassin de Piantelessio
Ouverture : 2 x 2 m. - Charge : 52 tonnes

Dos compuertas de mando hydraulico
para la evacuación del embalse de Piantelessio
anchura : 2 x 2 m. - Presión del agua : 52 ton.

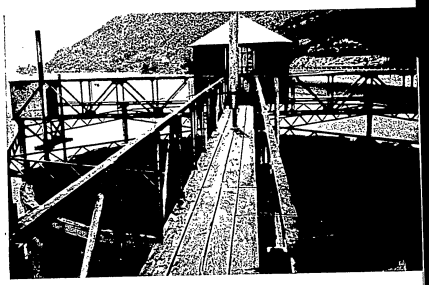


Surface circular drain gate
Diameter m. 13 - Height m 3,7
Barcis Plant (Pordenone)

Kreisspundwand fur Wasserflächeabfluss
Lichte Weite m. 13 - Höhe m 3,7
Anlage von Barcis (Pordenone)

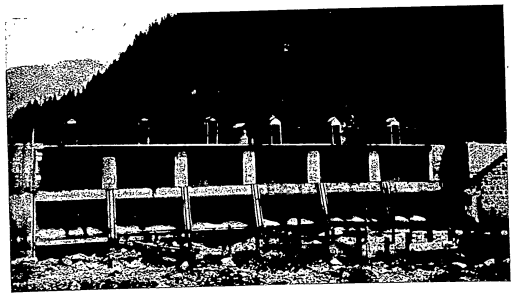
Vanne circulaire pour décharge superficielle
diamètre m 13 - hauteur m 3,7
installation de Barcis (Pordenone)

Compuerta circular para descarga suderficial
diámetro m 13 - alto m 3,7
Planta de Barcis (Pordenone)



Paratoia circolare
scarico superficie
Lago di S Croce (Belluno)
diam. m 16 - alt m 3,5

Sbarramento sul Molveno
Val di Genova (Pinzolo - Trento)
n. 6 paratoie piane doppie sghiaiatrici
luce = m 1,7 x 5,8 cad.

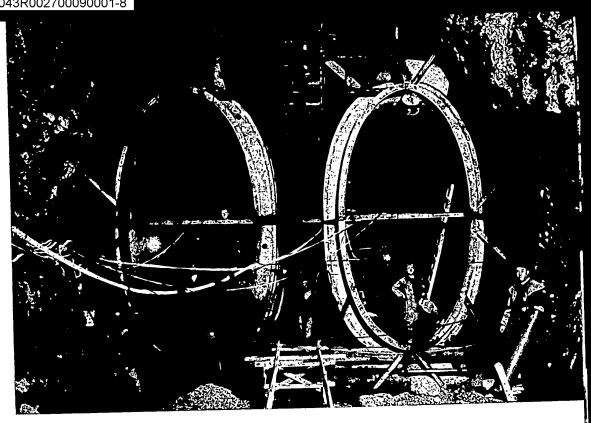


Circular gate
for discharge at water level of Lake S. Croce (Belluno)
diameter m 16 - height m. 3,5

Kreisschutze
für Wasserlächeabfluss von S. Croce see (Belluno)
Durchmesser m 16 - Höhe m 3,5

Vanne circulaire
pour le décharge superficiel du lac de S. Croce (Belluno)
diamètre m. 16 - hauteur m. 3,5

Compuerta circular
para el descargo al nivel del agua del Lago de S. Croce (Belluno)
diámetro m 16 - altura m 3,5



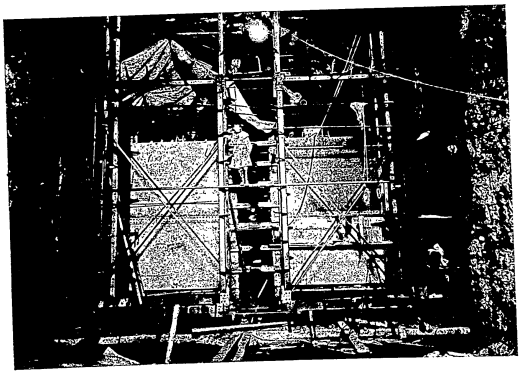
Diga di Val Gallina - impianto sul Pieve
n. 2 paratoie di presa in galleria - luce = m 3,2 x 4,7
carico idrostatico m. 97 (foto Ferruzzi)

Barrage on the Molveno river - Genova Valley (Pinzolo - Trento)
Six sliding double wheel gates
sized each of them m 1,7 x 5,8

Wehr über dem Molveno - Genovatal (Pinzolo - Trento)
Sechs doppelte Gleitenschützen
jede gross m. 1,7 x 5,8

Barrage sur le Molveno - Vallée de Genova (Pinzolo - Trento)
Six double vannes-wagon à glissement
chacune de m. 1,7 x 5,8

Barrera sobre el rio Molveno - Valle de Genova (Pinzolo - Trento)
Seis compuertas llanas dobles a deslizamento
cada una de m. 1,7 x 5,8



PONTI

BRIDGES
BRUECKEN
PONTS
PUENTES

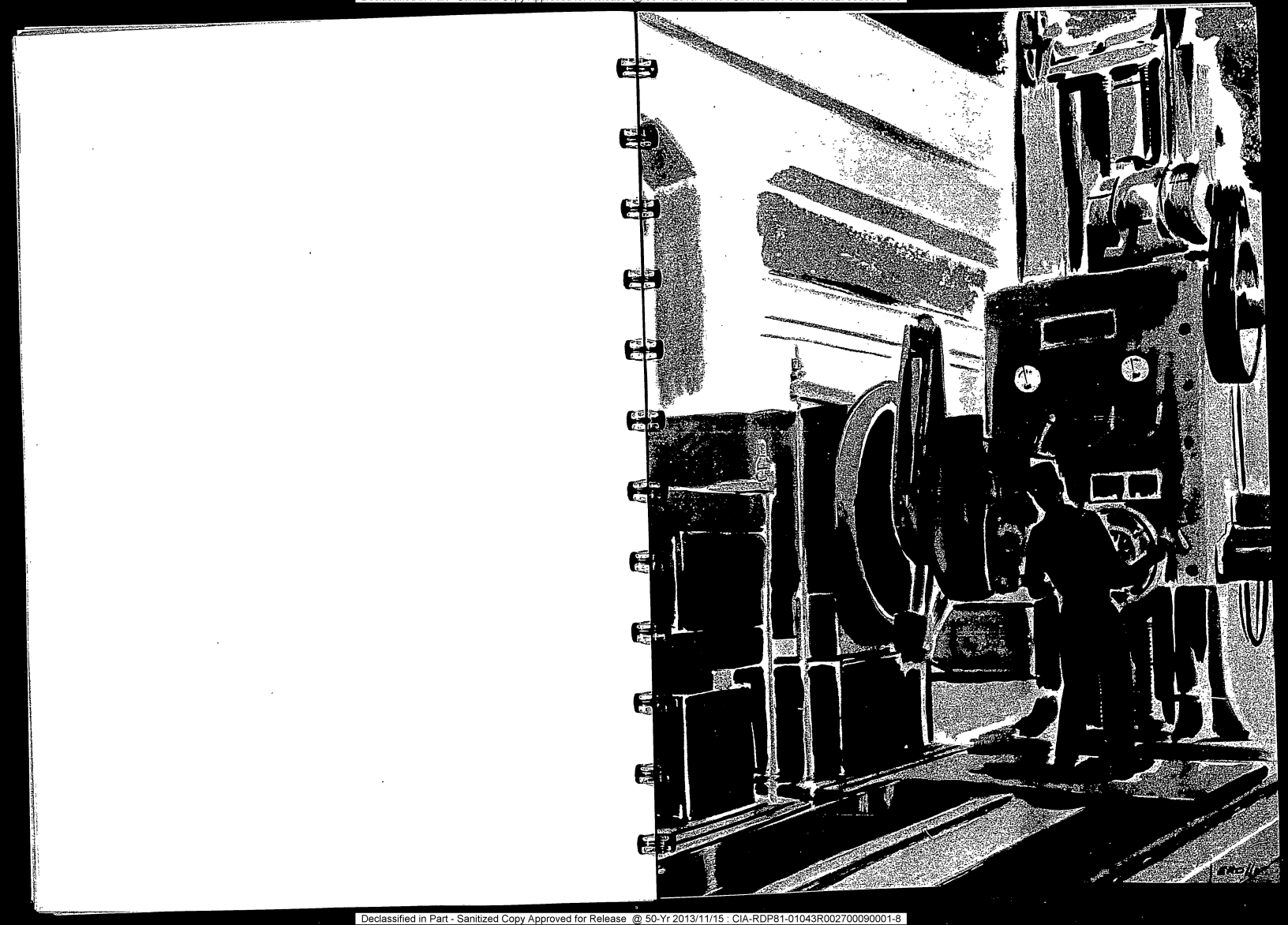
Val Gallina dam - Plant on the Piave river
Two underground inlet gates, sized m. 3,2 x 4,7
hydrostatic head m. 97

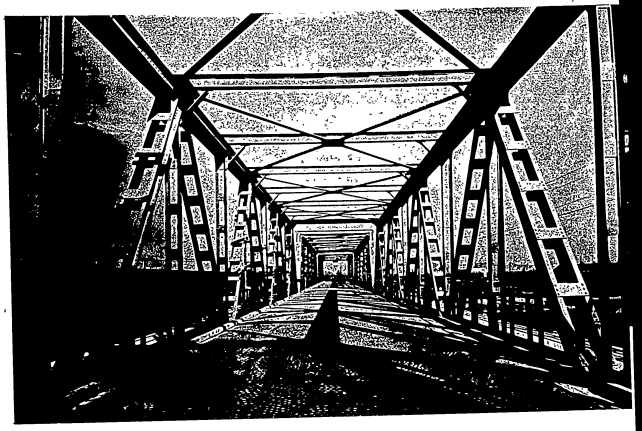
Wehr in Gallinatal - Anlage über dem Piave
Zwei unterirdische Einflussabsperrschieben
abmessungen m. 3,2 x 4,7 - hydrostatische Belastung m 97

Digue della vallée Gallina - travaux sur le Piave
Deux vannes d'entrée en galérie
dimensions m. 3,2 x 4,7 - Pression hydrostatique m. 97

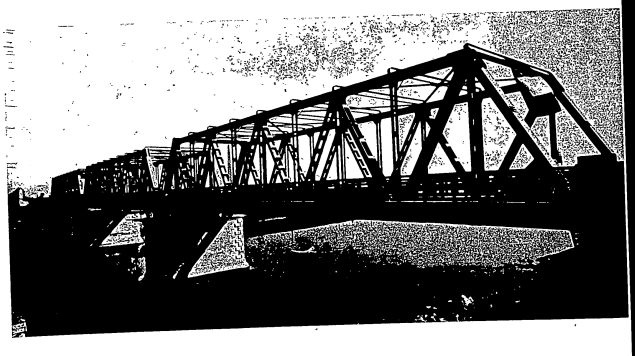
Barrera del valle Gallina
Planta sobre el río Piave - Dos compuertas de entrada en galería
medidas m. 3,2 x 4,7 - Carga hidroestática m. 97

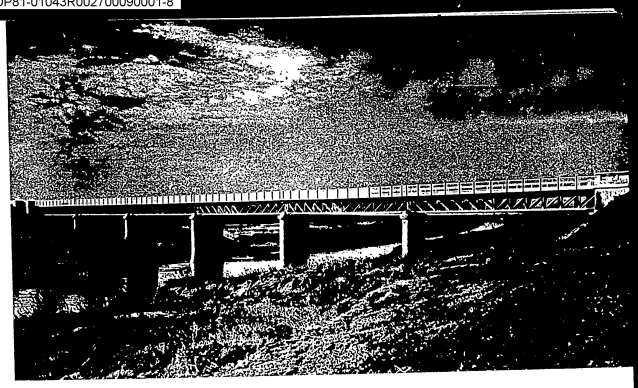
OFFICINE ELETTROMECCANICHE GALILEO





Ponte sull'Adige a Boara Pisani (Rovigo)
Strada Statale n. 16
n. 3 campate di m. 40 cad. (foto Giacomelli)





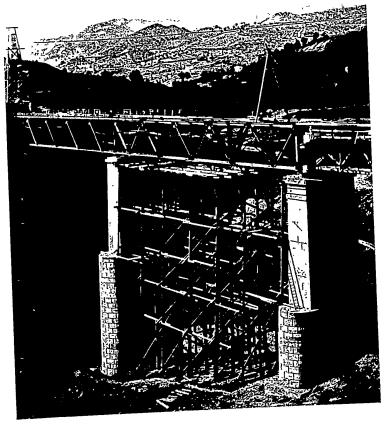
Ponte stradale
sul Reno a Traghetto (Ferrara)
lunghezza m 124

Bridge over the Adige at Boara Pisani (Rovigo)
State road N. 16
Three bays, each of them m. 40

Brücke über dem Etsch bei Boara Pisani (Rovigo)
Staatsstrasse N. 16
Drei Bögen, jeder m. 40 weit

Pont sur l'Adige à Boara Pisani (Rovigo)
Route nationale N. 16
Trois travées, chacune longue m. 40

Puente sobre el rio Adige en Boara Pisani (Rovigo)
Ruta Nacional N. 16
Tres ojos, cada uno largo m. 40



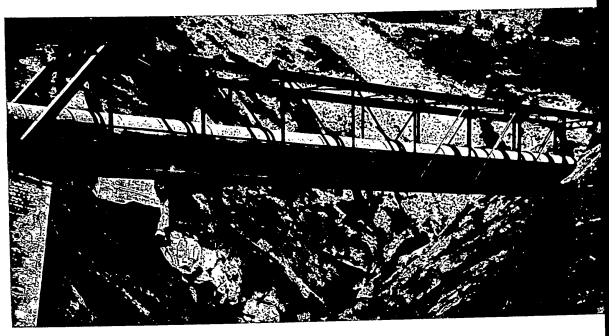
Ponte stradale
sul Fosso di Chiusa (Alto Savio)
lunghezza m 82

Road bridge
over the Reno river at Traghetto (Ferrara)
Length m 124

Strassenbrücke
über dem Reno bei Traghetto (Ferrara)
Länge m 124

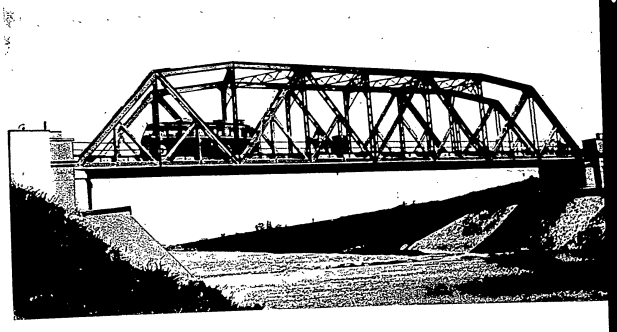
Pont routier
sur le Reno à Traghetto (Ferrara)
Longueur m 124

Puente caminero
por arriba del río Reno en Traghetto (Ferrara)
Largo m 124



Passerella metallica
sostegno condottura acquedotto
Alto Savio - Quarto di Sarsina (Rimini)

Ricostruzione ponte di Salboro
sul Bacchiglione (Padova)
lunghezza m. 53



Road bridge
over the Fosso di Chiusa (Upper Savio)
Length m. 82

Strassenbrücke
über dem Fosso di Chiusa (Ober-Savio)
Länge m 82

Pont routier
sur le Fosso di Chiusa (Savio supérieur)
Longueur m. 82

Puente caminero
por arriba del Fosso di Chiusa (Alto Savio)
Largo m. 82

Iron bridge framework
to support the aqueduct conduit
Upper Savio - Quarto di Sarsina (Rimini)

Eisengerüst
um die Wasserleitung zu tragen
Ober Savio Quarto di Sarsina (Rimini)

Arc métallique
pour soutenir l aqueduc
Haut Savio - Quarto di Sarsina (Rimini)

Viaducto metálico
para sustentar el acueducto
Alto Savio - Quarto di Sarsina (Rimini)

Ponte ferroviario sul Reno
tra Bologna e Ferrara (in collaborazione)
n. 1 campata di m. 51,36

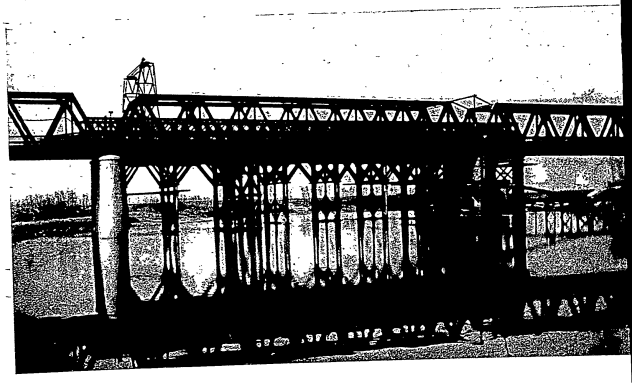
Reconstruction of Salboro bridge
over the Bacchiglione river (Padua)
Length m. 53

Wiederaufbau der Brücke bei Salboro
über dem Bacchiglione (Padua)
Länge m. 53

Réconstruction du pont de Salboro
au dessus du Bacchiglione (Padoue)
Longueur m. 53

Reconstrucción del puente de Salboro
por arriba del río Bacchiglione (Padua)
largo m. 53

Ricostruzione del ponte stradale
sul Piave a S. Donà
Strada Statale n. 14
campate di m. 51,66



Railroad bridge over the Reno
between Bologna and Ferrara (in co-operation)
One bay of m 51,26

Eisenbahnbrucke uber dem Reno
zwischen Bologna und Ferrara (in Mitarbeit)
Ein Bogen von m 51,26

Pont de chemin de fer au dessus du Reno
entre Bologna et Ferrara (en collaboration)
Un arc de m. 51,26

Puente ferroviario por arriba del rio Reno
entre Bologna y Ferrara (in colaboración)
Un arco de m. 51,26

Ponte ferroviario sull' Isonzo
n. 7 campate di m. 50 cad

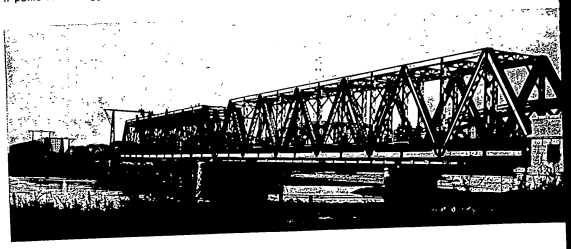
Reconstruction of the road bridge
over the Piave river at S. Donà - State road N 14
Bays of m. 51,66

Wiederaufbau der Strassenbrüke
über dem Piave bei S. Donà Staatliche Strasse N 14
Bögen von m 51,66

Reconstruction du pont routier
au dessus du Piave à S. Donà - Route Nationale N. 14
Arcs de m. 51,66

Reconstrucción del puente carretero
por arriba del rio Piave en S. Donà - Ruta nacional N 14
Arcos de m. 51,66

Il ponte in montaggio



Railroad bridge
over the Isonzo river
Seven bays, each of m. 50

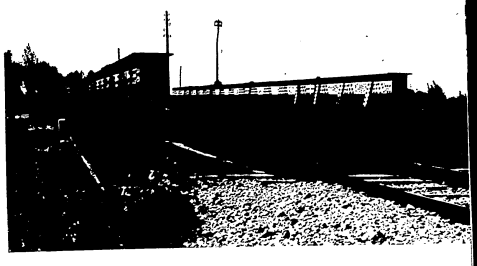
Strassenbrücke
über dem Isonzo
Sieben Bögen, jeder von m. 50

Pont routier
au dessus de l' Isonzo
Sept arcs, chacun de m. 50

Puente carretero
por arriba del rio Isonzo
Siete arcos, cada uno de m. 50

Ponte ferroviario
sul tratto Prove di Sacco - Mestre

Ponte ferroviario sul canale
Buonacquisto (Lavezzola - Ferrara)



Ponte ferroviario
sulla Padova-Bologna a Monselice

Railroad bridge
on the section Piove di Sacco - Mestre

Eisenbahnenbrücke
an der Strecke Piove di Sacco - Mestre

Pont de chemin de fer
sur la distance Piove di Sacco - Mestre

Puente ferroviario
en el trecho Piove di Sacco - Mestre

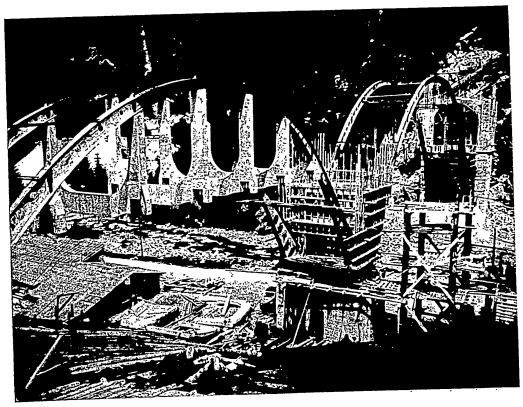
Railroad bridge
over the canal Buonacquisto (Ferrara)

Eisenbahnenbrücke
über dem Kanal Buonacquisto (Ferrara)

Pont de chemin de fer
au dessus du canal Buonacquisto (Ferrara)

Puente ferroviario
por arriba del canal Buonacquisto (Ferrara)

Armature metalliche da incorporare nel calcestruzzo
per il ponte canale sul Serca di Campiglio
derivazione Serca Molveno per l'impianto di S. Massenza (foto Pedrotti)



Railroad bridge
on the line Padua-Bologna at Monselice

Eisenbahnenbrücke
an der Linie Padua-Bologna bei Monselice.

Pont de chemin de fer
sur la ligne Padoue-Boulogne à Monselice

Puente ferroviario
en la linea Padua-Bolonia, cerca de Monselice

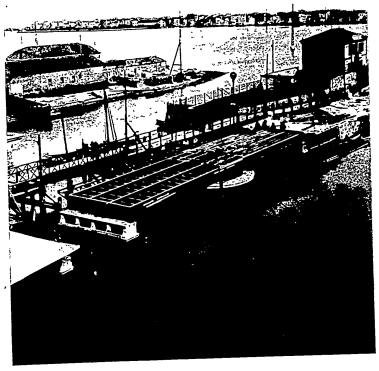
Ponte girevole a Marano Lagunare
lunghezza m. 27

Iron reinforcements to be embedded
in the concrete for the channel bridge over the river Sarca of Campiglio
derivation from the Sarca Molveno for the S. Massenza 1ª plant

Eisenarmaturen in den Beton
für den Bau der Wasserkanalbrücke über dem Sarca von Campiglio
Ableitung des Sarca Molveno für die Anlage bei S. Massenza 1ª - zu einverleiben

Renforts métalliques à incorporer dans le béton
pour le pont canal au dessus du Sarca de Campiglio
dérivation du Sarca Molveno pour les travaux de S. Massenza 1ª

Armazones metálicas para incorporar en el hormigón del puente canal
por arriba del río Sarca de Campiglio
derivación del Sarca Molveno para la planta de S. Massenza 1ª



Ponte girevole
a Chioggia - Sottomarina (Venezia)
lunghezza m 30

Slewing bridge
at Marano Lagunare - Lenght m. 27

Drehbrücke
bei Marano Lagunare - Länge m. 27

Pont tournant
à Marano Lagunare Longueur m. 27

Puente giratorio
en Marano Lagunare - Largo m. 27

Slewing bridge
at Chioggia Sottomarina (Venice)
Length m. 30

Drehbrücke
in Chioggia-Sottomarina (Venedig)
Länge m 30

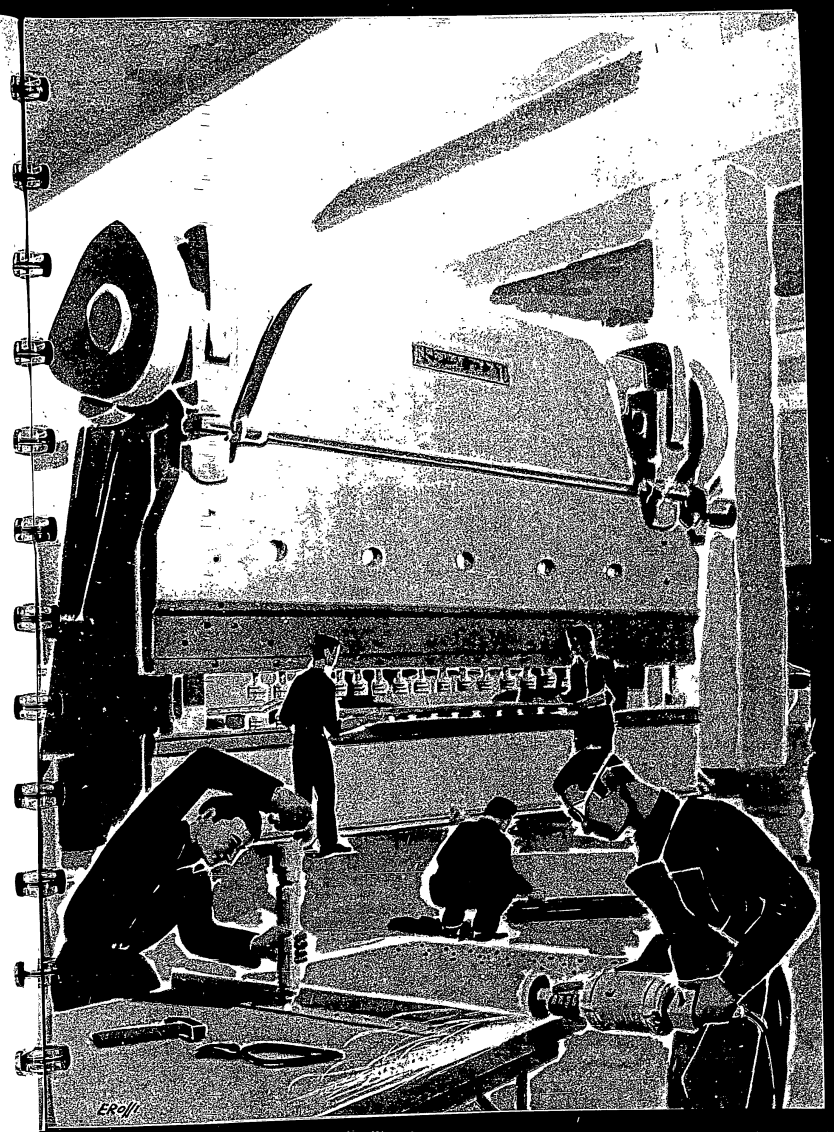
Pont tournant
à Chioggia Sottomarina (Venise)
Longueur m 30

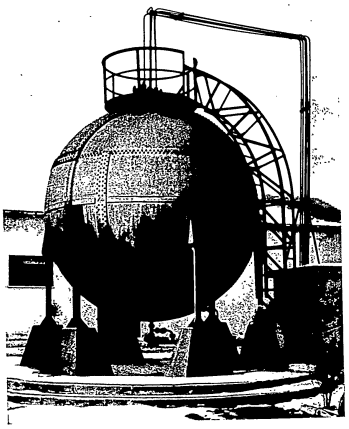
Puente giratorio
en Chioggia-Sottomarina (Venecia)
Largo m 30

VARIE

OTHER FRAMEWORKS
IRGENDEINE RAHMENWERKE
AUTRES CHARPENTES
OTRAS TERLICES

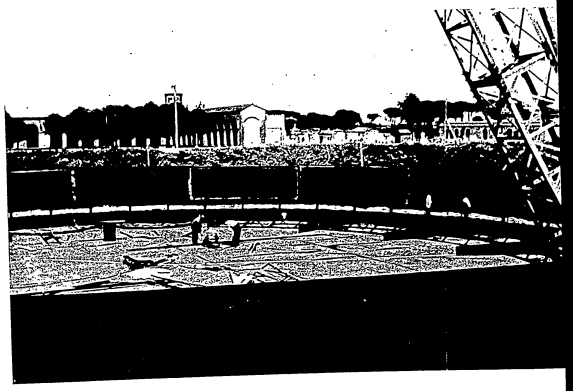
OFFICINE ELETTROMECCANICHE GALILEO





Serbatoio sferico
diametro m. 4,6
pressione 7 atm (foto Pedrotti)

Serbatoio cilindrico di 15.000 mc
a tetto galleggiante, in fase di montaggio



Spherical tank
diameter m. 4,6 - pressure 7 atm

Kugelförmiger Behälter
Durchmesser m 4,6 - Druck 7 atm.

Reservoir sphérique
Diamètre m. 4,6 - Pression 7 atm.

Tanque esférico
diámetro m 4,6 - presión 7 atm.

Serbatoi a pressione
per la centrale termoelettrica di Marghera (Venezia)
diametro m. 4 - lunghezza m 8

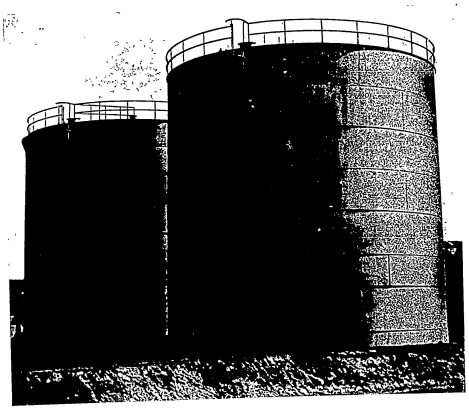
Cylindrical tank with floating roof
tankage 15.000 cubic meters

Kugelförmiger Behälter mit schwimmendem Dach
Fassungsvermögen m³ 15000

Reservoir cylindrique avec le toit flottant
Capacité m³ 15000

Tanque cilíndrico con el techo flotante
capacidad 15000 metros cúbicos

Serbatoi cilindrici da 1500 mc.
a S. Giuseppe del Cairo (Savona)

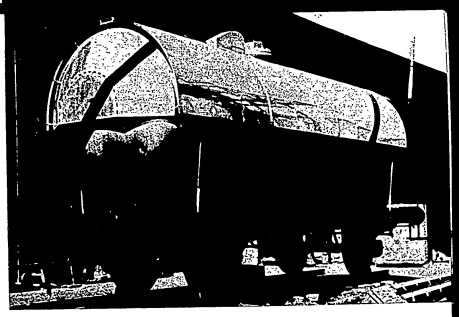


Pressure tanks for the thermoelectric power plant of Marghera (Venice)
Diameter m. 4 - Length m. 8

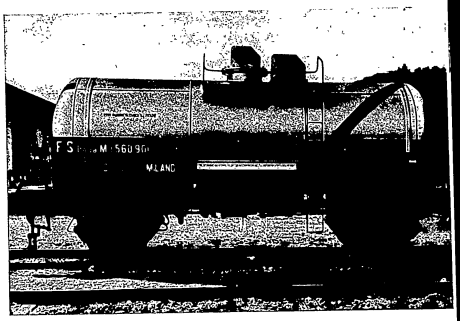
Ueberdrucktank für die thermoelektrische Zentrale in Marghera (Venedig)
Durchmesser m. 4 - Länge m. 8

Reservoirs à pression pour la centrale thermoélectrique de Marghera (Venise)
Diamètre m. 4 - Longueur m. 8

Tanques de presión para la central termoeléctrica de Marghera (Venecia)
Diámetro m. 4 - Largo m. 8



Carro serbatoio, per trasporto di ammoniaca anidra, con protezione antisolare



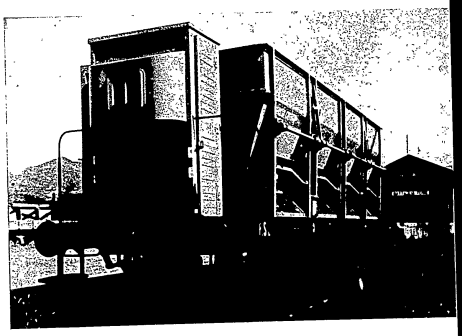
Carro serbatoio per trasporto di cloro liquido

Cylindrical tanks, capacity 1500 cubic meters, at S. Giuseppe del Cairo (Savona)

Zylindrische Behälter, Gehalt 1500 m³ bei S. Giuseppe del Cairo (Savona)

Reservoirs cylindriques, capacité 1500 m³ à S. Giuseppe del Cairo (Savona)

Tanques cilíndricos, capacidad 1500 m³ en S. Giuseppe del Cairo (Savona)



Carro tramoggia per carbone

Tank railroad car,
for carrying anhydrous ammonia, with sun protection

Eisenbahntankwagen mit Sonnenstrahlungschutz
um wasserfrei Ammoniak zu tragen

Wagon reservoir avec protection contre le soleil
pour le transport d'ammoniaque anhydre

Vagón tanque, para el transporte de amoniaco anhidro,
con protección contra el sol

Tank railroad car
for carrying fluid chlorine

Eisenbahntankwagen
um flüssiges Chlor zu tragen

Wagon reservoir
pour transporter chlore liquide

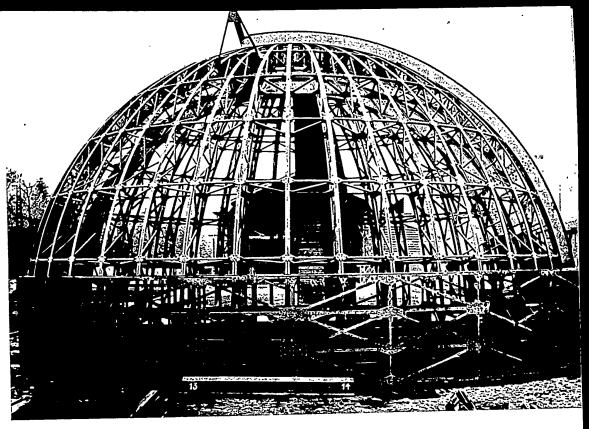
Vagón tanque
para el transporte de cloro liquido

Hopper railroad car for carryinh coal

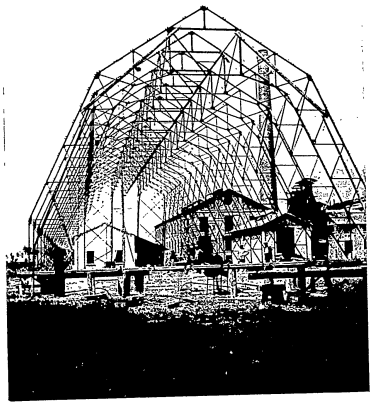
Trichterwagen für Kohle

Wagon pour houille, à trémie

Vagón tolva para carbón



Intelaiatura della cupola girevole
dell' Osservatorio Astrofisico di Asiago (Vicenza)



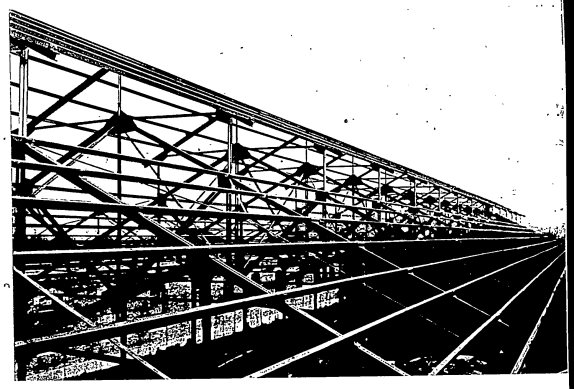
Capriate per lo zuccherificio
di Este (Padova)
largh. m 20 - alt m 15

Framework of the slewing dome of the astrophysical observatory at Asiago (Vicenza)

Rahmenwerk der Drehkuppel der Sternwarte bei Asiago (Vicenza)

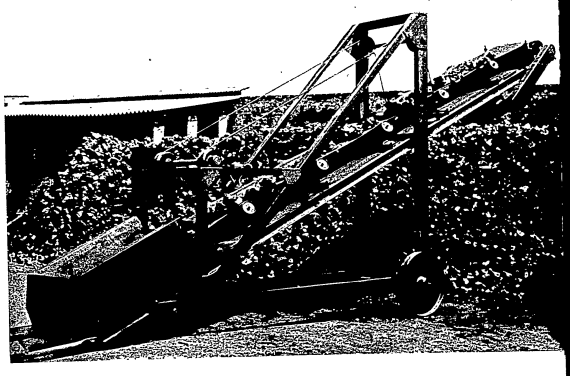
Charpente du dôme tournant de l'observatoire astrophysique d'Asiago (Vicenza)

Armazon de la cúpula giratoria del observatorio astrofísico de Asiago (Vicenza)



Capriate per un fabbricato industriale a Rosignano Solvay (Livorno)

Trasportatore mobile a nastro per carbone



Trusses for the sugar factory of Este (Padua) Width m. 20 - Height m. 15

Brückenträger für die Zuckerfabrik in Este (Padua) Breite m. 20 - Höhe m. 15

Fermes pour la sucrerie à Este (Padoue) Largeur — 20 - Hauteur m. 15

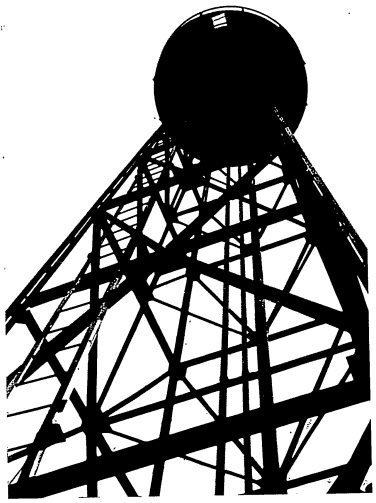
Armaduras de recalo para la fabrica de azúcar de Este (Padua) Ancho m. 20 - Alto m. 15

Trusses for an industrial building at Rosignano Solvay (Livorno)

Gewölbbögen für ein industrielles Gebäude in Rosignano Solvay (Livorno)

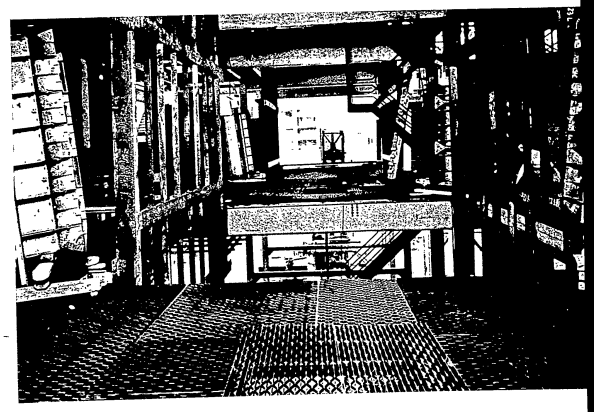
Fermes pour un bâtiment industriel à Rosignano Solvay (Livorno)

Armazones de techo para un edificio industrial en Rosignano Solvay (Livorno)



Serbatoio sopraelevato per acqua

Grigliati per pavimentazioni tipo « standard » per centrali termoelettriche, stabilimenti, ecc. (foto Ferruzzi)



Movable belt conveyor for coal

Fahrbares Förderband für Kohle

Transporteur mobile à courroie pour houille

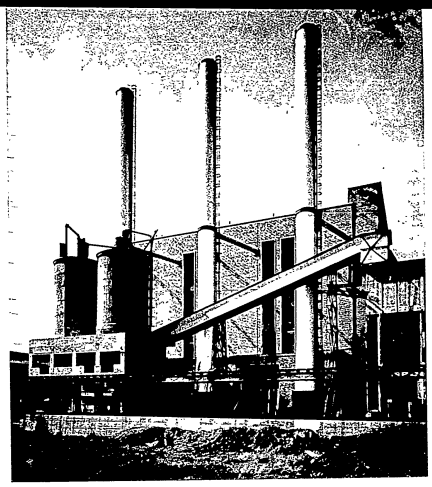
Transportador móvil de correa para carbón

Elevated water tank

Hochwasserbehälter

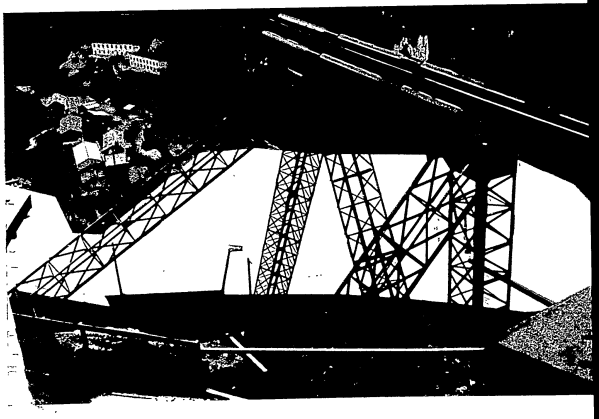
Réservoir d'eau surélevé

Tanque para agua en sobreal'ce



Camini e ossature metalliche per la centrale termoelettr. di Marghera (Venezia) (foto Ferruzzi)

Piano di scorrimento in curva del blondin
Diga di Val Gallina (Belluno)



« Standard » type gratings for pavements in thermoelectric power plant, workshops, etc

« Standard » Gitter für Pflasterung in thermoelektrischen Zentralen, Werkstätten, u. s. w.

Grilles pour planchéiage modèle « Standard » pour centrales thermoélectriques, usines, etc.

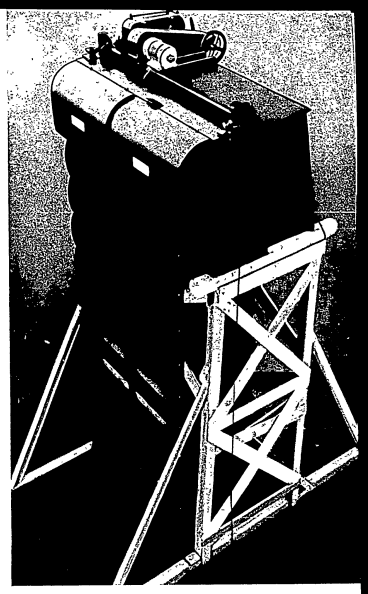
Rejas de entarimar modelo « standard » para centrales termoeléctricas, talleres, etc.

Chimneys and metal frames
for the thermoelectric power plant of Marghera (Venice)

Essen und Eisengerippe
für die Thermoelektrische Zentrale in Marghera (Venedig)

Cheminées et charpentes métalliques
pour la centrale thermoélectrique de Marghera (Venise)

Chimeneas y armazones metálicas
para la central termoeléctrica de Marghera (Venecia)



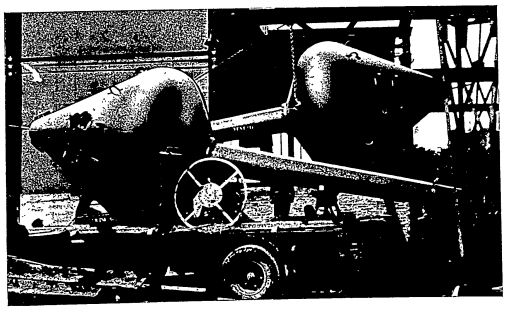
Griglia rotante per filtraggio acqua di mare
raffreddamento condensatori per centrali termiche

Curvilinear slide track for blondin car
Val Gallina Dam - Belluno

Krummlinige Laufbahn für Blondin Wagen
Val Gallina Damm - Belluno

Plan de course curviligne de wagon blondin
Digue de Val Gallina - Belluno

Plano de recorrido en curva de carro blondin
Esclusa de Val Gallina - Belluno



Boe autoluminose
per alti fondali

Rotating gridiron for filtering sea water
cooling condensers for thermoelectric power plants

Drehrost um Seewasser
für Kühlung Kondensatoren von thermischen Zentralen - zu filtern

Grille tournante pour philtrer l' eau de mer
pour refroidir les condenseurs de centrales thermiques

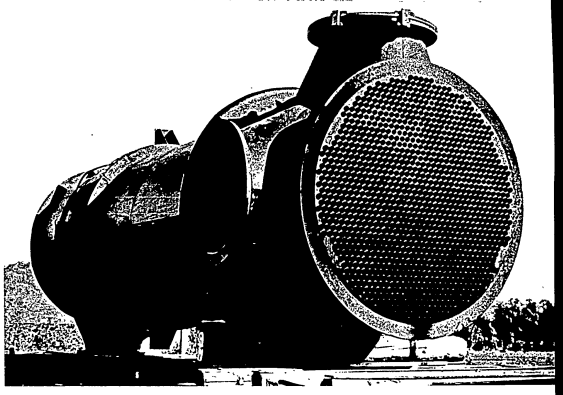
Parrilla giratoria para filtrar el agua de mar
enfriamiento de los condensadores para centrales térmicas

Self-lighting buoys for high depths

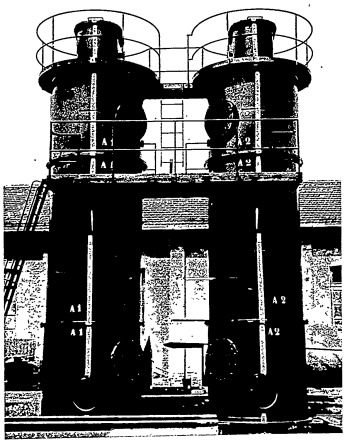
Selbstzündungleuchttonnen für wichtige Tiefen

Bouées s'allument par elles mêmes
pour grandes profondeurs

Boyas que se encienden por ellas mismas
para notables profundidades



Scambiatore di calore
superficie di scambio m² 120



Decalcificatore
o decloratore • Elex •

Heat exchanger
exchange surface : 120 m²

Waermeaustauscher
Heizflaeche : 120 m²

Echangeur de chaleur
surface utile : 120 m²

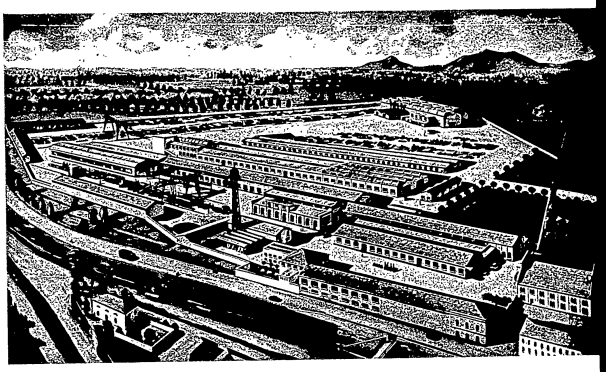
Cambiador de calor
Superficie de intercambio : 120 m²

Oil separating and deterring plant « ELEX »

Enteer und Entoel Anlage « ELEX »

Installation de dégraissage et de dégoudronnage type « ELEX »

Instalación de « ELEX » - Separadora de aceite y de alquitran



Veduta panoramica degli Stabilimenti delle Officine Elettromeccaniche Galileo

REDAZIONE: UFFICIO PUBBLICITÀ DELLE OFFICINE ELETTROMECCANICHE GALILEO

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

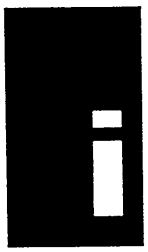
CATALOGO GENERALE APPARECCHIATURE ELETTRICHE

GENERAL CATALOGUE OF SWITCHGEAR
CATALOGO GENERAL APARATOS ELECTRICOS

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

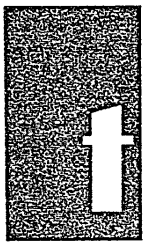
SEDE IN MILANO - CAP. L. 700.000.000 - STABILIMENTO A BATTAGLIA TERME - PADOVA - TEL.: PD 34340 (TRE LINEE) - TELEGR.: OFFICINE BATTAGLIATERME

JOINT STOCK CO. ESTABLISHED IN MILAN - WORKS AT BATTAGLIA TERME - PADOVA - CAPITAL LIT. 700,000,000 - PHONE: PD 34340 (3 LINES) - CABLES: OFFICINE BATTAGLIATERME S.P.A. - DOMICILIO SOCIAL: MILANO - TALLERES EN BATTAGLIA TERME - PADOVA - CAPITAL LIT. 700,000,000 - TELEFONO: PD 34340 (3 LINEAS) - TELEGR OFFICINE BATTAGLIATERME



INTERRUTTORI IN OLIO A COLONNA E PNEUMATICI

LOW OIL AND AIR BLAST CIRCUIT BREAKERS
INTERRUPTORES EN VOLUMEN REDUCIDO DE ACEITE TIPO DE COLUMNA Y NEUMATICOS

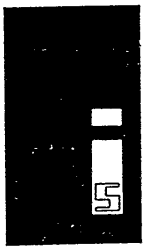


TRASFORMATORI DI CORRENTE E DI TENSIONE

CURRENT AND VOLTAGE TRANSFORMERS
TRANSFORMADORES DE CORRIENTE Y DE TENSION

SEZIONATORI DI OGNI TIPO

ISOLATING SWITCHES OF ALL TYPES
SECCIONADORES DE CUALQUIER TIPO



ISOLATORI PASSANTI E ISOLATORI PORTANTI

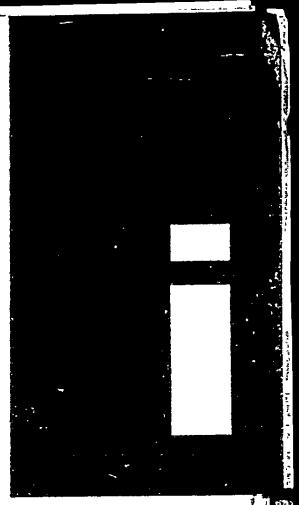
SUPPORTING AND PASS-THROUGH INSULATORS
AISLADORES PASANTES Y DE SOSTEN

TABLE OF DIMENSION APPEARING IN THIS PUBLICATION CONVERTED TO FEET AND INCHES

mm.	inches	mm.	inches	mm.	feet and inches	mm.	feet and inches	mm.	feet and inches	mm.	feet and inches	mm.	feet and inches	mm.	feet and inches	mm.	feet and inches
7	9/32"	126	4 61/64"	274	10 25/32"	400	1'-3 3/4"	594	1'-11 25/64"	860	2'-9 55/64"	1210	3'-11 41/64"	1735	5'-8 5/16"	2795	9'-2 3/64"
10	25/64"	130	5 1/8"	275	10 53/64"	402	1'-3 53/64"	596	1'-11 15/32"	862	2'-9 15/16"	1230	4'-0 7/16"	1748	5'-8 53/64"	2870	9'-5"
11	7/16"	132	5 13/64"	276	10 55/64"	405	1'-3 15/16"	599	1'-11 37/64"	870	2'-10 1/4"	1235	4'-0 5/8"	1750	5'-8 29/32"	2880	9'-5 25/64"
12	15/32"	134	5 9/32"	280	11 1/32"	407	1'-4 1/32"	600	1'-11 5/8"	880	2'-10 11/64"	1244	4'-0 63/64"	1755	5'-9 3/32"	2895	9'-5 63/64"
13	33/64"	135	5 5/16"	283	11 9/64"	410	1'-4 9/64"	602	1'-11 15/64"	886	2'-10 7/8"	1245	4'-1 1/64"	1770	5'-9 11/16"	2900	9'-6 3/16"
14	35/64"	140	5 33/64"	285	11 7/32"	418	1'-4 29/64"	603	1'-11 47/64"	893	2'-11 5/32"	1250	4'-1 7/32"	1775	5'-9 57/64"	2952	9'-8 15/64"
15	19/32"	142	5 19/32"	286	11 17/64"	420	1'-4 17/32"	608	1'-11 15/16"	895	2'-11 15/64"	1260	4'-1 39/64"	1780	5'-10 5/64"	2970	9'-8 15/16"
16	5/8"	144	5 43/64"	288	11 11/32"	427	1'-4 13/16"	610	2'-0 1/64"	900	2'-11 7/16"	1270	4'-2"	1784	5'-10 15/64"	2981	9'-9 3/8"
17	43/64"	145	5 45/64"	290	11 27/64"	430	1'-4 59/64"	612	2'-0 3/32"	910	2'-11 53/64"	1280	4'-2 13/32"	1795	5'-10 43/64"	2995	9'-9 59/64"
19	3/4"	148	5 53/64"	293	11 17/32"	431	1'-4 31/32"	615	2'-0 7/32"	912	2'-11 29/32"	1285	4'-2 19/32"	1800	5'-10 7/8"	3038	9'-11 5/8"
20	25/32"	150	5 29/32"	295	11 39/64"	435	1'-5 1/8"	618	2'-0 21/64"	920	3'-0 7/32"	1290	4'-2 51/64"	1814	5'-11 27/64"	3054	10'-0 1/4"
21	53/64"	152	5 63/64"	300	11 13/16"	436	1'-5 11/64"	620	2'-0 13/32"	928	3'-0 17/32"	1295	4'-2 63/64"	1815	5'-11 29/64"	3070	10'-0 7/8"
22	55/64"	153	6 1/32"	302	11 57/64"	438	1'-5 1/4"	625	2'-0 39/64"	930	3'-0 39/64"	1298	4'-3 7/64"	1834	6'-0 13/64"	3098	10'-1 63/64"
23	29/32"	155	6 7/64"	303	11 59/64"	440	1'-5 21/64"	630	2'-0 51/64"	932	3'-0 11/16"	1300	4'-3 3/16"	1849	6'-0 51/64"	3100	10'-2 1/16"
24	15/16"	160	6 19/64"	304	11 31/32"	441	1'-5 23/64"	640	2'-1 13/64"	935	3'-0 13/16"	1306	4'-3 27/64"	1850	6'-0 27/32"	3180	10'-5 7/32"
25	63/64"	162	6 3/8"	305	1'-0 1/64"	444	1'-5 31/64"	650	2'-1 19/32"	937	3'-0 57/64"	1320	4'-3 31/32"	1854	6'-1"	3190	10'-5 39/64"
27	1 1/16"	165	6 1/2"	310	1'-0 13/64"	445	1'-5 33/64"	655	2'-1 25/32"	940	3'-1"	1335	4'-4 9/16"	1860	6'-1 15/64"	3205	10'-6 13/64"
28	1 7/64"	166	6 17/32"	312	1'-0 9/32"	446	1'-5 9/16"	656	2'-1 53/64"	950	3'-1 13/32"	1363	4'-5 43/64"	1892	6'-2 31/64"	3218	10'-6 45/64"
32	1 17/64"	170	6 11/16"	316	1'-0 7/16"	447	1'-5 19/32"	660	2'-1 63/64"	959	3'-1 3/4"	1400	4'-7 1/8"	1910	6'-3 13/64"	3235	10'-7 3/8"
34	1 11/32"	171	6 47/64"	320	1'-0 49/64"	450	1'-5 23/32"	665	2'-2 3/16"	960	3'-1 51/64"	1404	4'-7 9/32"	1936	6'-4 7/32"	3270	10'-8 3/4"
35	1 3/8"	172	6 49/64"	321	1'-0 51/64"	455	1'-5 59/64"	670	2'-2 3/8"	962	3'-1 7/8"	1410	4'-7 33/64"	1950	6'-4 25/32"	3280	10'-9 5/32"
37	1 29/64"	173	6 13/16"	322	1'-0 53/64"	457	1'-5 63/64"	675	2'-2 37/64"	965	3'-1 63/64"	1415	4'-7 23/32"	1960	6'-5 11/64"	3355	11'-0 1/32"
38	1 1/2"	175	6 57/64"	324	1'-0 3/4"	460	1'-6 7/64"	680	2'-2 19/64"	970	3'-2 3/16"	1425	4'-8 7/64"	1980	6'-5 61/64"	3450	11'-3 27/32"
40	1 37/64"	180	7 3/32"	325	1'-0 51/64"	465	1'-6 5/16"	682	2'-2 27/32"	975	3'-2 25/64"	1440	4'-8 45/64"	2000	6'-6 3/4"	3458	11'-4 5/32"
43	1 11/16"	182	7 11/64"	326	1'-0 53/64"	468	1'-6 27/64"	684	2'-2 59/64"	980	3'-2 37/64"	1445	4'-8 57/64"	2013	6'-7 7/64"	3460	11'-4 15/64"
45	1 49/64"	185	7 9/32"	327	1'-0 7/8"	470	1'-6 1/2"	685	2'-2 31/32"	985	3'-2 55/64"	1450	4'-9 3/32"	2040	6'-8 21/64"	3480	11'-5 1/64"
48	1 57/64"	186	7 21/64"	328	1'-0 29/32"	475	1'-6 45/64"	690	2'-3 11/64"	995	3'-3 11/64"	1460	4'-9 31/64"	2052	6'-8 51/64"	3485	11'-5 7/32"
50	1 31/32"	188	7 13/32"	330	1'-1"	477	1'-6 25/32"	695	2'-3 23/64"	1000	3'-3 3/8"	1465	4'-9 11/16"	2060	6'-9 7/64"	3530	11'-6 63/64"
52	2 3/64"	190	7 31/64"	332	1'-1 5/64"	479	1'-6 55/64"	700	2'-3 9/16"	1010	3'-3 49/64"	1466	4'-9 23/32"	2085	6'-10 3/32"	3585	11'-9 5/32"
55	2 11/64"	192	7 9/16"	335	1'-1 3/16"	480	1'-6 57/64"	705	2'-3 3/4"	1012	3'-3 27/32"	1470	4'-9 7/8"	2130	6'-11 7/8"	3647	11'-11 19/32"
56	2 13/64"	193	7 19/32"	336	1'-1 15/64"	483	1'-7 1/64"	707	2'-3 53/64"	1014	3'-3 17/64"	1475	4'-10 5/64"	2192	7'-2 5/16"	3655	11'-11 29/32"
57	2 1/4"	195	7 43/64"	340	1'-1 25/64"	484	1'-7 1/16"	710	2'-3 61/64"	1015	3'-3 31/32"	1480	4'-10 17/64"	2210	7'-3 1/64"	3720	12'-2 15/32"
60	2 23/64"	200	7 7/8"	341	1'-1 27/64"	485	1'-7 3/32"	712	2'-4 1/32"	1020	3'-4 5/32"	1482	4'-10 11/32"	2220	7'-3 13/32"	3765	12'-4 15/64"
64	2 33/64"	202	7 61/64"	345	1'-1 37/64"	490	1'-7 19/64"	720	2'-4 11/32"	1023	3'-4 9/32"	1490	4'-10 13/64"	2235	7'-4"	3780	12'-4 53/64"
65	2 9/16"	203	7 63/64"	346	1'-1 5/8"	495	1'-7 31/64"	725	2'-4 35/64"	1030	3'-4 9/16"	1500	4'-11 1/16"	2240	7'-4 13/64"	3828	12'-6 23/32"
70	2 3/4"	205	8 5/64"	348	1'-1 15/64"	498	1'-7 39/64"	726	2'-4 37/64"	1040	3'-4 61/64"	1509	4'-11 13/32"	2260	7'-4 63/64"	3830	12'-6 31/64"
75	2 61/64"	206	8 1/64"	350	1'-1 25/32"	500	1'-7 11/16"	730	2'-4 47/64"	1045	3'-5 9/64"	1510	4'-11 29/64"	2278	7'-5 11/16"	3837	12'-7 5/64"
76	3	210	8 17/64"	351	1'-1 13/16"	505	1'-7 7/8"	731	2'-4 25/32"	1046	3'-5 3/16"	1515	4'-11 21/32"	2290	7'-6 11/64"	3980	13'-0 15/64"
77	3 1/32"	215	8 15/32"	354	1'-1 15/16"	507	1'-7 61/64"	740	2'-5 1/32"	1050	3'-5 11/32"	1527	5'-0 1/8"	2300	7'-6 9/16"	4045	13'-3 17/64"
80	3 5/32"	220	8 21/32"	355	1'-1 31/32"	510	1'-8 5/64"	750	2'-5 17/32"	1058	3'-5 21/32"	1535	5'-0 7/16"	2310	7'-6 61/64"	4195	13'-9 11/64"
82	3 15/64"	221	8 45/64"	356	1'-2 1/64"	520	1'-8 15/32"	755	2'-5 33/32"	1070	3'-6 1/8"	1536	5'-0 31/64"	2343	7'-8 1/4"	4250	13'-11 11/32"
83	3 17/64"	224	8 13/16"	357	1'-2 1/16"	530	1'-8 55/64"	760	2'-5 59/64"	1080	3'-6 17/32"	1540	5'-0 41/64"	2370	7'-9 5/16"	4340	14'-2 57/64"
85	3 11/32"	225	8 55/64"	360	1'-2 11/64"	533	1'-8 63/64"	765	2'-6 7/64"	1084	3'-6 11/16"	1545	5'-0 53/64"	2376	7'-9 35/64"	4590	15'-0 47/64"
87	3 27/64"	226	8 57/64"	362	1'-2 1/4"	535	1'-9 1/16"	770	2'-6 5/16"	1087	3'-6 31/64"	1557	5'-1 19/64"	2390	7'-10 7/64"	4700	15'-5 1/16"
88	3 15/32"	230	9 1/16"	365	1'-2 3/8"	536	1'-9 7/64"	776	2'-6 35/64"	1094	3'-7 5/64"	1575	5'-2 1/64"	2405	7'-10 11/16"	5150	16'-10 25/32"
90	3 35/64"	235	9 1/4"	366	1'-2 13/32"	540	1'-9 47/64"	782	2'-6 25/32"	1100	3'-7 5/16"	1595	5'-2 51/64"	2416	7'-11 1/8"	5295	17'-4 31/64"
92	3 5/8"	236	9 19/64"	368	1'-2 31/64"	542	1'-9 11/32"	795	2'-7 19/64"	1110	3'-7 45/64"	1596	5'-2 27/32"	2435	7'-11 7/8"	5345	17'-6 29/64"
93	3 21/32"	238	9 3/8"	370	1'-2 9/16"	544	1'-9 27/64"	796	2'-7 11/32"	1120	3'-8 3/32"	1600	5'-3"	2500	8'-2 7/16"	5390	17'-8 15/64"
94	3 45/64"	240	9 29/64"	371	1'-2 39/64"	548	1'-9 37/64"	800	2'-7 1/2"	1135	3'-8 11/16"	1605	5'-3 3/16"	2505	8'-2 11/64"	5990	19'-7 27/32"
95	3 47/64"	242	9 17/32"	372	1'-2 41/64"	550	1'-9 21/32"	804	2'-7 21/32"	1136	3'-8 47/64"	1606	5'-3 15/64"	2510	8'-2 53/64"	6040	19'-9 53/64"
98	3 55/64"	245	9 41/64"	373	1'-2 11/16"	555	1'-9 27/32"	808	2'-7 13/16"	1150	3'-9 9/32"	1620	5'-3 25/32"	2523	8'-3 1/32"	6235	20'-5 1/2"
100	3 15/16"	246	9 11/16"	375	1'-2 49/64"	556	1'-9 57/64"	812	2'-7 31/32"	1160	3'-9 43/64"	1625	5'-3 63/64"	2535	8'-3 13/16"	7230	23'-8 11/16"
103	4 1/16"	248	9 49/64"	376	1'-2 51/64"	560	1'-10 3/64"	812	2'-7 31/32"	1164	3'-9 53/64"	1629	5'-4 9/64"	2590	8'-5 31/32"		
105	4 9/64"	250	9 27/32"	378	1'-2 7/8"	564	1'-10 13/64"	814	2'-8 3/64"	1165	3'-9 7/8"	1630	5'-4 11/64"	2600	8'-6 3/8"		
110	4 21/64"	252	9 59/64"	380	1'-2 61/64"	565	1'-10 1/4"	820	2'-8 9/32"	1169	3'-10 1/32"	1635	5'-4 3/8"	2610	8'-6 49/64"		
112	4 13/32"	255	10 1/32"	383	1'-3 5/64"	570	1'-10 7/16"	825	2'-8 31/64"	1170	3'-10 1/16"	1649	5'-4 59/64"	2627	8'-7 1/16"		
114	4 31/64"	256	10 5/64"	385	1'-3 5/32"	574	1'-10 49/64"	828	2'-8 43/64"	1178	3'-10 25/64"	1660	5'-5 23/64"	2635	8'-7 3/4"		
115	4 17/32"	258	10 5/32"	386	1'-3 13/64"	575	1'-10 1/64"	830	2'-8 43/64"	1179	3'-10 27/64"	1670	5'-5 3/4"	2655	8'-8 17/32"		
116	4 9/16"	260	10 15/64"	390	1'-3 23/64"	579	1'-10 51/64"	839	2'-9 1/32"	1180	3'-10 15/32"	1685	5'-6 11/32"	2700	8'-10 5/16"		
118	4 41/64"	263	10 23/64"	391	1'-3 25/64"	580	1'-10 53/64"	840	2'-9 1/16"	1184	3'-10 5/8"	1700	5'-6 15/16"	2704	8'-10 15/32"		
120	4 23/32"	265	10 7/16"	394	1'-3 33/64"	585	1'-11 1/32"	844	2'-9 15/64"	1188	3'-10 25/32"	1710	5'-7 21/64"	2710	8'-10 45/64"		
122	4 51/64"	270	10 5/8"	395	1'-3 35/64"	588	1'-11 5/32"	845	2'-9 17/64"	1192	3'-10 15/16"	1714	5'-7 31/64"	2733	8'-11 39/64"		
123	4 27/32"	271	10 43/64"	396	1'-3 19/32"	589	1'-11 3/16"	850	2'-9 15/32"	1200	3'-11 1/4"	1720	5'-7 23/32"	2737	8'-11 49/64"		
125	4 59/64"	272	10 45/64"	397	1'-3 5/8"	590	1'-11 15/64"	857	2'-9 47/64"	1205	3'-11 29/64"	1724	5'-7 7/8"	2775	9'-1 17/64"		

TABLE OF WEIGHTS APPEARING IN THIS PUBLICATION CONVERTED TO POUNDS

Kg.	lbs.	Kg.	lbs.	Kg.	lbs.	Kg.	lbs.	Kg.	lbs.	Kg.	lbs.	Kg.	lbs.	Kg	lbs.	Kg.	lbs.	Kg.	lbs.
1,3	2 3/4	7,2	15 3/4	23	50 3/4	46	101 1/2	85	187 1/2	144	317 1/2	215	474	310	683 1/2	500	1102	1050	2315
2	4 1/2	8	17 1/2	25	55	48	105 3/4	80	198 1/2	150	330 3/4	220	485	315	694 1/2	520	1146	1100	2425
2,2	4 3/4	10	22	28	61 3/4	50	110 1/4	95	209 1/2	155	341 3/4	230	507	320	705 1/2	560	1235	1150	2535
2,5	5 1/2	11	24 1/4	29	64	55	121 1/4	100	220 1/2	160	352 3/4	235	518	325	716 1/2	600	1323	1170	2580
2,8	6 1/4	11,5	25 1/4	30	66 1/4	58	127 3/4	105	231 1/2	165	363 3/4	240	529	335	738 1/2	630	1389	1260	2777
3,5	7 3/4	13	28 1/2	32	70 1/2	60	132 1/4	110	242 1/2	170	374 3/4	250	551	350	771 1/2	650	1433	1370	3020
4	8 3/4	15	33	33	72 3/4	65	143 1/4	115	253 1/2	175	385 3/4	260	573	370	816	680	1499	1970	4343
4,2	9 1/4	16	35 1/4	35	77 1/4	69	152	118	260 1/4	180	396 3/4	265	584	400	882	700	1543	2120	4674
4,5	10	17	37 1/2	36	79 1/4	70	154 1/4	120	264 1/2	185	407 3/4	270	595	410	904	730	1609	3000	6614
5	11	18	39 3/4	38	83 3/4	72	158 3/4	125	275 1/2	190	419	285	628 1/2	430	948	740	1631	3060	6967
5,5	12	20	44	40	88 1/4	75	165 1/4	130	286 1/2	195	430	290	639 1/2	440	970	830	1830	3700	8157
6	13 1/4	21	46 1/2	42	92 1/2	80	176 1/4	135	297 1/2	200	441	300	661 1/2	450	992	850	1874	3750	8267
7	15 1/2	22	48 1/2	45	99 1/2	82	180 3/4	140	308 3/4	210	463	305	672 1/2	490	1080	950	2094	6320	13934



interruttori

CIRCUIT BREAKERS - INTERRUPTORES

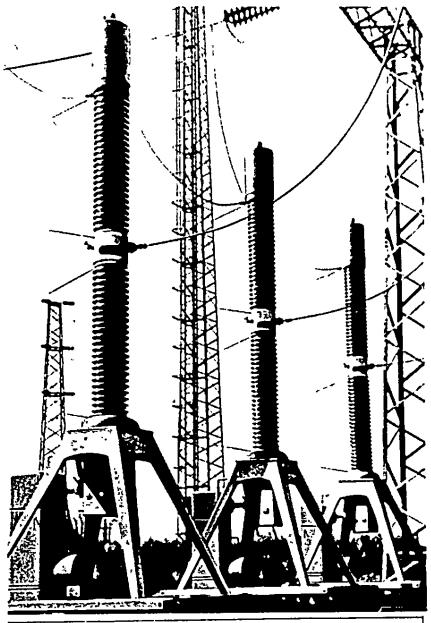
Declassified in Part - Sanitized Copy Approved for Release @ 50-Yr 2013/11/15 : CIA-RDP81-01043R002700090001-8

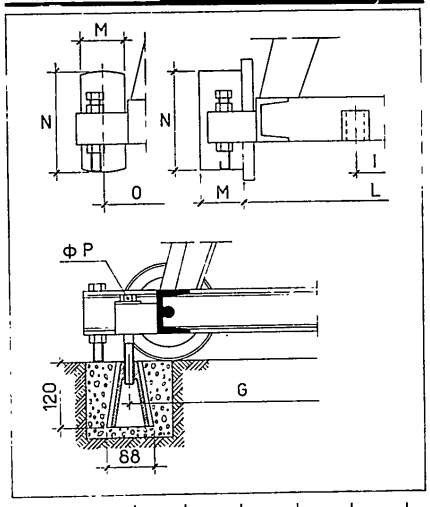
1100 | INTERRUTTORI IN OLIO A COLONNA MOD. OCER-OCERD

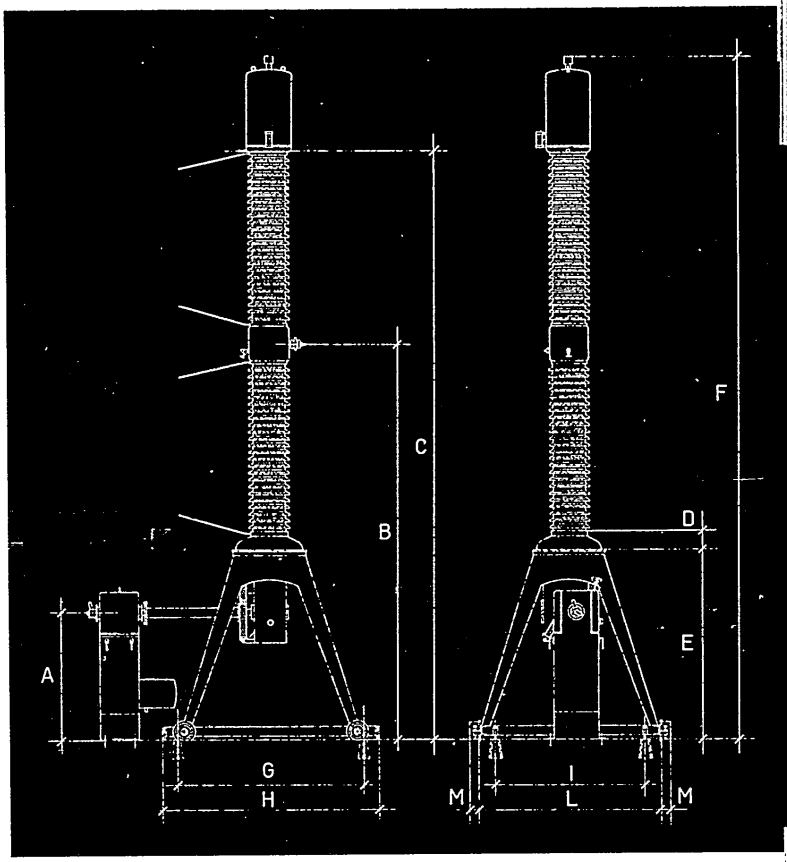
PILLAR TYPE OIL CIRCUIT BREAKERS MOD. OCER (OGOR) - OCERD (OGORD)
INTERRUPTORES EN ACEITE TIPO DE COLUMNA MOD. OCER - OCERD

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER ESTERNO
FOR OUTDOOR
PARA INTEMPERIE







L'altezza del cavalletto può essere subordinata alle particolari esigenze dell'impianto
The supporting frame may have dimensions according with plants requirements
L'altura del soporte puede ser variada de acuerdo con las exigencias de la planta

INTERRUTTORE CIRCUIT BREAKER INTERRUPTOR	Tensione nominale Rated voltage Tension nominal KV	Corrente nominale Rated current Corriente nominal A	Potere di apertura Breaking capacity Capacidad de ruptura MVA	Tens. di prova per 1' One minute test voltage Tens. de prueba durante 1' KV	Tens. di prova per 1h One hour test voltage Tens. de prueba durante 1h KV	Olio parte superiore Upper part oil Aceite parte superior Kg	Peso senza manovra Weight without control Peso sin mando Kg	A	B	C	D	E	F	G	H	I	L	M	N	O	ΔP
OCER 60	60	630	1200	152	90	36	1370~	1527	2710	3485	118	1892	4045	1030	1290	700	1000	65	140	1040	16 MA
OCER 80	80	630	1500	200	120	42	2120~	1482	2880	3780	118	1892	4340	1030	1290	700	1000	65	140	1040	16 MA
OCERD 110	110	800	2500	265	165	140	3060~	1335	3190	4700	160	1850	5390	1465	1770	1100	1440	80	180	1490	18 MA
OCERD 150	150	800	3000	350	225	165	3750~	1335	3530	5345	160	1850	6040	1465	1770	1100	1440	80	180	1490	18 MA
OCERD 220	220	800	5000	504	330	270	6320~	1363	4195	6235	200	2013	7230	1980	2300	1596	1936	100	180	2000	18 MA

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[illegible] A COLONNA
[illegible] OCER - OCERD

[illegible] da quelli tipo [illegible] più elevata potenza [illegible] per il diverso dimensio- [illegible] attiva della colonna Questi interruttori sono del tipo a colonna. I cilindri di bachelite che costituiscono i tre poli dell'interruttore, sono protetti da camicie di porcellana che pero sono montate in modo da non prender parte agli sforzi meccanici che sollecitano i cilindri isolanti, nè a quelli derivanti da variazioni termiche delle parti

Sono interruttori a quantita molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l'impiego della camera d'interruzione a labirinto

Essa è essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita questo gas non puo penetrare nella zona centrale dell'arco, quando la corrente e intensa, per la sovrapressione che vi si oppone, nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell arco.

Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice. le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall'arco (idrogeno, ecc) e favorevo'e a questa rigenerazione

Ques'o sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi e una garanzia di durata e di buon funzionamento

Nell'interno degli isolatori di sostegno sono generalmente contenuti anche i riduttori di corrente.

Il comando puo essere a mano od a distanza. In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a trifase, qualora non si disponga di batterie di accumulatori Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio

MOD OCER (OGOR) - OCERD (OGORD) PILLAR TYPE OIL CIRCUIT BREAKERS FOR OUTDOOR INSTALLATION

These circuit breakers are different from the OCE (OGO) - OCED (OGOD) type because of their greater breaking capacity and consequently of the different size of the active part of the column.

They are of pillar structure. The bakelite cylinders forming the three poles of the circuit breaker are protected by porcelain sleeves mounted in such a way as not to be affected either by the stress to which the insulating cylinders are subjected or by strain due to the dilatation of the parts caused by heat These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency, all this is obtained thanks to a labyrinth-like arc-quenching chamber

The latter consists essentially of a series of small oil chamber placed at the sides of the duct through which the moving contact passes and in which the arc take place. These small chambers are sitvated at superposed levels prallel to each other, and they are angularly shifted regard to the central duct. The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available, for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc. This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i e when the pressure is minimum Further mixing of this oil with gas generated by the arc (hydrogen, etc.), facilitates said regenerating action.

This rupturing system requires a very small quantity of oil, while the simplicity of the mechanism guarantees long service and efficiency

Current transformers are usually incorporated in the insulating lower pole of the circuit breaker

Hand or remote control may be used. In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electropneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid

INTERRUPTORES EN ACEITE TIPO DE COLUMNA MOD OCER - OCERD PARA INSTALACION INTEMPERIE

Estos interruptores difieren de los tipo OCE-OCED por ser su capacidad de interrupcion superior y en consecuencia, por el mayor volumen de la camara deyonizadora

Los interruptores estan constituidos por 3 columnas.

Los cilindros de bakelita que forman los 3 polos del interruptor estan protegidos por camisas de porcelana, que quedan montadas en forma de no ser sometidas a los esfuerzos mecanicos que obran sobre los cilindros aislantes, ni a los ocasionados por la dilatacion termica

Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora. Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el el contacto movil y se desarolla el arco

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central.

El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a traves del cual no tienen posipilidad de salida, estes gases no pueden penetrar en la zona central del arco debilo a la sobrepresion que se les opone, en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero

La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla las celdas, deteniendo aceite aislante, aun en los periodos de maxima corriente, permiten una mezcla de este, en la columna yonizada, en el momento en que la corriente pasa por el cero; en el mismo momento tambien la presion es minima La mezcla con los gases generados por el arco (hidrogeno, etc) es favorable a dicha regeneracion. Este sistema de interrupción del arco necesita muy poco aceite y la sencillez de las partes mecanicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad.

En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad.

El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia

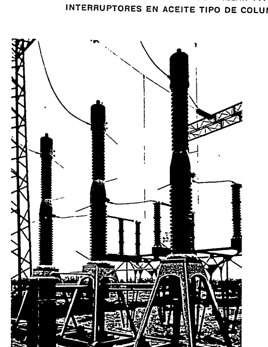
En el caso de mando a distancia, èste puede efectuarse con un electroiman de corriente continua y si no existiera una bateria de acumuladores, con motor trifásico de corriente alterna

El mando puede ser tambien del tipo electropneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroimán desenganche

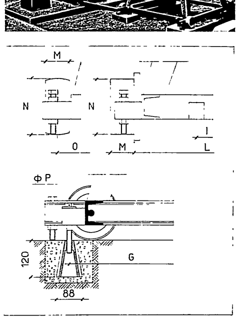
1110 | INTERRUTTORI IN OLIO A COLONNA MOD. OCE-OCED

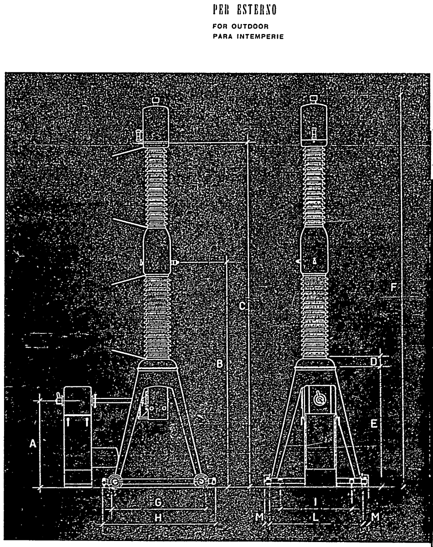
MOD. OCE (OGO) - OCED (OGOD) PILLAR TYPE OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE TIPO DE COLUMNA MOD. OCE-OCED

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S. p. A.



PER ESTERNO
FOR OUTDOOR
PARA INTEMPERIE





L'altezza del cavalletto può essere subordinata alle partico'ari esigenze dell'impianto
The supporting frame may have dimensions according with plants requirements
L'altura del soporte puede ser variada de acuerdo con las exigencias de la planta

INTERRUTTORE / CIRCUIT BREAKER / INTEPRUPTOR		Tensione nominale / Rated voltage / Tension nominal KV	Corrente nominale / Rated current / Corriente nominal A	Potere di apertura / Breaking capacity / Capacidad de ruptura MVA	Tens. di prova per 1' / One minute test voltage / Tens. de prueba durante 1' KV	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h KV	Olio parte superiore / Upper part oil / Aceite parte superior Kg	Peso senza manovra / Weight without control / Peso sin mando Kg.	A	B	C	D	E	F	G	H	I	L	M	N	O	P
OCE	60	60	400	600	152	90	25	1170~	1536	2700	3450	118	1892	3980	1030	1290	700	1000	65	140	1040	16 MA
OCE	80	80	400	800	200	120	36	1970~	1482	2870	3720	118	1892	4250	1030	1290	700	1000	65	140	1040	16 MA
OCED	120	120	500	1500	285	180	140	3000~	1335	3100	4590	160	1850	5150	1465	1770	1100	1440	80	180	1490	18 MA
OCED	150	150	500	2000	350	225	165	3700~	1335	3480	5295	160	1850	5990	1465	1770	1100	1440	80	180	1490	18 MA

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INTERRUTTORI IN OLIO A COLONNA TIPO ESTERNO MOD OCE - OCED

Questi [illegible] sono da quelli tipo OCER-OCERD [illegible] una elevata potenza di [illegible] il diverso dimensionamento della colonna. Questi [illegible] del tipo a colonna. I [illegible] sono costituiscono i tre poli [illegible] sono protetti da camicie [illegible] che però sono montate in modo da non risentire per parte agli sforzi meccanici che [illegible] dei cilindri isolanti, né a quelli derivanti da variazioni termiche delle parti.

Sono interruttori a quantità molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l'impiego della camera di interruzione a labirinto.

Essa è essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco. Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente sfasate angolarmente rispetto al canale centrale. L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita. questo gas non può penetrare nella zona centrale dell'arco, quando la corrente è in fase, per la sovrapressione che vi si oppone, nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.

Lo scopo viene raggiunto generando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima. Il rimescolamento con gas generati dall'arco (idrogeno, ecc.) è favorevole a questa rigenerazione.

Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi e una garanzia di durata e di buon funzionamento.

Nell'interno degli isolatori di sostegno sono generalmente contenuti anche i riduttori di corrente.

Il comando può essere a mano od a distanza. In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c. a trifase, qualora non si disponga di batterie di accumulatori. Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sganciо.

MOD OCE (OGO) - OCED (OGOD) PILLAR TYPE OIL CIRCUIT BREAKERS FOR OUTDOOR INSTALLATION

These circuit breakers differ from the OCER (OGOR) - OCERD (OGORD) type for their lower breaking capacity and consequently for the different size of the active part of the column.

They are of pillar structure. The bakelite cylinders forming the three poles of the circuit breaker are protected by porcelain sleeves mounted in such a way as not to be affected either by the stress to wich the insulating cylinders are subjected or by the strain due to dilatation of the parts caused by heat. These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency, all this is obtained thanks to a labyrinth-like arc-quenching chamber.

The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place. These small chambers are situated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct. The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available. for higher values of current, the gas cannot enter the central zone of the arc oving to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc. This purpose is achieved in a very simple way by regenerating a non-onized med um as the small chambers do retain oil with hing insulation capacity also during periods of peak current. they allow the remixing of this oil with the ionizing column when the current goes through zero, i.e. when the pressure is minimum. Further mixing of this oil with gas generated by the arc (hydrogen, etc.) facilitates said regenerating action.

This rupturing system requires a very small quantity of oil, while the simplicity of the mechanism guarantees long service and efficiency.

Current transformers are usually housed in the insulating lower pole of the circuit breaker.

Hand or remote control may be used. In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current when storage batteries are not available. The control may also be electropneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid.

INTERRUPTORES EN ACEITE, TIPO DE COLUMNA MOD OCE - OCED PARA INSTALACION INTEMPERIE

Estos interruptores difieren de los tipo OCER OCERD por ser su capacidad interruptiva inferior y, en consecuencia por el diferente dimensionamento de la parte activa de la columna.

Los interruptores estan constituidos por 3 columnas.

Los cilindros de bakelita que forman los 3 polos del interruptor estan protegidos por camisas de porcelana, que quedan montadas en forma de no ser someti das a los esfuerzos mecanicos que obran sobre los cilindros aislantes, ni a los ocasionados por la dilatacion térmica.

Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora. Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco.

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central.

El arco, que con el movimiento de la barra movi, queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a traves del cual no tienen posibilidad de salida; estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone, en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero.

La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla. las celdas, reteniendo aceite aislante, aun en los periodos de maxima corriente, permiten una mezcla de éste, en la columna yonizada, en el momento en que la corriente pasa por el cero, en el mismo momento tambien la presion es minima. La mezcla con los gases generados por el arco (hidrogeno, etc.) es favorable a dicha regeneracion. Este sistema de interrupcion del arco necesita muy poco aceite y la sencillez de las partes mecanicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad.

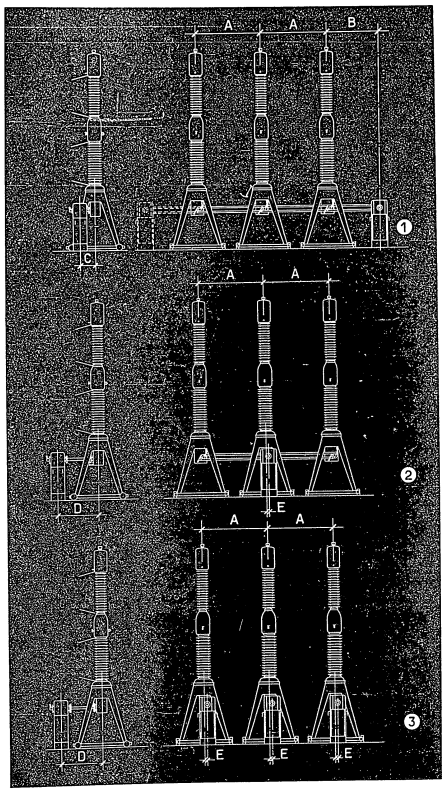
En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad.

El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia.

En el caso de mando a distancia, este puede efectuarse con un electroiman de corriente continua y si no existiera una bateria de acumuladores, con motor trifasico de corriente alterna.

El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroiman de desenganche.

CIRCUIT BREAKERS' AND OPERATING MECHANISMS' INSTALLATION
INSTALACION INTERRUPTORES Y MANDOS



1) COMANDO LATERALE
Side control
Mando lateral

2) COMANDO CENTRALE
Central control
Mando central

3) COMANDO MONOFASE
Single phase control
Mando monofasico

Tensione nominale Rated voltage Tension nominal KV	A norm.	B norm.	C norm.	D	E
60	1200	1200	410	1000	118
80	1500	1500	446	1000	144
110-120	1800	1600	477	1250	75
150	2000	1600	477	1250	75
220	2500	1600	596	1600	75

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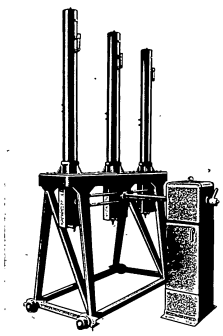
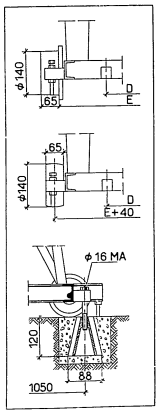
1200 | # INTERRUTTORI IN OLIO A COLONNA MOD. OC

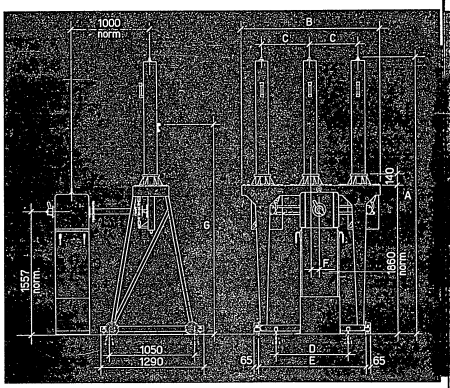
MOD. OC (OGI) PILLAR TYPE OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO DE COLUMNA MOD. OC

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A

PER INTERNO
FOR INDOOR
PARA INTERIOR







L'altezza del cavalletto può essere subordinata alle particolari esigenze dell'impianto
The supporting frame may have dimensions according with plants requirements
L'altura del soporte puede ser variada de acuerdo con las exigencias de la planta

INTERRUTTORE CIRCUIT BREAKER INTERRUPTOR	Tensione nominale Rated voltage Tensión nominal	Corrente nominale Rated current Intensidad nominal	Potere di rottura Breaking capacity Capacidad de ruptura	Tens. di prova per 1' Dry voltage test voltage Tens. de prueba durante 1h	Tens. di prova per 1h Wet voltage test voltage Tens. de prueba durante 1h	Olio circolante Oil charge Aceite para el llenado	Peso senza massa Weight without contact Peso sin masa	A norm.	B	C	D	E	F	G norm
	KV	A	MVA	KV	KV	Kg.	Kg.							
OC 60	60	400	500	152	90	85	630~	3647	1720	600	1050	1335	100	2627
OC 80	80	400	600	200	120	95	700~	3837	2220	800	1450	1735	144	2737

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. . . . . IIO A COLONNA
. . . . . MOD OC

. . . . . quantita molto ridotta di . . . . . semplicissima e di alta . . . . . ottenuti con l impiego della camera di interruzione a labirinto
Essa e essenzialmente costituita da una serie di camerette d olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l arco Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale L'arco, che col movimento dell asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita questo gas non puo penetrare nella zona centrale dell'arco, quando la corrente e intensa, per la sovrapressione che vi si oppone; nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco
Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall'arco (idrogeno, ecc e favorevole a questa rigenerazione
Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi e una garanzia di durata e di buon funzionamento
Il comando può essere a mano od a distanza In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a trifase, qualora non si disponga di batterie di accumulatori Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio
Questo tipo di interruttore puo essere fornito di relè di minima tensione, relè di massima corrente e di bobina di sgancio, a richiesta del cliente

MOD CC (OGI)
PILLAR TYPE OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency all this is obtained thanks to a labyrinth-like arc-quenching chamber
The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place These small chambers are placed at superposed levels parallel to each other, and they are angularly shifted regard to the central duct The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available; for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when tre current passes by zero, so as to avoid a subsequent restriking of the arc.
This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i.e when the pressure is minimum Further mixing of this oil with gas generated by the arc (hydrogen, etc), facilitates said regenerating action
This rupturing system requires a very small quantity of oil, while the simplicity of the mechanism guarantees long service and efficiency
Hand or remote control may be used In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current when, storage batteries are not available. The control may also be electro-pneumatic, in which case closing s obtained by means of compressed air and opening by means of a small solenoid
This type of circuit breaker can be supplied whit minimum and maximum current relays and tripping coil, if required

INTERRUPTORES EN ACEITE TIPO DE COLUMNA MOD OC PARA INSTALACION INTERIOR

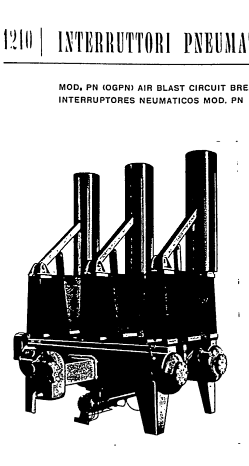
Son interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza sin embargo una gran potencia de interrupcion por medio de la camara deyonizadora Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco
Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central
El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida, estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone, en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero
La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla, las celdas, deteniendo aceite aislante, aun en los periodos de maxima corriente, permiten una mezcla de èste, en la columna yonizada, en el momento en que la corriente pasa por el cero; en el mismo momento tambien la presion es minima La mezcla con los gases generados por el arco (hidrogeno, etc.) es favorable a dicha regeneracion. Este sistema de interrupción del arco necesita muy poco aceite y la sencillez de las partes mecánicas garantiza una larga duración del interruptor y un ejercicio de toda seguridad.
El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia
En el caso de mando a distancia, èste puede efectuarse con un electroimán de corriente continua y si no existiera una bateria de acumuladores, con motor trifásico de corriente alterna.
El mando puede ser tambien del tipo electro neumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroimán de desenganche.
Este tipo de interruptor puede ser equipado — a petición del Cliente — con relé de tension minima, relé de maxima corriente y electroiman de desenganche

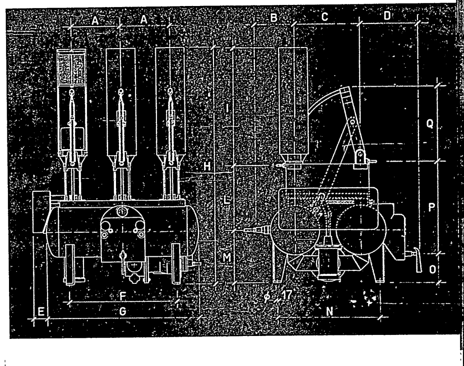
1210 | INTERRUTTORI PNEUMATICI MOD. PN

MOD. PN (OGPN) AIR BLAST CIRCUIT BREAKERS
INTERRUPTORES NEUMATICOS MOD. PN

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A

PER INTERNO
FOR INDOOR
PARA INTERIOR





INTERRUTTORE / CIRCUIT BREAKER / INTERRUPTOR	Tensione nominale / Rated voltage / Tension nominal KV	Corrente nominale / Rated current / Corriente nominal A	Potere di apertura / Breaking capacity / Capacidad de ruptura MVA	Tens. di prova per 1' / One minute test voltage / Tens. de prueba durante 1' KV	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h KV	Peso approssimativo / Approximate weight / Peso aproximado Kg	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q
PN 15	15	400-630	400	53	25	240	300	246	400	350	95	650	920	1425	710	395	320	620	175	555	455
PN 20	20	400-630	400	64	30	320	350	246	450	350	95	730	1020	1605	755	450	400	670	255	580	540
PN 30	30	400-630	400	86	45	410	400	246	500	450	95	820	1100	1750	845	505	400	720	255	665	660
PN 45	45	400-630	600	120	70	520	500	256	580	600	120	1000	1320	1960	895	615	450	800	305	760	725
PN 60	60	400-630	750	152	90	600	650	256	680	740	120	1300	1685	2235	1020	765	450	900	305	910	795

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. ' ' ORI PNEUMATICI
''RNO - MOD. PN

So ... ttori di costruzione molto semplice la cui realizzazione si avvicina ad un coltello sezionatore provvisto di un dispositivo per produrre un soffio di gas compresso al momento dell'apertura nel punto in cui si forma l'arco di interruzione.

L'apertura dell'interruttore avviene con un soffio violentissimo d'aria, limitato al tempo in cui i contatti compiono circa la prima metà della corsa.

Il movimento del contatto durante questa operazione è prodotto dal soffio stesso dell'aria di spegnimento per evitare in ogni modo la separazione dei contatti in assenza del soffio d'aria.

Un gioco di cassetti ed un pistone di comando fanno si che la chiusura si effettui rapidamente senza soffio d'aria. Un dispositivo di blocco automatico impedisce che si possa effettuare qualsiasi manovra se la pressione nei serbatoi non raggiunge un minimo prefissato e tale da assicurare lo spegnimento dell'arco in caso di corto circuito.

Questi interruttori sono previsti per funzionare tra 12 e 15 atm.

MOD. PN (OGPN)
AIR BLAST CIRCUIT BREAKERS FOR INDOOR INSTALLATION

The structure of these circuit breakers is very simple; they are similar to a disconnecting blade fitted with a mechanism for producing a blast of compressed gas, at the point in which the arc takes place when breaking occurs.

Opening of the circuit breaker is caused by a violent blast of air, lasting as long as the contacts complete approximately the first half of their run.

The movement of the contact during this operation is produced by the extinguishing air blast: this avoids any separation of the contacts in the absence of the compressed air.

The play of the slide valves and a control piston ensure rapid closing without the air blast. An automatic locking device prevents any operation being performed if the pressure in the chambers has not reached a pre-established minimum such as to ensure the extinction of the arc in the case of a short circuit.

These circuit breakers are designed to operate between 172 and 214 p.s.i.

INTERRUPTORES NEUMATICOS MOD. PN PARA INSTALACION AL INTERIOR

Son interruptores de construcción similar a las cuchillas seccionadoras, habiendose añadido a los contactos un dispositivo para soplar con aire comprimido el arco eléctrico, que se establece al abrirse el interruptor.

Con el fin de evitar la separación de los contactos, en ausencia del soplo de aire, el movimiento de apertura de estos es producido por el mismo soplo de aire que sirve para apagar el arco y que dura hasta que los contactos hayan cubierto acerca de la mitad del recorrido de apertura.

Un juego de valvulas y un pistón de mando obran el cierre del interruptor, sin intervención de aire comprimido soplado entre los contactos.

Un aparato de bloqueo automático impide la ejecución de cualquier maniobra, si la presión de aire en los tanques no alcanza un cierto valor pre-establecido y necesario para garantizar el apagamiento del arco en el caso de apertura en condición de corte circuito.

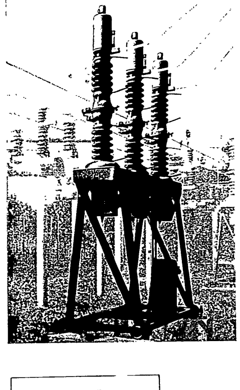
Estos interruptores están proyectados para trabajar con una presión de 12÷15 atms.

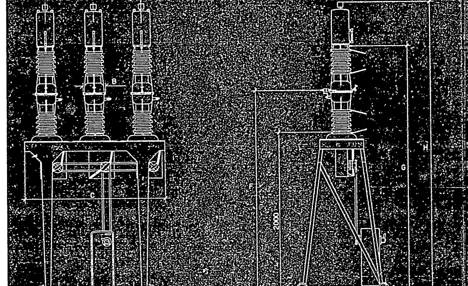
1250 | INTERRUTTORI IN OLIO A COLONNA MOD. OCE-OCER

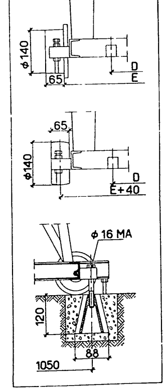
MOD. OCE (OGO) - OCER (OGOR) PILLAR TYPE OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO DE COLUMNA MOD OCE-OCER

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER ESTERNO
FOR OUTDOOR
PARA INTEMPERIE







L'altezza del cavalletto può essere subordinata alle particolari esigenze dell'impianto
The supporting frame may have dimensions according with plants requirements
L'altura del soporte puede ser variada de acuerdo con las exigencias de la planta

INTERRUTTORE / CIRCUIT BREAKER / INTERRUPTOR	Tensione nominale / Rated voltage / Tension nominal	Corrente nominale / Rated current / Corriente nominal	Potere di apertura / Breaking capacity / Capacidad de ruptura	Tensione di prova per 1' / One minute test voltage / Tens. de prueba durante 1'	Tensione di prova per 1h / One hour test voltage / Tens de prueba durante 1h	Olio occorrente / Filling oil / Aceite para el llenado	Peso senza manovra / Weight without control / Peso sin mando	A	B	C	D	E	F	G	H
	KV	A	MVA	KV	KV	Kg.	Kg.								
OCE 30	30	400	500	86	45	90	950~	600	290	1750	1000	1335	2500	3038	3585
OCE 45	45	400	600	120	70	115	1100~	700	290	1950	1200	1535	2590	3218	3765
OCER 30	30	630	700	86	45	118	1150~	600	300	1750	1000	1335	2500	3098	3655
OCER 45	45	630	1000	120	70	120	1260~	700	300	2000	1200	1535	2590	3270	3830

INTERR[illegible] OLIO A COLONNA
PER E[illegible] MOD OCE - OCER

Que[illegible] sono del tipo a colonna I [illegible], che costituiscono i tre poli dell'interruttore, sono protetti da camicie di porcellana che pero sono montate in modo da non prender parte agli sforzi meccanici che sollecitano i cilindri isolanti, ne a quelli derivanti da variazioni termiche delle parti

Sono interruttori a quantità molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l'impiego della camera d interruzione a labirinto.

Essa e essenzialmente costituita da una serie di camerette d olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco. Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita questo gas non può penetrare nella zona centrale dell'arco, quando la corrente è intensa, per la sovrapressione che vi si oppone, nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.

Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall'arco (idrogeno, ecc.) e favorevole a questa rigenerazione

Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi è una garanzia di durata e di buon funzionamento

Nell interno degli isolatori di sostegno sono generalmente contenuti anche i riduttori di corrente

Il comando può essere a mano od a distanza In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a trifase, qualora non si disponga di batterie di accumulatori Il comando può essere anche elettropneumatico e cioe con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio

MOD OCE (OGO) - OCER (OGOR)
PILLAR TYPE OIL CIRCUIT BREAKER
FOR OUTDOOR INSTALLATION

These circuit breakers are of the pillar type The bakelite cylinders forming the three poles of the circuit breaker are protected by porcelain sleeves mounted in such a way as not to be affected either by the stress to which the insulating cylinders are subjected or by the strain due to the dilatation of the parts caused by heat. The circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency. all this is obtained thanks to a labyrinth-like arc-quenching chamber The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place These small chambers are sitvated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available. for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i e when the pressure is minimum Further mixing of this oil with gas generated by the arc (hydrogen, etc), facilitates said regenerating action

This rupturing system requires a very small quantity of oil while the simplicity of the mechanism guarantees long service and efficiency.

Current transformers are usually incorporated in the insulating lower pole of the circuit breaker

Hand or remote control may be used. In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electropneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid

INTERRUPTORES EN ACEITE TIPO DE COLUMNA MOD OCE - OCER PARA INSTALACION INTEMPERIE

Estos interruptores son del tipo de columna Los cilindros de bakelita que forman los 3 polos del interruptor estan protegidos por camisas de porcelana, que quedan montadas en forma de no ser sometidas a los esfuerzos mecanicos que obran sobre los cilindros aislantes, ni a los ocasionados por la dilatacion têrmica

Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central

El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a traves del cual no tienen posibilidad de salida. estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone. en el interior, nor lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero.

La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla. las celdas, deteniendo aceite aislante, aun en los periodos de máxima corriente, permiten una mezcla de este, en loa columna yonizada, en el momento en que la corriente pasa por el cero, en el mismo momento tambien la presion es minima. La mezcla con los gases generados por el arco (hidrogeno, etc) es favorable a dicha regeneracion

Este sistema de interrupcion del arco necesita muy poco aceite y la sencillez de las partes mecánicas garantiza una larga duración del interruptor y un ejercicio de toda seguridad

En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad

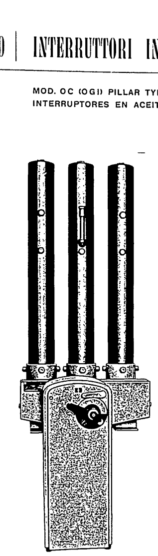
El mando del interruptor puede ser efectuado ya localmente y a mano ya a distancia En el caso de mando adistancia, éste puede efectuarse con un electroimán de corriente continua y si no existiera una bateria de acumuladores, con motor trifasico de corriente alterna

El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroimán de desenganche

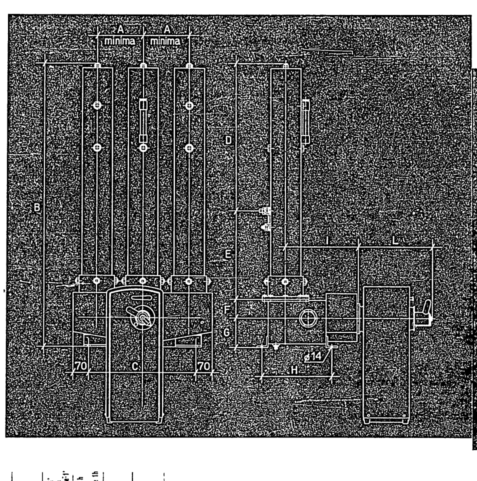
1300 | INTERRUTTORI IN OLIO A COLONNA MOD. OC

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S p A

MOD. OC (OGI) PILLAR TYPE OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO DE COLUMNA MOD. OC



PER INTERNO
FOR INDOOR
PARA INTERIOR



INTERRUTTORE CIRCUIT BREAKER INTERRUPTOR	Tensione nominale / Rated voltage / Tension nominal KV	Corrente nominale / Rated current / Corriente nominal A	Potere di apertura / Breaking capacity / Capacidad de ruptura MVA	Tensione di prova per 1' / One minute test voltage / Tens. de prueba durante 1' KV	Tensione di prova per 1h / One hour test voltage / Tens. de prueba durante 1h KV	Olio occorrente / Filling oil / Aceite para el llenado Kg.	Peso senza manovra / Weight without control / Peso sin mando Kg.	A	B	C	D	E	F	G	H	I
OC 15	15	400-630	400	53	25	30	135~	200	1295	460	710	380	80	125	305	316
OC 15	15	1000-1600	400	53	25	28	160~	240	1295	540	710	380	80	125	305	316
OC 20	20	400-630	400	64	30	35	155~	240	1415	540	740	435	100	140	325	336
OC 30	30	400-630	500	86	45	40	180~	300	1545	660	770	495	120	160	340	351
OC 45	45	400-630	500	120	70	50	210~	450	1815	960	830	625	165	195	395	396

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INTERRU[illegible] IN OLIO A COLONNA PER [illegible]NO - MOD OC

[illegible] quantità molto ridotta di [illegible] semplicissima e di alta [illegible] ottenuti con l'impiego della [illegible] d'interruzione a labirinto
Essa è essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilita di uscita. questo gas non può penetrare nella zona centrale dell'arco, quando la corrente e intensa, per la sovrapressione che vi si oppone, nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.
Lo scopo viene raggiunto rigenerando un ambiente non ionizzado ed in modo estremamente semplice: le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall'arco (idrogeno, ecc.) è favorevole a questa rigenerazione.
Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi è una garanz a di durata e di buon funzionamento
Il comando puo essere a mano od a distanza In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a trifase, qualora non si disponga di batterie di accumulatori Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio
Questo tipo di interruttore può essere fornito di rele di minima tensione, relè di massima corrente e di bobina di sgancio, a richiesta del cliente.

MOD OC (OGI)
PILLAR TYPE OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency; all this is obtained thanks to a labyrinth-like arc-quenching chamber
The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place. These small chambers are sitvated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct. The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available; for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc. This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capac ty also during periods of peak current, they allow the remixing of this oil with the ion zing column when the current goes through zero, i.e. when the pressure is minimum Further mixing of this oil with gas generated by the arc (hydrogen, etc.), facilitates said regenerating action.
This rupturing system requires a very small quantity of oil. while the simplicity of the mechanism guarantees long service and efficiency.
Current transformers are usually incorporated in the insulating lower pole of the circuit breaker.
Hand or remote control may be used In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electro-pneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid
This type of circuit breaker can be supplied whit m nimum and maximum current relays and tripping coil, if required.

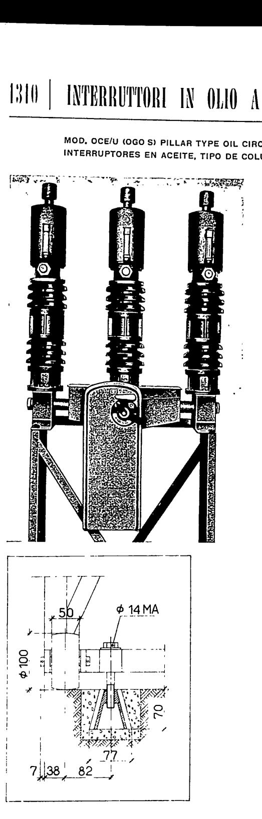
INTERRUPTORES EN ACEITE TIPO DE COLUMNA MOD OC PARA INSTALACION INTERIOR

Son interruptores en volumen de aceite muy reducido cuya construccion extremadamente sencilla realiza sin embargo una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora. Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco.
Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central.
El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida; estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone; en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero.
La extinción del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla. las celdas, deteniendo aceite aislante, aun en los periodos de máxima corriente, permiten una mezcla de éste, en la columna yonizada, en el momento en que la corriente pasa por el cero, en el mismo momento tambien la presion es minima. La mezcla con los gases generados por el arco (hidrogeno, etc) es favorable a dicha regeneracion Este sistema de interrupción del arco necesita muy poco aceite y la sencillez de las partes mecanicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad.
En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad
El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia
En el caso de mando a distancia, èste puede efectuarse con un electroiman de corriente continua y si no existiera una bateria de acumuladores, con motor trifasico de corriente alterna.
El mando puede ser tambien del tipo electro neumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroiman de desenganche
Este tipo de interruptor puede ser equipado — a petición del Cliente — con relé de minima tension, y de maxima corriente y electroimán de desenganche

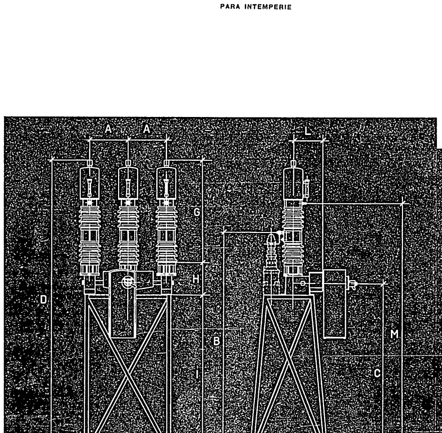
1310 | INTERRUTTORI IN OLIO A COLONNA MOD. OCE/U

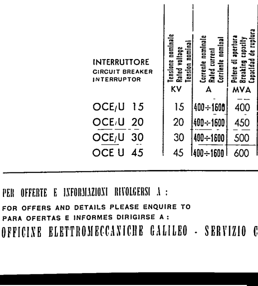
OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

MOD. OCE/U (OGO S) PILLAR TYPE OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO DE COLUMNA MOD. OCE U



PER ESTERNO
FOR OUTDOOR
PARA INTEMPERIE





L'altezza del cavalletto può essere subordinata alle particolari esigenze dell'impianto
The supporting frame may have dimensions according with plants requirements
L'altura del soporte puede ser variada de acuerdo con las exigencias de la planta

INTERRUTTORE / CIRCUIT BREAKER / INTERRUPTOR	Tensione nominale / Rated voltage / Tension nominal KV	Corrente nominale / Rated current / Corriente nominal A	Potere di apertura / Breaking capacity / Capacidad de ruptura MVA	Tensione di prova per 1' / One minute test voltage / Tens. de prueba durante 1' KV	Tensione di prova per 1h / One hour test voltage / Tens. de prueba durante 1h KV	Olio occorrente / Filling oil / Aceite para el llenado Kg.	Peso senza manovra / Weight without control / Peso sin mando Kg.	A	B	C	D	E	F	G	H	I	L	M
OCE/U 15	15	400÷1600	400	53	25	30	200~	400	2260	1795	2970	670	840	970	330	1670	316	2510
OCE/U 20	20	400÷1600	450	64	30	35	230~	450	2310	1775	3070	770	940	1070	365	1635	336	2610
OCE/U 30	30	400÷1600	500	86	40	40	260~	500	2390	1755	3235	870	1040	1235	405	1595	351	2775
OCE U 45	45	400÷1600	600	119	68	50	450~	700	2523	1710	3460	1270	1280	1460	485	1515	396	2995

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INTERRUTTORI IN OLIO A COLONNA PER ESTERNO - MOD OCE/U

Quest inter ttori costituiscono una variante, apposita ata per l'istallazione all'aperto dei interruttori della serie OC. Essi sono di tipo a colonna

I cilindri di bachelite che costituiscono i tre poli dell'interruttore, sono protetti da camicie di porcellana che però sono montate in modo da non prender parte agli sforzi meccanici che sollecitano i cilindri isolanti, nè a quelli derivanti da variazioni termiche delle parti

Sono interruttori a quantità molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l'impiego della camera d'interruzione a labirinto.

Essa è essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita· questo gas non può penetrare nella zona centrale dell'arco, quando la corrente è intensa, per la sovrapressione che vi si oppone, nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.

Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall'arco (idrogeno, ecc) è favorevole a questa rigenerazione.

Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi e una garanzia di durata e di buon funzionamento.

Il comando può essere a mano od a distanza. In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a trifase, qualora non si disponga di batterie di accumulatori Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio

MOD OCE/U (OGO/S) PILLAR TYPE OIL CIRCUIT BREAKERS FOR OUTDOOR INSTALLATION

These circuit breakers are a variation of the OC (OGI) series circuit breakers specially designed for outdoor installation They are of pillar structure.

The bakelite cylinders forming the three poles of the circuit breaker are protected by porcelain sleeves mounted in such a way as not to be affected either by the stress to which the insulating cylinders are subjected or by the strain due to the dilatation of the parts caused by heat. These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency; all this is obtained thanks to a labyrinth-like arc-quenching chamber

The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place. These small chambers are situated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct. The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available, for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc. This purpose is achieved in a very simple way by regenerating a non-ionized medium. as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i e when the pressure is minimum Further mixing of this oil with gas generated by the arc (hydrogen, etc), facilitates said regenerating action.

This rupturing system requires a very small quantity of oil, while the simplicity of the mechanism guarantees long service and efficiency

Current transformers are usually incorporated in the insulating lower pole of the circuit breaker

Hand or remote control may be used In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electro-pneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid.

INTERRUPTORES EN ACEITE, TIPO DE COLUMNA MOD OCE/U PARA INSTALACION INTEMPERIE

Estos interruptores representan una variacion, oportunamente proyetada, para la instalacion intemperie de los interruptores del tipo OC. Son interruptores tipo de columna. Los cilindros de bakelita que forman los 3 polos del interruptor estan protegidos por camisas de porcelana, que quedan montadas en forma de no ser sometidas a los esfuerzos mecanicos que obran sobre los cilindros aislantes, ni a los ocasionados por la dilatacion termica

Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora. Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central

El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida, estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone, en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero.

La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla. las celdas, deteniendo aceite aislante, aun en los periodos de maxima corriente, permiten una mezcla de éste, en la columna yonizada, en el momento en que la corriente pasa por el cero. en el mismo momento tambien la presion es minima. La mezcla con los gases generados por el arco (hidrogeno, etc) es favorable a dicha regeneración. Este sistema de interrupción del arco necesita muy poco aceite y la sencillez de las partes mecanicas garantiza una larga duración del interruptor y un ejercicio de toda seguridad

En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad

El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia.

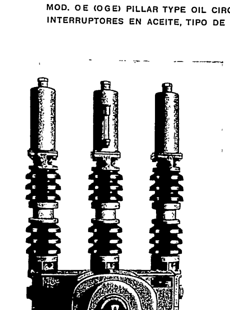
En el caso de mando a distancia, èste puede efectuarse con un electroiman de corriente continua y si no existiera una bateria de acumuladores, con motor trifasico de corriente alterna

El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroimán de desenganche

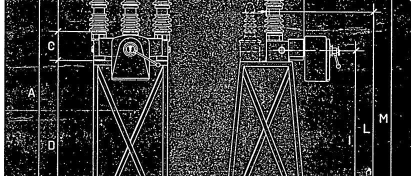
1320 | INTERRUTTORI IN OLIO A COLONNA MOD. OE

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

MOD. OE (OGE) PILLAR TYPE OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO DE COLUMNA MOD. OE



PER ESTERNO
FOR OUTDOOR
PARA INTEMPERIE



L'altezza del cavalletto può essere subordinata alle particolari esigenze dell'impianto
The supporting frame may have dimensions according with plants requirements
L'altura del soporte puede ser variada de acuerdo con las exigencias de la planta

INTERRUTTORE / CIRCUIT BREAKER / INTERRUPTOR	Tensione nominale / Rated voltage / Tension nominal KV	Corrente nominale / Rated current / Corriente nominal A	Potere di apertura / Breaking capacity / Capacidad de ruptura MVA	Tens. di prova per 1' / One minute test voltage / Tens. de prueba durante 1' KV	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h KV	Olio occorrente / Filling oil / Aceite para el llenado Kg.	Peso senza manovra / Weight without control / Peso sin mando Kg.	A	B	C	D	E	F	G	H	I	L	M
OE 15	15	400	250	53	25	15	135∼	2795	795	276	1724	300	450	840	280	1834	2210	2435
OE 20	20	400	280	64	30	18	150∼	2895	895	322	1678	350	550	940	302	1814	2290	2535
OE 30	30	400	310	86	86	22	165∼	2995	995	371	1629	400	650	940	324	1784	2376	2635

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INTERRU... ... OLIO A COLONNA PER ... ANO - MOD OE

Ques... ... ...ito del tipo a colonna I ...indri di ... ..., che costituiscono i tre poli dell'... ...ttore, sono protetti da camicie di porcellana che pero sono montate in modo da non prender parte agli sforzi meccanici che ...llecitano i cilindri isolanti, ne a quelli derivanti da variazioni termiche delle parti

Sono interruttori a quantità molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l'impiego della camera d interruzione a labirinto

Essa e essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale L arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita questo gas non può penetrare nella zona centrale dell'arco, quando la corrente è intensa, per la sovrapressione che vi si oppone, nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.

Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall'arco (idrogeno, ecc) e favorevole a questa rigenerazione

Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi e una garanzia di durata e di buon funzionamento

Il comando può essere a mano od a distanza In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a trifase, qualora non si disponga di batterie di accumulatori Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio

MOD OE (OGE) PILLAR TYPE OIL CIRCUIT BREAKERS FOR OUTDOOR INSTALLATION

These circuit breakers are of the pillar type The bakelite cylinders forming the three poles of the circuit breaker are protected by porcelain sleeves mounted in such a way as not to be affected either by the stress to which the insulating cylinders are subjected or by the strain due to the dilatation of the parts caused by heat These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency, all this is obtained thanks to a labyrinth-like arc-quenching chamber The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place. These small chambers are situated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct. The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available, for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i e when the pressure is minimum Further mixing of this oil with gas generated by the arc (hydrogen, etc.), facilitates said regenerating action.

This rupturing system requires a very small quantity of oil; while the simplicity of the mechanism guarantees long service and efficiency

Current transformers are usually incorporated in the insulating lower pole of the circuit breaker

Hand or remote control may be used In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available. The control may also be electropneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid

INTERRUPTORES EN ACEITE TIPO DE COLUMNA MOD OE

Estos interruptores son del tipo de columna Los cilindros de bakelita que forman los 3 polos del interruptor estan protegidos por camisas de porcelana, que quedan montadas en forma de no ser sometidas a los esfuerzos mecanicos que obran sobre los cilindros aislantes, ni a los ocasionados por la dila tacion térmica

Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central

El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida, estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone, en el interior, por lo tanto, quedaria un pequeño chorro yonizado que es necesario interrumpir en el breve instante en que la corriente pasa por el cero

La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla las celdas, deteniendo aceite aislante, aun en los periodos de maxima corriente, permiten una mezcla de este, en la columna yonizada, en el momento en que la corriente pasa por el cero, en el mismo momento tambien la presion es minima. La mezcla con los gases generados por el arco (hidrogeno, etc) es favorable a dicha regeneracion Este sistema de interrupcion del arco necesita muy poco aceite y la sencillez de las partes mecanicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad

En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad

El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia

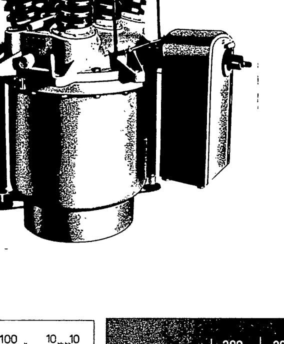
En el caso de mando a distancia, èste puede efectuarse con un electroiman de corriente continua y si no existiera una bateria de acumuladores, con motor trifasico de corriente alterna

El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroiman de desenganche

1340 | INTERRUTTORI IN CASSA D'OLIO MOD. COR 15

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

MOD. COR 15 (OGBR 15) BULK OIL CIRCUIT BREAKERS
INTERRUPTORES EN CAJA DE ACEITE MOD. COR 15

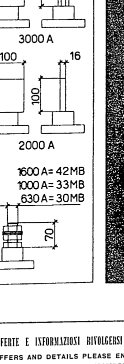


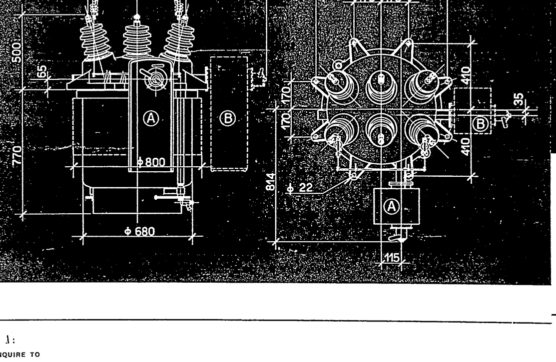
PER INTERNO OD ESTERNO
FOR INDOOR OR OUTDOOR
PARA INTERIOR O EXTERIOR

Tensione nominale / Rated voltage / Tension nominal	Corrente nominale / Rated current / Corriente nominal	Potere di apertura / Breaking capacity / Capacidad de ruptura	Tens. di prova per 1' / One minute test voltage / Tens de prueba durante 1'	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h	Olio occorrente / Filling oil / Aceite para el llenado	Peso senza manovra / Weight without control / Peso sin mando
KV	A	MVA	KV	KV	Kg.	Kg
15	630÷3000	750	53	25	165	430÷490 ~

A) Comando rinviato
Indirect control
Mando indirecto

B) Comando diretto
Direct control
Mando directo





INTERRUTTORI IN CASSA D'OLIO PER ESTERNO OD INTERNO MOD. COR 15

Si tratta di interruttori eccezionalmente robusti particolarmente adatti per servizi pesanti nei quali si abbiano frequenti scatti con correnti rilevanti o quando la potenza di corto circuito dell'impianto sia molto elevata.
Questi interruttori sono provvisti di contatti principali del tipo ad elementi multipli indipendenti, proporzionati per la corrente nominale dell'apparecchio e di contatti ausiliari in camera di interruzione del tipo a labirinto. Quest'ultima è essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove scorre l'asta mobile di contatto e nel quale si sviluppa l'arco.
Queste camerette sono disposte in tanti piani diversi paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale.
L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, e non avendo altra possibilità di uscita questo gas non può penetrare nella zona centrale dell'arco, quando la corrente è intensa, per la sovrapressione che vi si oppone, nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.
Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice: le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima. Il rimescolamento con gas generati dall'arco (idrogeno, ecc.) è favorevole a questa rigenerazione.
Il comando può essere a mano od a distanza. In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c. a. trifase, qualora non si disponga di batterie di accumulatori. Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio.
Questo tipo di interruttore può essere fornito di relè di minima tensione, relè di massima corrente e di bobina di sgancio, a richiesta del Cliente.

MOD. COR 15 (OGBR 15) BULK OIL CIRCUIT BREAKERS FOR INDOOR OR OUTDOOR INSTALLATION

These are exceptionally strong circuit breakers particularly suitable for very heavy duty when tripping occurs frequently under very high currents or when the short circuit capacity of the plant is very high.
The main contacts of these circuit breakers are of the multiple independent elements type the elements being proportionate to the rated current of the switchgear and the arcing contacts moving in a labyrinth-like arc-quenching chamber.
This chamber consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place. These small chambers are situated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct. The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available, for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc. This purpose is achieved in a very simple way by regenerating a non-ionized medium; as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i.e. when the pressure is minimum. Further mixing of this oil with gas generated by the arc (hydrogen, etc.), facilitates said regenerating action.
This rupturing system requires a very small quantity of oil, while the simplicity of the mechanism guarantees long service and efficiency.
Current transformers are usually incorporated in the insulating lower pole of the circuit breaker.
Hand or remote control may be used. In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available. The control may also be electropneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid.
This type of circuit breaker can be supplied whit minimum and maximum current relays and tripping coil, if required.

INTERRUPTORES EN CAJA DE ACEITE MOD. COR 15 PARA INSTALACION INTERIOR O INTEMPERIE

Son interruptores excepcionalmente resistentes, particularmente indicados para servicios muy pesados, en los que las maniobras se producen frecuentemente en presencia de corrientes elevadas o cuando la potencia de corto circuito de la instalacion es muy elevada.
Los contactos principales de estos interruptores son del tipo a elementos multiples, independientes, proporcionados para la corriente nominal del aparato y los contactos auxiliares son colocados en la camera deyonizadora del tipo a laberinto. Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco.
Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central.
El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a traves del cual no tienen posibilidad de salida; estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone, en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero.
La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla. las celdas, deteniendo aceite aislante, aun en los periodos de maxima corriente, permiten una mezcla de este, en la columna yonizada, en el momento en que la corriente pasa por el cero, en el mismo momento tambien la presion es minima. La mezcla con los gases generados por el arco (hidrogeno, etc.) es favorable a dicha regeneracion. Este sistema de interrupcion del arco necesita muy poco aceite y la sencillez de las partes mecanicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad.
En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad.
El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia.
En el caso de mando a distancia, este puede efectuarse con un electroiman de corriente continua y si no existiera una bateria de acumuladores, con motor trifasico de corriente alterna.
El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroimán de desenganche.
Este tipo de interruptor puede ser equipado — a peticion del Cliente — con relé de tension minima, relé de máxima corriente y electroiman de desenganche.

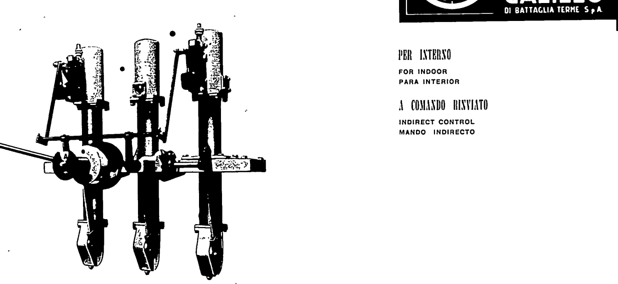
1350 | INTERRUTTORI IN OLIO A PASSANTE MOD. OPR

MOD. OPR (OGP) PASS-THROUGH OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO A PASANTE MOD. OPR

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S. p. A.

PER INTERNO
FOR INDOOR
PARA INTERIOR

A COMANDO RINVIATO
INDIRECT CONTROL
MANDO INDIRECTO



INTERRUTTORE / CIRCUIT BREAKER / INTERRUPTOR	Tensione nominale / Rated voltage / Tension nominal KV	Corrente nominale / Rated current / Corriente nominal A	Potere di apertura / Breaking capacity / Capacidad de ruptura MVA	Tens. di prova per 1' / One minute test voltage / Tens. de prueba durante 1' KV	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h KV	Olio occorrente / Filling oil / Aceite para el llenado Kg.	Peso senza manovra / Weight without control / Peso sin mando Kg.	A	B	C	D	E	F	G	H	I	L	M	N	O
OPR 15	15	400	250	53	25	4	55~	250	427	465	260	186	150	857	373	484	25	95	804	844
OPR 20	20	400	280	64	30	5,5	70~	290	440	530	325	236	160	1023	479	544	27	100	975	1015
OPR 30	30	400	310	86	45	7,2	100~	350	465	585	380	286	170	1169	570	599	27	105	1165	1205

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.NTERRUTTORI IN OLIO A PASSANTE PER INTERNO - MOD OPR

Sono interruttori [illegible] tipo a passante con un attacco [illegible] estremità Il corpo e costituito da [illegible] cilindro di bachelite munito, alla [illegible] superiore, di una camera ad espansione [illegible] e, a quella inferiore, [illegible] contenente le leve di comando del contatto mobile che ha il movimento dal basso verso l alto
Sono interruttori a quantita molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l impiego della camera d'interruzione a labirinto.
Essa e essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita questo gas non può penetrare nella zona centrale dell'arco, quando la corrente è intensa, per la sovrapressione che vi si oppone; nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.
Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice. le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima. Il rimescolamento con gas generati dall'arco (idrogeno, ecc) è favorevole a questa rigenerazione.
Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi è una garanzia di durata e di buon funzionamento
Il comando può essere a mano od a distanza In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c. a trifase, qualora non si disponga di batterie di accumulatori. Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio.
Questo tipo di interruttore può essere fornito di rele di minima tensione, relè di massima corrente e di bobina di sgancio, a richiesta del cliente.

MOD OPR (OGP) PASS-THROUGH OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

These circuit breakers are of the pass-through insulator type with terminals at both ends. The body consists of a bakelite cylinder provided — at the upper end — with a silumin expansion chamber and — at the lower end — with a box containing the control levers of the moving contact the movement of which is directed from the bottom towards the top.
These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency. all this is obtained thanks to a labyrinth-lice arc-quenching chamber.
The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place. These small chambers are sitvated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available; for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc. This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i.e. when the pressure is minimum. Further mixing of this oil with gas generated by the arc (hidrogen, etc.) facilitates said regenerating action.
This rupturing system requires a very small quantity of oil; while the simplicity of the mechanism guarantees long service and efficiency.
Current transformers are usually incorporated in the insulating lower pole of the circuit breaker.
Hand or remote control may be used In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electro-pneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid
This type of circuit breaker can be supplied whit minimum and maximum current relays and tripping coil if required.

INTERRUPTORES EN ACEITE TIPO de PASANTE MOD OPR PARA INSTALACION AL INTERIOR

Son interruptores de tipo de pasante con una acometida a cada extremo El cuerpo esta constituido por un cilindro de bakelita equipado, en la extremidad superior, con una camara de expansion en silumin y, en la camara inferior, con una caja conteniendo las palancas de mando del contacto movil en movimiento de bajo para arriba
Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco.
Dichas celdas están dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central.
El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre e eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida; estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone; en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero
La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla: las celdas, deteniendo aceite aislante, aun en los periodos de máxima corriente, permiten una mezcla de éste, en la columna yonizada, en el momento en que la corriente pasa por el cero; en el mismo momento tambien la presión es minima. La mezcla con los gases generados por el arco (hidrogeno, etc.) es favorable a dicha regeneración.
Este sistema de interrupción del arco necesita muy poco aceite y la sencillez de las partes mecánicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad.
En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad
El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia En el caso de mando a distancia, éste puede efectuarse con un electroimán de corriente continua y si no existiera una bateria de acumuladores, con motor trifásico de corriente alterna.
El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroimán de desenganche.
Este tipo de interruptor puede ser equipado — a peticion del Cliente — con relé de tension minima, relé de maxima corriente y electroimán de desenganche.

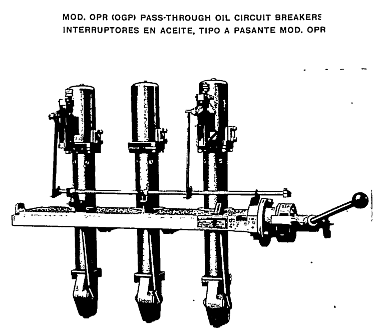
1360 | INTERRUTTORI IN OLIO A PASSANTE MOD. OPR

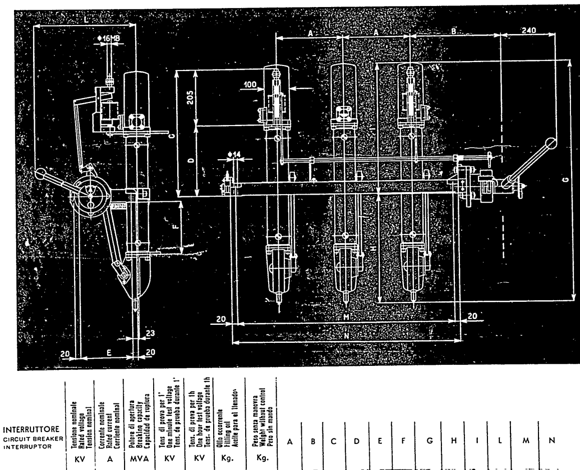
MOD. OPR (OGP) PASS-THROUGH OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO A PASANTE MOD. OPR

OFFICINE ELETTRO MECCANICHE GALILEO DI BATTAGLIA TERME S. p. A.

PER INTERNO
FOR INDOOR
PARA INTERIOR

A COMANDO DIRETTO
DIRECT CONTROL
MANDO DIRECTO





INTERRUTTORE / CIRCUIT BREAKER / INTERRUPTOR	Tensione nominale / Rated voltage / Tension nominal KV	Corrente nominale / Rated current / Corriente nominal A	Potere di apertura / Breaking capacity / Capacidad de ruptura MVA	Tens. di prova per 1' / One minute test voltage / Tens. de prueba durante 1' KV	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h KV	Olio occorrente / Filling oil / Aceite para el llenado Kg.	Peso senza manovra / Weight without control / Peso sin mando Kg.	A	B	C	D	E	F	G	H	I	L	M	N
OPR 15	15	400	250	53	25	4	55~	250	327	468	263	195	188	880	397	483	579	804	844
OPR 20	20	400	280	64	30	5,5	70~	290	372	533	328	206	238	1046	498	548	590	975	1015
OPR 30	30	400	310	86	45	7,2	100~	350	407	588	383	206	288	1192	589	603	590	1165	1205

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INTERRUTTORI IN OLIO A PASSANTE PER INTERNO - MOD OPR

Sono interruttori del tipo a passante con un attacco a ciascuna estremità. Il corpo è costituito da un cilindro di bachelite munito, alla estremità superiore, di una camera ad espansione in silumin e, a quella inferiore, di una scatola contenente le leve di comando del contatto mobile che ha il movimento dal basso verso l'alto.

Sono interruttori a quantità molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l'impiego della camera d'interruzione a labirinto.

Essa è essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco. Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito turto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita: questo gas non può penetrare nella zona centrale dell'arco, quando la corrente è intensa, per la sovrapressione che vi si oppone; nell'interno tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.

Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall'arco (idrogeno, ecc) è favorevole a questa rigenerazione.

Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi è una garanzia di durata e di buon funzionamento.

Il comando può essere a mano od a distanza In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a. trifase, qualora non si disponga di batterie di accumulatori Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio.

Questo tipo di interruttore può essere fornito di rele di minima tensione, relè di massima corrente e di bobina di sgancio, a richiesta del cliente.

MOD OPR (OGP) PASS-THROUGH OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

These circuit breakers are of the pass-through insulator type with terminals at both ends The body consists of a bakelite cylinder provided — at the upper end — with a silumin expansion chamber and — at the lower end — with a box containing the control levers of the moving contact the movement of which is directed from the bottom towards the top.

These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency, all this is obtained thanks to a labyrinth-like arc-quenching chamber

The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place These small chambers are situateu at superposed levels parallel to each other, and they are angularly shifted regard to the central duct. The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available, for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc, This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak currenr, they allow the remixing of this oil with the ionizing column when the current goes through zero, i e when the pressure is minimum Further mixing of this oil with gas generated by the arc (hydrogen, etc), facilitates said regenerating action.

This rupturing system requires a very small quantity of oil, while the simplicity of the mechanism guarantees long service and efficiency

Current transformers are usually incorporated in the insulating lower pole of the circuit breaker

Hand or remote control may be used. In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electro-pneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid

This type of circuit breaker can be supplied whit minimum and maximum current relays and tripping coil, if required

INTERRUPTORES EN ACEITE, TIPO DE PASANTE MOD OPR PARA INSTALACION AL INTERIOR

Son interruptores de tipo de pasante con una acometida a cada extremo. El cuerpo esta constituido por un cilindro de bakelita equipado, en la extremidad superior, con una camara de expansion en silumin y, en la camara inferior, con una caja conteniendo las palancas de mando dee contacto movil en movimiento de bajo para arriba.

Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara desyonizadora. Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil) se desarolla el arco

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central.

El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre e eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida. estos gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone, en el interior, por lo tanto, quedaria un pequeño chorro ionizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero.

La extincion del arco es alcanzada regenerando un ambiente no ionizado en manera particularmente sencilla: las celdas, deteniendo aceite aislante, aún en los periodos de máxima corriente, permiten una mezcla de éste, en la columna ionizada, en el momento en que la corriente pasa por el cero, en el mismo momento tambien la presion es minima. La mezcla con los gases generados por el arco (hidrogeno, etc) es favorable a dicha regeneración.

Este sistema de interrupcion del arco necesita muy poco aceite y la sencillez de las partes mecánicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad.

En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad.

El mando del interruptor puede ser efectuado ya localmente y a mano ya a distancia. En el caso de mando a distancia, éste puede efectuarse con un electroimán de corriente continua y si no existiera una bateria de acumuladores, con motor trifásico de corriente alterna.

El mando puede ser tambien del tipo electro-neumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroimán de desenganche.

Este tipo de interruptor puede ser equipado — a peticion del Cliente — con relé de tension minima, relé de max ma corriente y electroiman de desenganche

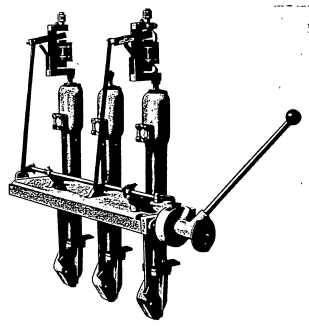
1400 | INTERRUTTORI IN OLIO A PASSANTE MOD. OPR 12

MOD. OPR 12 (OGP 12) PASS-THROUGT OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO A PASANTE MOD. OPR 12

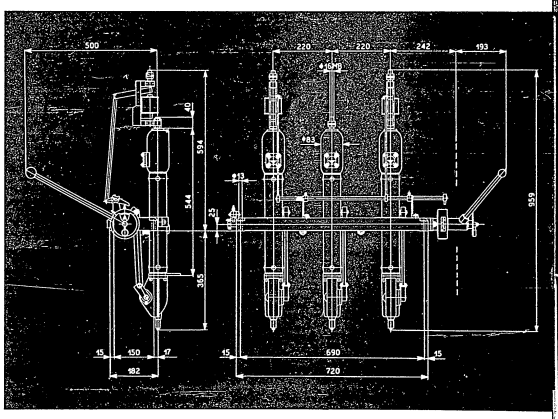
OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER INTERNO
FOR INDOOR
PARA INTERIOR

COMANDO DIRETTO
DIRECT CONTROL
MANDO DIRECTO



Tensione nominale / Rated voltage / Tensión nominal	Corrente nominale / Rated current / Corriente nominal	Potere di apertura / Breaking capacity / Capacidad de ruptura	Tens. di prova per 1 min. a frequenza industriale / Test. de prueba durante 1'	Tens. di prova per 1/5 di min. a frequenza industriale / Test. de prueba durante 1'	Olio occorrente / Oil required / Aceite para el llenado	Peso senza imballo / Weight without packing / Peso sin embalaje
KV	A	MVA	KV	KV	Kg.	Kg.
12	400	125	46	20	2,5 ca.	30 ca.



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INTERRUTTORI IN OLIO A PASSANTE PER INTERNO - MOD OPR 12

Sono interruttori del tipo a passante con un attacco a ciascuna estremita Il corpo e costituito da un cilindro di bachelite munito, alla estremita superiore, di una camera ad espansione in silumin e, a quella inferiore, di una scatola contenente le leve di comando del contatto mobile che ha il movimento dal basso verso l alto

Sono interruttori a quantita molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l impiego della camera d interruzione a labirinto

Essa e essenzialmente costituita da una serie di camerette d'olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l arco. Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale. L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilita di uscita questo gas non può penetrare nella zona centrale dell arco, quando la corrente e intensa, per la sovrapressione che vi si oppone nell'intento tende percio a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.

Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall arco (idrogeno, ecc) è favorevole a questa rigenerazione

Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi e una garanzia di durata e di buon funzionamento.

Il comando può essere a mano od a distanza In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a trifase, qualora non si disponga di batterie di accumulatori Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio

Questo tipo di interruttore può essere fornito di rele di minima tensione, rele di massima corrente e di bobina di sgancio, a richiesta del cliente.

MOD OPR 12 (OGP 12) PASS-THROUGH OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

These circuit breakers are of the pass-through insulator type with terminals at both ends. The body consists of a bakelite cylinder provided — at the upper end — with a silumin expansion chamber and — at the lower end — with a box containing the control levers of the moving contact the movement of which is directed from the bottom towards the top.

These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency all this is obtained thanks to a labyrinth-lice arc-quenching chamber

The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place These small chambers are sitvated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available, for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i.e when the pressure is minimum Further mixing of this oil with gas generated by the arc (hidrogen, etc) facilitates said regenerating action

This rupturing system requires a very small quantity of oil while the simplicity of the mechanism guarantees long service and efficiency

Current transformers are usually incorporated in the insulating lower pole of the circuit breaker.

Hand or remote control may be used In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electro-pneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid

This type of circuit breaker can be supplied whit minimum and maximum current relays and tripping coil, if required

INTERRUPTORES EN ACEITE TIPO de PASANTE MOD OPR 12 PARA INSTALACION AL INTERIOR

Son interruptores de tipo de pasante con una acometida a cada extremo El cuerpo esta constituido por un cilindro de bakelita equipado, en la extremidad superior, con una camara de expansion en silumin y, en la camara inferior, con una caja conteniendo las palancas de mando del contacto movil en movimiento de bajo para arriba

Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central

El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre e eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida, estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone, en el interior, por lo tanto quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero

La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla las celdas, deteniendo aceite aislante, aun en los periodos de maxima corriente, permiten una mezcla de éste, en la columna yonizada, en el momento en que la corriente pasa por el cero; en el mismo momento tambien la presion es minima. La mezcla con los gases generados por el arco (hidrogeno, etc) es favorable a dicha regeneracion

Este sistema de interrupcion del arco necesita muy poco aceite y la sencillez de las partes mecanicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad

En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad

El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia En el caso de mando a distancia, éste puede efectuarse con un electroimán de corriente continua y si no existiera una bateria de acumuladores, con motor trifasico de corriente alterna

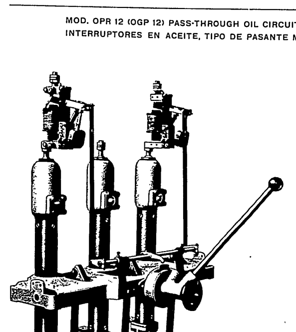
El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroiman de desenganche

Este tipo de interruptor puede ser equipado — a peticion del Cliente — con relé de tension minima, relé de maxima corriente y electroiman de desenganche

INTERRUTTORI IN OLIO A PASSANTE MOD. OPR 12

MOD. OPR 12 (OGP 12) PASS-THROUGH OIL CIRCUIT BREAKERS
INTERRUPTORES EN ACEITE, TIPO DE PASANTE MOD. OPR 12

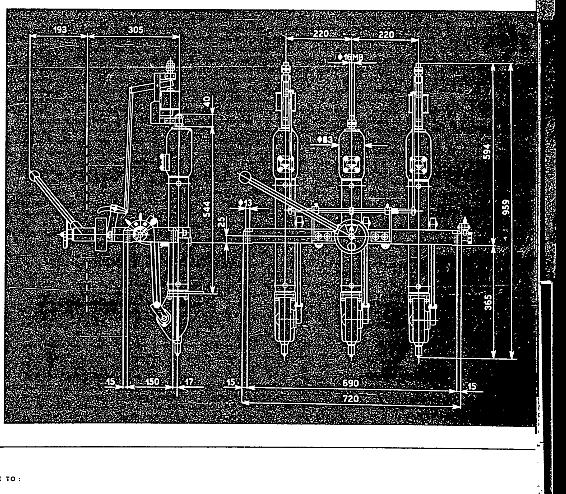
OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S. p. A.



PER INTERNO
FOR INDOOR
PARA INTERIOR

COMANDO RINVIATO
INDIRECT CONTROL
MANDO INDIRECTO

Tensione nominale / Rated voltage / Tension nominal	Corrente nominale / Rated current / Corriente nominal	Potere di apertura / Breaking capacity / Capacidad de ruptura	Tens. di prova per 1' / One minute test voltage / Tens. de prueba durante 1'	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h	Olio occorrente / Filling oil / Aceite para el llenado	Peso senza manovra / Weight without control / Peso sin mando
KV	A	MVA	KV	KV	Kg	Kg
12	400	125	46	20	2,5~	30~



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INTERRUTTORI IN OLIO A PASSANTE PER INTERNO - MOD OPR 12

Sono interruttori del tipo a passante con un attacco a ciascuna estremità Il corpo è costituito da un cilindro di bachelite munito, alla estremità superiore, di una camera ad espansione in silumin e, a quella inferiore, di una scatola contenente le leve di comando del contatto mobile che ha il movimento dal basso verso l alto.

Sono interruttori a quantità molto ridotta di olio, di costruzione semplicissima e di alta efficienza, risultati ottenuti con l'impiego della camera d interruzione a labirinto

Essa e essenzialmente costituita da una serie di camerette d olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l'arco. Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale. L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull'asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilità di uscita. questo gas non puo penetrare nella zona centrale dell arco, quando la corrente è intensa, per la sovrapressione che vi si oppone. nell'intento tende perciò a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco.

Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima. Il rimescolamento con gas generati dall'arco (idrogeno, ecc) è favorevole a questa rigenerazione

Questo sistema di interruzione porta ad un consumo molto limitato di olio, mentre la semplicità dei meccanismi e una garanzia di durata e di buon funzionamento.

Il comando può essere a mano od a distanza. In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c. a trifase, qualora non si disponga di batterie di accumulatori. Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio.

Questo tipo di interruttore può essere fornito di rele di minima tensione, rele di massima corrente e di bobina di sgancio, a richiesta del cliente

MOD OPR 12 (OGP 12) PASS-THROUGH OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

These circuit breakers are of the pass-through insulator type with terminals at both ends. The body consists of a bakelite cylinder provided — at the upper end — with a silumin expansion chamber and — at the lower end — with a box containing the control levers of the moving contact the movement of which is directed from the bottom towards the top

These circuit breakers require a very small quantity of oil and are of very simple construction and high efficiency, all this is obtained thanks to a labyrinth-lice arc-quenching chamber.

The latter consists essentially of a series of small oil chambers placed at the sides of the duct through which the moving contact passes and in which the arc takes place These small chambers are sitvated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct. The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available; for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i.e. when the pressure is minimum Further mixing of this oil with gas generated by the arc (hidrogen, etc.) facilitates said regenerating action.

This rupturing system requires a very small quantity of oil, while the simplicity of the mechanism guarantees long service and efficiency.

Current transformers are usually incorporated in the insulating lower pole of the circuit breaker.

Hand or remote control may be used. In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electro-pneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid.

This type of circuit breaker can be supplied whit minimum and maximum current relays and tripping coil, if required

INTERRUPTORES EN ACEITE. TIPO de PASANTE MOD OPR 12 PARA INSTALACION AL INTERIOR

Son interruptores de tipo de pasante con una acometida a cada extremo. El cuerpo está constituido por un cilindro de bakelita equipado, en la extremidad superior, con una cámara de expansión en silumin y, en la cámara inferior, con una caja conteniendo las palancas de mando del contacto movil en movimiento de bajo para arriba

Tratase de interruptores en volumen de aceite muy reducido, cuya construccion extremadamente sencilla realiza, sin embargo, una gran potencia de interrupcion, alcanzada por medio de la camara deyonizadora. Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco.

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central.

El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre e eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida; estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone; en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero

La extinción del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla: las celdas, deteniendo aceite aislante, aún en los periodos de máxima corriente, permiten una mezcla de éste, en la columna yonizada, en el momento en que la corriente pasa por el cero; en el mismo momento tambien la presión es minima. La mezcla con los gases generados por el arco (hidrogeno, etc.) es favorable a dicha regeneración.

Este sistema de interrupción del arco necesita muy poco aceite y la sencillez de las partes mecánicas garantiza una larga duración del interruptor y un ejercicio de toda seguridad.

En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad

El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia

En el caso de mando a distancia, éste puede efectuarse con un electroimán de corriente continua y si no existiera una bateria de acumuladores, con motor trifásico de corriente alterna.

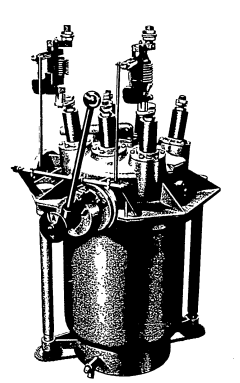
El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroimán de desenganche.

Este tipo de interruptor puede ser equipado — a petición del Cliente — con relé de tension minima, relé de maxima corriente y electroimán de desenganche.

1500 | INTERRUTTORI IN CASSA D'OLIO MOD. CO 6

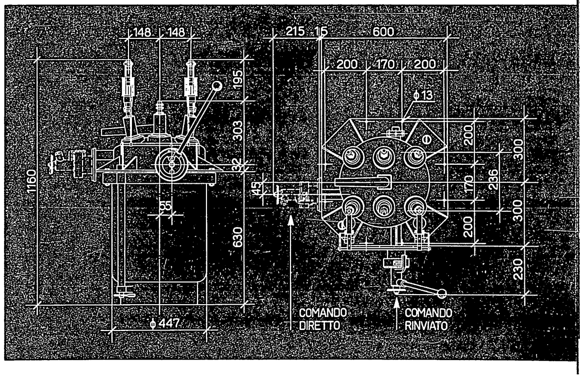
MOD. CO 6 (OGB 6) BULK OIL CIRCUIT BREAKERS
INTERRUPTORES EN CAJA DE ACEITE MOD. CO 6

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.



PER INTERNO
FOR INDOOR
PARA INTERIOR

Tensione nominale / Rated voltage / Tension nominal	Corrente nominale / Rated current / Corriente nominal	Potere di apertura / Breaking capacity / Capacidad de ruptura	Tens. di prova per 1' / One minute test voltage / Tens. de prueba durante 1'	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h	Olio occorrente / Filling oil / Aceite para el llenado	Peso senza manovra / Weight without control / Peso sin mando
KV	A	MVA	KV	KV	Kg.	Kg.
6	630	300	33	10	45	200~



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INTERRUTTORI A CASSONE MOD CO 6 PER INTERNO

Si tratta di interruttori per servizi pesantissimi, particolarmente adatti per stabilimenti industriali ed in quei casi nei quali si abbiano scatti molto frequenti con correnti molto elevate

L interruzione avviene dentro camera a rottura del tipo detto a labirinto, analoga a quella montata in tutti gli altri nostri interruttori

Essa e essenzialmente costituita da una serie di camerette d olio situate a lato del canale ove passa il contatto mobile e dove si sviluppa l arco

Queste camerette sono disposte in tanti piani diversi, paralleli fra loro e sono successivamente spostate angolarmente rispetto al canale centrale

L'arco, che col movimento dell'asta scorrevole viene trascinato entro il canale, si mantiene praticamente sull asse e viene lambito tutto attorno da una corrente di gas che sfugge verso il contatto fisso, non avendo altra possibilita di uscita questo gas non può penetrare nella zona centrale dell arco, quando la corrente e intensa, per la sovrapressione che vi si oppone, nell interno tende percio a rimanere un filetto ionizzato che bisogna interrompere nel breve istante di passaggio a zero della corrente, onde impedire la successiva riaccensione dell'arco

Lo scopo viene raggiunto rigenerando un ambiente non ionizzato ed in modo estremamente semplice le camerette, infatti, trattenendo olio fortemente isolante anche nei periodi di massima corrente, permettono un rimescolamento di questo con la colonna ionizzata nel momento di passaggio per lo zero della corrente che corrisponde anche alla pressione minima Il rimescolamento con gas generati dall'arco (idrogeno, ecc.) e favorevole a questa rigenerazione

Il comando può essere a mano ad a distanza In questo secondo caso, del tipo a solenoide, per corrente continua, oppure del tipo a motore, per c a trifase, qualora non si disponga di batterie di accumulatori. Il comando può essere anche elettropneumatico e cioè con chiusura ad aria compressa ed apertura per mezzo di elettromagnete di sgancio

Questo tipo di interruttore puo essere fornito di rele di minima tenione, rele di massima corrente e di bobina di sgancio, a richiesta del cliente

MOD CO 6 (OGB 6) BULK OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

These circuit breakers are designed for very heavy duty and are particularly suitable for use in factories and wherever tripping occurs frequently with very high currents

Breaking takes place in a labyrinth-like arc-quenching chamber of the type all our circuit breakers are provided with

This labyrinth-like arc-quenching chamber consists essentially of a series of small oil chambers placed at the sides of the duct through with the moving contant passes and in which the arc takes place These small chambers are situated at superposed levels parallel to each other, and they are angularly shifted regard to the central duct The arc, which is drawn into the labyrinth by the moving contact, is kept actually along the axis of the duct and is completely wrapped by a current of gas which flows towards the fixed contact as no other outlet is available. for higher values of current, the gas cannot enter the central zone of the arc owing to the overpressure opposing it, thus a thin ionized stream remains inside the duct and has to be interrupted when the current passes by zero, so as to avoid a subsequent restriking of the arc This purpose is achieved in a very simple way by regenerating a non-ionized medium as the small chambers do retain oil with high insulation capacity also during periods of peak current, they allow the remixing of this oil with the ionizing column when the current goes through zero, i e when the pressure is minimum Further mixing of this oil with gas generated by the arc (hydrogen, etc), facilitates said regenerating action

This rupturing system requires a very small quantity of oil, while the simplicity of the mechanism guarantees long service and efficiency.

Current transformers are usually incorporated in the insulating lower pole of the circuit breaker.

Hand or remote control may be used In the latter case the control is either solenoid operated when direct current is available, or motor operated by three-phase alternating current, when storage batteries are not available The control may also be electro-pneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid

This type of circuit breaker can be supplied with minimum and maximum current relays and tripping coil if required

INTERRUPTORES EN CAJA DE ACEITE MOD CO 6 PARA INSTALACION AL INTERIOR

Tratase de interruptores para servicios muy pesados, aptos particularmente para establecimientos industriales, para los casos de disparos frecuentes con corrientes muy elevadas La interrupcion se realiza en la camara de interrupcion de laberinto, del tipo de las adoptadas en todos los demas interruptores de nuestra construccion

Esta es principalmente constituida por una serie de pequeñas celdas, llenas de aceite, situadas al rededor del conducto en que pasa el contacto movil y se desarolla el arco.

Dichas celdas estan dispuestas en planos distintos, paralelos entre si, y estan angularmente desplazadas al rededor del canal central

El arco, que con el movimiento de la barra movil queda arrastrado a lo largo del canal, se mantiene practicamente sobre el eje de este y queda envuelto por una corriente de gases que corre hacia el contacto fijo, a través del cual no tienen posibilidad de salida, estes gases no pueden penetrar en la zona central del arco debido a la sobrepresion que se les opone, en el interior, por lo tanto, quedaria un pequeño chorro yonizado, que es necesario interrumpir en el breve instante en que la corriente pasa por el cero

La extincion del arco es alcanzada regenerando un ambiente no yonizado en manera particularmente sencilla las celdas, deteniendo aceite aislante, aun en los periodos de maxima corriente, permiten una mezcla de éste, en la columna yonizada, en el momento en que la corriente pasa por el cero, en el mismo momento tambien la presion es minima La mezcla con los gases generados por el arco (hidrogeno, etc.) es favorable a dicha regeneracion Este sistema de interrupcion del arco necesita muy poco aceite y la sencillez de las partes mecanicas garantiza una larga duracion del interruptor y un ejercicio de toda seguridad

En el interior de los aisladores de soporte se encuentran, en general, tambien los transformadores de intensidad.

El mando del interruptor puede ser efectuado ya localmente y a mano, ya a distancia

En el caso de mando a distancia, éste puede efectuarse con un electroimán de corriente continua y si no existiera una bateria de acumuladores, con motor trifasico de corriente alterna

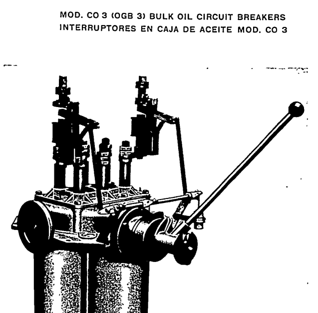
El mando puede ser tambien del tipo electroneumatico, es decir con cierre por medio de aire comprimido y apertura por medio de un electroiman de desenganche

A peticion del Cliente, estos interruptores pueden ir equipados con rele de máxima intensidad y de minima tension y electroiman de desenganche

1510 | INTERRUTTORI IN CASSA D'OLIO MOD. CO 3

MOD. CO 3 (OGB 3) BULK OIL CIRCUIT BREAKERS
INTERRUPTORES EN CAJA DE ACEITE MOD. CO 3

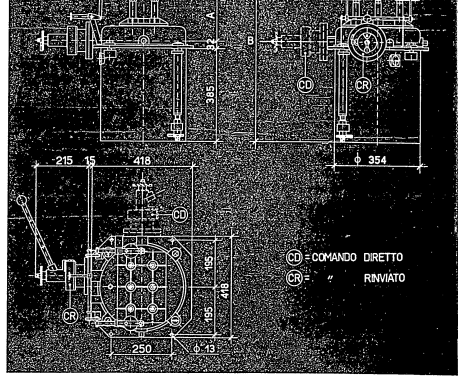
OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S p A



PER INTERNO
FOR INDOOR
PARA INTERIOR

Tensione nominale / Rated voltage / Tension nominal KV	Corrente nominale / Rated current / Corriente nominal A	Potere di apertura / Breaking capacity / Capacidad de ruptura MVA	Tens. di prova per 1' / One minute test voltage / Tens de prueba durante 1' KV	Tens. di prova per 1h / One hour test voltage / Tens. de prueba durante 1h KV	Olio occorrente / Filling oil / Aceite para el llenado Kg.	Peso senza manovra / Weight without control / Peso sin mando Kg.
3	400	100	27	5	25~	50~
3	630	100	27	5	25~	58~
3	1000	100	27	5	25~	65~
3	1250	100	27	5	25~	70~
3	1600	100	27	5	25~	82~

AMPÈRES	A	B
400	206	808
630 - 1000 - 1250 - 1600	226	828



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INTERRUTTORI IN CASSA D'OLIO PER INTERNO - MOD. CO 3

Si tratta di interruttori per servizi pesantissimi, particolarmente adatti per stabilimenti industriali ed in quei casi nei quali si abbiano scatti molto frequenti con correnti molto elevate.

I contatti principali, immersi in olio, sono del tipo ad elementi indipendenti autoaggiustabili in parallelo, il numero dei quali varia a seconda della portata dell'interruttore.

L'interruzione avviene in olio libero su dei robusti contatti rompiarco largamente dimensionati e di tipo uguale per tutti gli interruttori, indipendentemente dalla portata degli stessi.

Questi interruttori sono provvisti di apparecchio per il rapido abbassamento della cassa d'olio

Il comando può essere previsto a mano, oppure a distanza. In questo secondo caso, a solenoide, per corrente continua, oppure a motore, per corrente alternata trifase, qualora non si disponga di batteria.

Il comando può anche essere elettropneumatico e cioè con chiusura ad aria compressa ed apertura a mezzo elettromagnete di sgancio.

Su questi interruttori possono essere montati relais di massima corrente e di minima tensione, sia inseriti direttamente sul circuito principale, sia alimentati da riduttori di corrente.

MOD. CO 3 (OGB 3) BULK OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

These circuit breakers are for very heavy duty and are particularly suitable for use in factories and in cases where tripping occurs frequently with very high currents.

The main contacts, immersed in oil, consist of independent elements adjusting themselves in parallel, their number varying according to the capacity of the circuit breaker.

Breaking occurs in free oil, on sturdy large sized arc rupturing contacts of the same type for all circuit breakers, regardless of their capacity.

These circuit breakers are provided with a mechanism for lowering rapidly the oil tank.

Control may be by and or remote. In the latter case it is either solenoid operated when direct current is available or motor operated by three-phase alternating current if no storage battery is available. The control may also be electro-pneumatic, in which case closing is obtained by means of compressed air and opening by means of a small solenoid.

Maximum current and minimum voltage relays may be mounted on these circuit breakers, they are either inserted directly into the main circuit or fed by current transformers

INTERRUPTORES EN CAJA DE ACEITE MOD. CO. 3 PARA INSTALACION AL INTERIOR

Son interruptores para servicios muy pesados, particularmente indicados para establecimientos industriales, para los casos de disparos frecuentes con corrientes muy elevadas.

Los contacts principales, sumergidos en aceite, son del tipo de elementos independientes autoajustables en paralelo, el numero de los cuales varia en relación a la corriente de servicio del interruptor.

La interrupción se produce, en aceite libre, entre robustos contactos apagachispas ampliamente dimensionados, de tipo igual para todos los interruptores independientemente de la capacidad de los mismos.

Estos interruptores son provistos de aparato para bajar rapidamente la cuba.

El mando puede ser previsto de mano o de distancia eléctrico.

En este segundo caso puede ser de solenoide por corriente continua o de motor por corriente alterna trifásica, cuando no se disponga de una batería de acumuladores.

El mando puede ser tambien electroneumatico con enganche de aire comprimido y desenganche por bobina electromágnetica.

Estos interruptores pueden ir equipados por relais de máxima intensidad y minima tension, tanto montados directamente en el circuito principal como alimentados por reductores de intensidad.

trasformatori

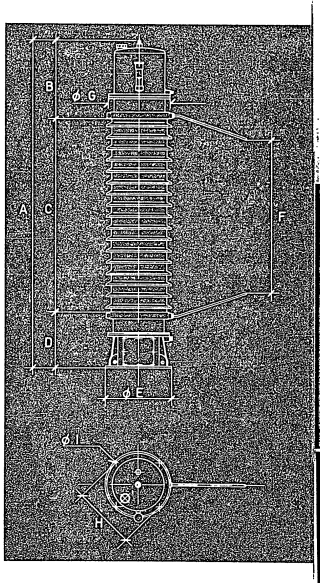
TRANSFORMERS - TRANSFORMADORES

2101 | TRASFORMATORI DI TENSIONE MOD. TVE

MOD. TVE (VTO) VOLTAGE TRANSFORMERS
TRANSFORMADORES DE TENSION MOD. TVE

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER ESTERNO
FOR OUTDOOR
PARA EXTERIOR



TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal KV	Peso approssimativo Approx. weight Peso aproximado Kg	A	B	C	D	E	F	G	H	ø I
TVE 45	45	100	928	378	350	200	400	330	345	368	13
TVE 60	60	150	1058	378	480	200	400	420	345	368	13
TVE 80	80	170	1188	378	610	200	400	550	345	368	13
TVE 120	120	350	1748	500	886	362	430	810	400	396	17
TVE 150	150	440	2192	580	1250	362	430	1000	400	396	17
TVE 220	220	650	2952	610	1980	362	600	1450	400	550	17
TVE 275	275	730	3355	650	2343	362	600	1850	400	550	17

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TRASFORMATORI DI TENSIONE PER ESTERNO - MOD. TVE

Sono trasformatori di misura del tipo così detto « ad isolatore » privo di isolatori passanti ad alta tensione.
In questi trasformatori il nucleo magnetico si trova nella parte centrale dell'isolatore ed è a potenziale intermedio tra la linea e la terra.
Gli isolatori sono dello stesso tipo di quelli impiegati negli interruttori per tensione corrispondente, il che contribuisce all'estetica degli impianti e facilita i ricambi.
Nei trasformatori per tensione superiore a 100 kV l'isolatore è costituito essenzialmente da un cilindro di bakelite rivestito da una camicia di porcellana; ciò conferisce ai trasformatori stessi una particolare robustezza meccanica.
Questi ultimi trasformatori, nel caso di installazione all'interno, possono essere forniti anche senza la camicia in porcellana.

MOD. TVE (VTO) VOLTAGE TRANSFORMERS FOR OUTDOOR INSTALLATION

These measuring transformers belong to what is known as the « insulator » type and have no high voltage pass-through insulators.
In these transformers the magnetic core is in the central part of the insulator and is at intermediate potential between the line and the earth.
The insulators are of the same type as those used in circuit breakers having the same voltage; this enhances the aesthetic appearance of the plants and facilitates replacements.
In trasformers for voltages over 100 kV the insulator consists essentially of a bakelite cylinder covered with a porcelain sleeve; this makes the transformer exceptionally robust.
The latter transformers may also be obtained without porcelain sleeves if they are for indoor installation.

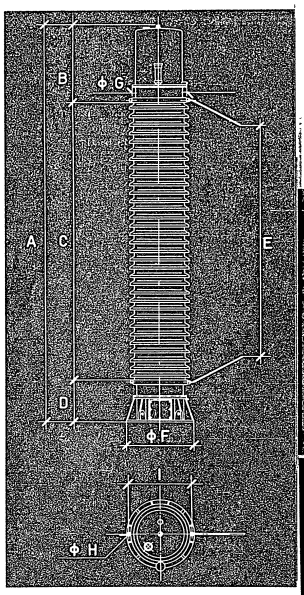
TRANSFORMADORES DE TENSION PARA INSTALACION INTEMPERIE MOD. TVE

Trátase de transformadores de medida del tipo llamado de « aislador », sin aisladores pasantes de alta tensión.
En estos transformadores el nucleo magnetico queda colocado en la parte central del aislador y es de potencial intermedio entre la linea y el suelo.
Los aisladores son del mismo tipo de los empleados en los interruptores para tensiones correspondientes, lo que contribuye a la estética de las instalaciones y aún facilita las reposiciones.
En los transformadores para tensión superior a 100 kV, el aislador está constituido principalmente por un cilindro de baekelita protejido por una camisa de porcelana; esto confiere a los transformadores una particular robustez mecánica.
Estos transformadores, en el caso de instalación al interior, pueden ser suministrados tambien sin las capas de porcelana.

MOD TVES (VTOS) VOLTAGE TRANSFORMERS
TRANSFORMADORES DE TENSION MOD TVES

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER ESTERNO
FOR OUTDOOR
PARA EXTERIOR



TRASFORMAT TRANSFORMER TRANSFORMADOR	Tensione nominale Nominal voltage Tensión nominal KV	Peso approssimativo Approximate weight Peso aproximado Kg.	A	B	C	D	E	F	G	H	I
TVES 60	60	235	1178	378	490	310	420	430	400	17	396
TVES 80	80	260	1298	378	610	310	550	430	400	17	396
TVES 110	110	560	1854	530	962	362	750	505	475	17	470
TVES 150	150	650	2278	610	1306	362	1000	505	475	17	470
TVES 220	220	950	3054	640	2052	362	1450	600	475	17	550
TVES 275	275	1050	3458	680	2416	362	1850	600	475	17	550

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TRASFORMATORI DI TENSIONE PER ESTERNO - MOD. TVES

Sono trasformatori di misura del tipo così detto « ad isolatore » privo di isolatori passanti ad alta tensione.
Si differenziano dal tipo TVE perchè hanno una prestazione maggiore.
In questi trasformatori il nucleo magnetico si trova nella parte centrale del l'isolatore ed è a potenziale intermedio tra la linea e la terra.
Gli isolatori sono dello stesso tipo di quelli impiegati negli interruttori per tensione corrispondente, il che contribuisce all'estetica degli impianti e facilita i ricambi.
Nei trasformatori per tensione superiore a 100 kV l'isolatore è costituito essenzialmente da un cilindro di bakelite rivestito da una camicia di porcellana; ciò conferisce ai trasformatori stessi una particolare robustezza meccanica.
Questi ultimi trasformatori, nel caso di installazione all'interno, possono essere forniti anche senza la camicia in porcellana.

MOD. TVES (VTOS) VOLTAGE TRANSFORMERS FOR OUTDOOR INSTALLATION

These measuring transformers belong to what is known as the « insulator » type and have no high voltage pass through insulators.
They differ from the TVE (VTO) model in that their burden is higher.
In these transformers the magnetic core is in the central part of the insulator and is at intermediate potential between the line and the earth.
The insulators are of the same type as those used in circuit breakers having the same voltage; this enhances the aesthetic appearance of the plants and facilitates replacements.
In transformers for voltages over 100 kV the insulator consists essentially of a bakelite cylinder covered with a porcelain sleeve; this makes the transformer exceptionally robust.
The latter transformers may also be obtained without porcelain sleeves if they are for indoor installation.

TRANSFORMADORES DE TENSION PARA INSTALACION INTEMPERIE MOD. TVES

Trátase de transformadores de medida del tipo llamado de « aislador », sin aisladores pasantes de alta tensión.
Difieren del tipo TVE por su capacidad superior.
En estos transformadores el núcleo magnético es colocado en la parte central del aislador y es de potencial intermedio entre la línea y el suelo.
Los aisladores son del mismo tipo de aquellos empleados en los interruptores para tensión correspondiente; lo que contribuye a la estética de las instalaciones y aún facilita las reposiciones
En los transformadores para tensión superior a 100 kV, el aislador está constituido por un cilindro de bakelita protejido por una capa de porcelana; esto confiere a los transformadores una particular robustez mecánica.
Estos transformadores, en el caso de instalación al interior pueden ser suministrados tambien sin capas de porcelana

2121 | TRASFORMATORI DI CORRENTE MOD. TAE

MOD. TAE (CTO) CURRENT TRANSFORMERS
TRANSFORMADORES DE INTENSIDAD MOD. TAE

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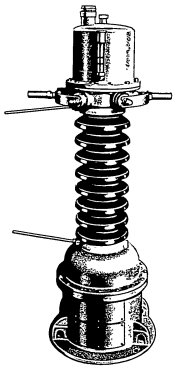
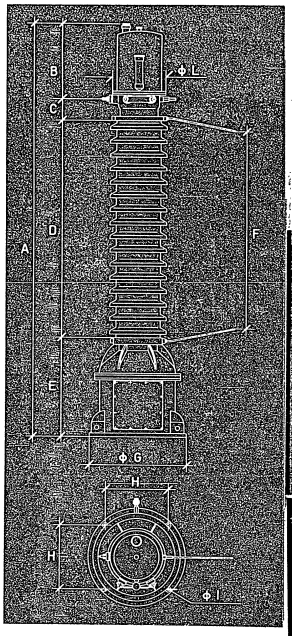
DI BATTAGLIA TERME S.p.A.

PER ESTERNO
FOR OUTDOOR
PARA EXTERIOR





TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal	Peso approssimato Approximate weight Peso aproximado	A	B	C	D	E	F	ΦG	H	ΦI	ΦL
	KV	Kg.										
TAE 45	45	50	1170	310	65	355	440	330	350	230	13	310
TAE 60	60	120	1295	310	65	480	440	420	450	290	13	310
TAE 80	80	135	1465	310	65	600	490	550	520	332	13	310
TAE 120	120	315	2040	420	110	935	575	810	550	350	17	310
TAE 150	150	335	2405	420	110	1245	630	1000	600	390	17	310
TAE 220	220	680	2981	500	130	1625	726	1450	740	480	21	400
TAE 275	275	830	3828	675	130	2130	893	1850	740	480	21	400

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TRASFORMATORI DI CORRENTE PER ESTERNO - MOD. TAE

Sono trasformatori di corrente per alte ed altissime tensioni e quindi per installazioni all'aperto.
Essi possono avere fino a tre nuclei alimentanti circuiti secondari indipendenti.
Essi hanno generalmente due rapporti di trasformazione ed il dispositivo per il cambio di rapporto è uguale a quello usato nei trasformatori montati nella base degli interruttori.
Per tensioni maggiori di 100 kV l'isolatore è formato da un tubo di bachelite su cui sono montate le camicie isolanti di porcellana ciò conferisce ai trasformatori stessi una particolare robustezza meccanica.

MOD. TAE (CTO) CURRENT TRANSFORMERS FOR OUTDOOR INSTALLATION

These current transformers are for high and very high voltages and consequently for outdoor installation. They may have as many as three cores feeding independent secondary circuits.
They generally have two transformation ratios and the ratio changing device is the same as that used in transformers housed in the base of the circuit breakers.
For voltages exceeding 100 kV the insulator consists of a bakelite cylinder on which are mounted porcelain insulating sleeves: this makes the transformers particularly robust.

TRANSFORMADORES DE INTENSIDAD MOD. TAE PARA INTEMPERIE

Trátase de transformadores de intensidad para altas y altísimas tensiones y por consiguiente para instalación intemperie.
Pueden tener hasta a 3 nucleos alimentantes circuitos secundarios independientes.
Llevan generalmente dos relaciones de transformación y su dispositivo para el cambio de la relación es análogo a él que está colocado en los transformadores montados en la base de los interruptores.
Para tensiones de más de 100 kV, el aislador queda constituido por un cilindro de bakelita sobre el cual quedan montadas las capas de porcelana; esto confiere a los transformadores mismos una particular robustez mecánica.

2130 | TRASFORMATORI DI TENSIONE ANTIRISONANTI MOD. TVT/AR

NON-RESONANT MOD. TVT/AR VOLTAGE TRANSFORMERS
TRANSFORMADORES DE TENSION ANTIRESONANTES MOD. TVT/AR

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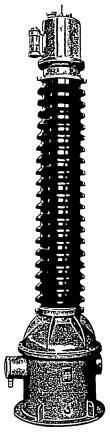
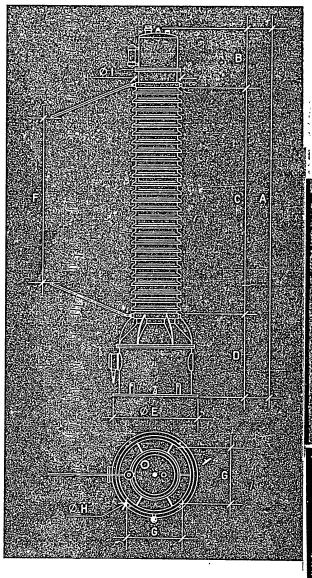
PER ESTERNO
FOR OUTDOOR
PARA EXTERIOR





TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal KV	Peso approssimativo Approximate weight Peso aproximado Kg	A	B	C	D	E	F	G	H	I
TVT AR 80	80	300	1635	457	603	575	520	550	330	17	310
TVT AR 120	120	400	2085	490	935	660	590	810	380	17	310
TVT AR 150	150	500	2655	550	1404	700	620	1000	400	17	310
TVT AR 220	220	850	3280	574	1980	726	740	1450	480	21	400

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TRASFORMATORI DI TENSIONE ANTIRISONANTI MOD TVT/AR PER ESTERNO

I trasformatori Mod TVT AR sono apparecchi atti alla misura delle tensioni di fase per reti ad alta ed altissima tensione (80 - 120 - 150 - 220 kV). Con questi trasformatori si è riusciti a dare una brillante soluzione al difficilissimo problema della distribuzione del potenziale lungo l'avvolgimento primario dei riduttori di tensione in caso di onde ad impulso, normali o troncate, allo scopo di renderli meglio resistenti alle sovratensioni prodotte da scariche atmosferiche o ai transitori di tensione conseguenti a manovre. Questo risultato è stato raggiunto frazionando l'avvolgimento primario in sezioni completamente schermate in modo da assegnare un percorso controllato alla quasi totalità della corrente di carica delle capacità in parallelo alle singole sezioni e di evitare il più possibile che ci siano correnti di carica che seguano percorsi diversi. Tali schermature, oltre a racchiudere l'avvolgimento primario, situato nell'interno del cassone di base, proseguono lungo il passante d'entrata, nell'interno della colonna isolante, e suddividono lungo di essa il campo elettrico esterno in modo uniforme anche sotto la tensione a frequenza industriale.

Naturalmente, alla fase di progetto e di studio ha fatto seguito tutta una serie di prove: in bassa tensione, per controllare sperimentalmente se la distribuzione sotto onde ad impulso riusciva soddisfacente, in alta tensione (secondo le più gravose norme sia europee che americane), per verificare se effettivamente tali presupposti trovavano rispondenza nella realtà. Queste prove, felicemente superate, hanno messo in grande evidenza le qualità di questo trasformatore; l'ultima conferma è venuta, poi, dall'ottimo rendimento fornito, nella fase di esercizio, in molte stazioni italiane ed estere.

NON RESONANT MOD TVT AR VOLTAGE TRANSFORMER

Mod TVT AR instrument transformers are suitable for measuring line-to-ground voltage in high voltage systems (80-120-150-220 kV). In these transformers a most important result has been achieved. When an impulse voltage or a steep chopped wave is applied to the terminals, the dielectric gradient throughout the coils and turns is distributed in a perfectly uniform way.

Thus Mod TVT AR voltage transformers fully withstand both lightning and switching surges.

This was obtained by dividing the primary winding into electrostatic-shielded sections, in order to control the path of the current that loads the capacities of these sections.

The electrostatic shields not only enclose the primary winding located inside the base box, but also extend upwards to build up a condenser bushing within the porcelain housing and to ensure an uniform gradient distribution, also at operating frequency.

After Mod TVT AR voltage transformers have been studied and adequately designed they were submitted to a complete series of tests.

— Impulse tests at reduced voltage to check satisfactory gradient distribution.

— Impulse tests at high voltage (according to the severest European and American Specifications) to control that previsions were effectively implemented.

All these tests proved the good quality of the transformers and this was confirmed by the high performances obtained while in service all Italian as well as foreign Substations where they are installed.

TRANSFORMADORES DE TENSION ANTIRESONANTES MOD TVT/AR

Los transformadores Mod TVT AR son aparatos destinados a medir las tensiones entre las fases de las lineas de alta y altisima tension (80-120-150-220 kV).

Con estos transformadores se ha logrado solucionar problemas de una manera brillante o sea el dificilisimo problema de la distribucion del potencial a lo largo del arrollado primario de los reductores de tension en el caso de andar a impulso normales o truncadas, a fin de hacerlos mas resistentes a las sobretensiones producidas por descargas atmosfericas o a las transitorias de tension consecuentes a las maniobras.

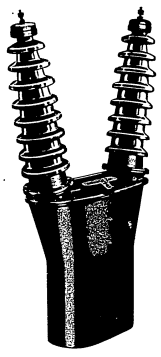
Este resultado se ha conseguido fraccionando el arrollado primario en secciones completamente blindadas de manera que se ha establecido un recorrido controlado por casi la totalidad de la corriente de carga de las capacidades en paralelo a las mismas secciones y se ha evitado lo mas posible que haya corrientes de carga que puedan seguir recorridos diferentes. Estos blindajes, ademas de encerrar el arrollado primario colocado en el interior de la base se extiende a lo largo del pasante de entrada, en el interior de la columna aislante y reparten a lo largo de la misma el campo electrico exterior de manera uniforme aun bajo tension de frecuencia industrial. Naturalmente después de la fase de proyecto y estudio se ha sometido el transformador a una serie de pruebas en baja tension para controlar experimentalmente si la distribucion bajo ondas a impulso era satisfactoria en alta tension (segun las mas estrictas normas europeas y americanas), para verificar si efectivamente se lograban tales condiciones de funcionamiento. Estas pruebas, que tuvieron el mejor de los exitos, han puesto en evidencia la calidad de este transformador los magnificos resultados alcanzados por los aparatos en muchas estaciones de distribucion en Italia y en el Exterior, han confirmado en la practica lo que ya habia sido comprobado experimentalmente.

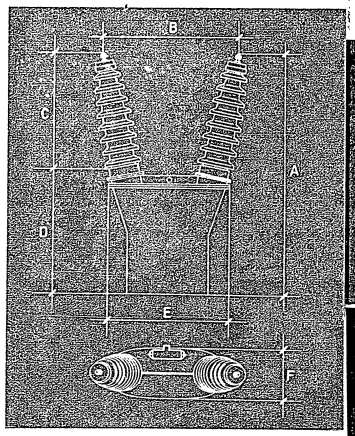
2200 | TRASFORMATORI DI TENSIONE MOD. TV

MOD. TV (VT) VOLTAGE TRANSFORMERS
TRANSFORMADORES DE TENSION MOD TV

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER INTERNO ED ESTERNO
FOR INDOOR AND OUTDOOR
PARA INTERIOR Y EXTERIOR





TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tension nominal	Peso complessivo Total weight Peso total	Per interno For indoor Para interior		Per esterno For outdoor Para exterior				
	KV	Kg	A	C	A	C	B	D	E	F
TV 45	45	120	980	445	1010	475	608	535	612	252
TV 60	60	175	1250	570	1280	600	710	680	684	270
TV 80	80	230	1445	695	1475	725	825	760	750	304

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2210 | TRASFORMATORI DI CORRENTE MOD. TA

MOD. TA (CT) CURRENT TRANSFORMERS
TRANSFORMADORES DE INTENSIDAD MOD TA

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER INTERNO ED ESTERNO
FOR INDOOR AND OUTDOOR
PARA INTERIOR Y EXTERIOR

TRASFORMATORI DI TENSIONE PER INTERNO E PER ESTERNO MOD. TV

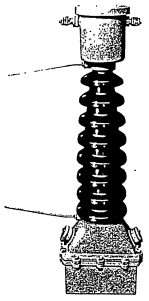
Sono trasformatori a quantità minima di olio. Gli avvolgimenti sono isolati fortemente con carta impregnata e trattati in autoclave sotto alto vuoto, con procedimento analogo a quello per l'impregnazione dei cavi.
Con ciò si è ottenuto di sottrarre all'olio ogni funzione di isolamento lasciandogli soltanto quella di mantenere impregnati convenientemente gli avvolgimenti e di ridurre a valori trascurabili le distanze fra le pareti della cassa e gli avvolgimenti, riducendo a quantitativo trascurabile il contenuto di olio. Ciò è particolarmente vantaggioso nel caso di incendio.
Questi trasformatori possono essere costruiti sia del tipo per interno, sia del tipo per esterno

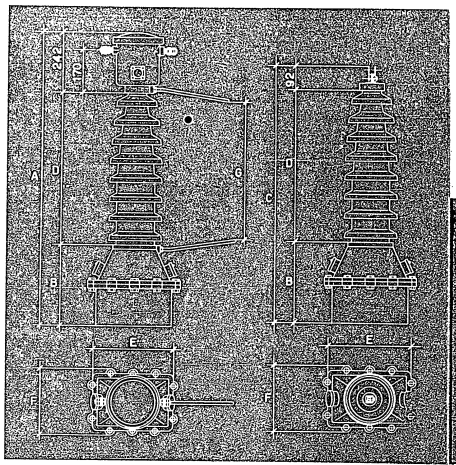
MOD. TV (VT) VOLTAGE TRANSFORMERS FOR INDOOR AND OUTDOOR INSTALLATION

These voltage transformers require a very small quantity of oil. The windings are highly insulated with oil impregnated paper and treated in an autoclave under vacuum with a process similar to the one used for the impregnation of cables.
It has thus been possible to deprive the oil of its typical insulating purpose, its only function being here of keeping the windings suitably impregnated, and of reducing the distances between the walls of the box and the windings to negligible values: the oil contents are reduced to a very low quantity indeed. This is a far from negligible advantage in case of fire.
These transformers are obtainable in outdoor and indoor models.

TRANSFORMADORES DE TENSION MOD. TV PARA INSTALACION INTEMPERIE Y AL INTERIOR

Son trasformadores de tension de mínima cantidad de aceite. Los arrollamientos son fuertemente aislados con papel impregnado y tratados en tanques de elevado vacio, con procedimientos análogos a los que se emplean para la impregnación de los cables.
Con ese se ha conseguido cuitar al aceite toda función de aislamiento dejándole solamente la función de mantener debidamente impregnados los arrollamientos y de reducir a valores transcurables las distancias entre las paredes de las cubas y los arrollamientos, reduciendo a cantidades transcurables los contenidos de aceite. Eso es particularmente ventajoso en los casos de incendio.
Estos transformadores pueden ser construidos de tipo para interior y de tipo para intemperie.





TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal KV	Peso approssimativo Approximate weight Peso aproximado Kg.	A	B	C	A	B	C	D	E	F	G
			1 isolo 1 unit 1 aislador			2 isolatori 2 units 2 aisladores						
TA 45	45	45÷55~	857	265	707	932	340	782	350	271	235	330
TA 60	60	55÷65~	1012	290	862	1087	365	937	480	286	245	420
TA 80	80	65÷75~	1164	322	1014	1244	402	1094	600	326	265	550

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TRASFORMATORI DI CORRENTE MOD. TA PER INTERNO E PER ESTERNO

Sono trasformatori di corrente a quantità minima di olio. Gli avvolgimenti sono isolati fortemente con carta impregnata e trattati in autoclave sotto alto vuoto, con procedimento analogo a quello per l'impregnazione dei cavi.
Con ciò si è ottenuto di sottrarre all'olio ogni funzione di isolamento lasciandogli soltanto quella di mantenere impregnati convenientemente gli avvolgimenti e di ridurre a valori trascurabili le distanze fra le pareti della cassa e gli avvolgimenti, riducendo a quantitativo trascurabile il contenuto di olio. Ciò è particolarmente vantaggioso nel caso di incendio.
Questi trasformatori possono essere costruiti sia del tipo per interno, sia del tipo per esterno.
Essi hanno generalmente due rapporti di trasformazione ed il dispositivo per il cambio del rapporto sui morsetti primari è particolarmente semplice.
A richiesta, possono essere forniti con due o più nuclei magnetici ed altrettanti circuiti secondari indipendenti.

MOD. TA (CT) CURRENT TRANSFORMERS FOR INDOOR AND OUTDOOR INSTALLATION

These current transformers require a very small quantity of oil.
The windings are highly insulated with oil impregnated paper and treated in an autoclave under vacuum with a process similar to the one used for the impregnation of cables.
It has thus been possible to deprive the oil of its typical insulating purpose, its only function being here of keeping the windings suitably impregnated, and of reducing the distances between the walls of the box and the windings; the oil contents are reduced to a very low quantity indeed. This is a far from negligible advantage in case of fire.
These transformers are obtainable in outdoor and indoor models.
They generally have two transformation ratios and the device for changing the ratio on the primary terminals is exceptionally simple.
Upon request, these transformers can be supplied with two or more magnetic cores and as many independent secondary circuits.

TRANSFORMADORES DE INTENSIDAD MOD. TA PARA INSTALACION INTEMPERIE Y AL INTERIOR

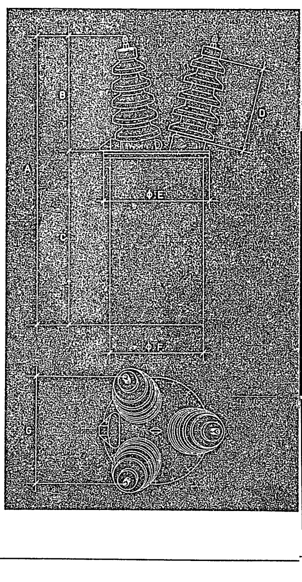
Son transformadores de intensidad de mínima cantidad de aceite. Los arrollamientos son fuertemente aislados con papel impregnado y tratados en tanques de elevado vacío, con procedimientos análogos a los que se emplean para la impregnación de los cables.
Con eso se ha conseguido quitar al aceite toda función de aislamiento dejándole solamente la función de mantener debidamente impregnados los arrollamientos y de reducir a valores transcurables las distancias entre las paredes de las cubas y los arrollamientos, reduciendo así a cantidades transcurables los contenidos de aceite; eso es particularmente ventajoso en los casos de incendio.
Estos transformadores pueden ser construidos de tipo para interior y de tipo para intemperie; llevan generalmente dos relaciones de transformación y su dispositivo para el cambio de la relación, en las bornas primarias, es particularmente sencillo.
A petición, pueden ser suministrados con dos o más nucleos magneticos y otrostantos circuitos secundarios independientes.

2220 | TRASFORMATORI DI TENSIONE MOD. 3 TVT

MOD. 3 TVT (3 VTG) VOLTAGE TRANSFORMERS
TRANSFORMADORES DE TENSION MOD. 3 TVT

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER INTERNO ED ESTERNO
FOR INDOOR AND OUTDOOR
PARA INTERIOR Y EXTERIOR



TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale / Rated voltage / Tension nominal KV	Peso approssimativo / Approximate weight / Peso aproximado Kg.	Per interno / For indoor / Para interior A	B	Per esterno / For outdoor / Para exterior A	B	C	D	⌀E	⌀F	G
3 TVT 45	45	190	1205	480	1235	510	725	350	445	394	500
3 TVT 60	60	310	1510	560	1540	590	950	480	495	444	650
3 TVT 80	80	400	1720	675	1750	705	1045	600	560	520	800

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TRASFORMATORI TRIFASE DI TENSIONE E DI TERRA PER INTERNO E PER ESTERNO MOD 3TVT

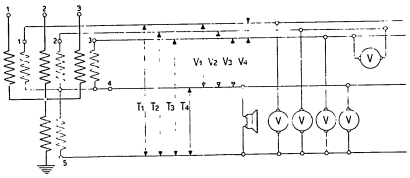
Si tratta di un complesso di trasformatori di tensione mediante il quale è possibile la misura della tensione tra le fasi di un impianto trifase, fra ciascuna fase ed il punto neutro dell'impianto stesso, sia questo isolato o no, e tra detto neutro e la terra, in modo che i valori delle tensioni secondarie corrispondano esattamente alle tensioni generate dagli alternatori anche in caso di contatto a terra. Questo complesso consente inoltre la misura contemporanea ed indipendente delle tensioni di isolamento di ciascuna fase rispetto alla terra, serve per eliminare piccole cariche statiche a terra, e può rimanere costantemente sotto tensione anche nel caso che vi sia una delle fasi primarie in contatto con la stessa, senza che aumenti la sollecitazione elettrica fra le spire del suo avvolgimento. E' costituito da un trasformatore trifase di tensione avente il circuito magnetico equilibrato sulle 3 fasi mediante disposizione

MOD 3TVT (3VTG) THREE-PHASE VOLTAGE AND EARTH LEAKAGE TRANSFORMERS

This is a set of voltage trans ormers allowing to measure the voltage between the phases of a three-phase plant, between each phase and the neutral point of the plant whether insulated or not, and between the aforesaid neutral point and the earth so as to make sure that the values of the secondary voltages correspond exactly to the voltages generated by the alternators also in the case of an earth contact. With this set it is also possible to measure, either simultaneously or independently, the insulation voltage of each phase with respect to the earth, it eliminates small static earth charges and can be constantly under tension also if one of the primary phases is in contact with the earth, without causing any increase of the electrical stress between the turns

TRANSFORMADORES TRIFASICOS DE TENSION Y DE TIERRA PARA INSTALACION AL INTERIOR Y AL EXTERIOR MOD 3TVT

Este modelo se compone de un grupo de transformadores de tension, el cual en una linea trifasica permite la medicion de las tensiones existientes entre fases y entre cada fase y el neutro. Esta medicion es posible tanto con neutro aislado como con neutro puesto a tierra, de modo que los valores medidos en los segundarios de dichos transformadores corresponden exactamente a las bornas de los generadores, aun en el caso de que se produzca un contacto a tierra. Ademas, este grupo de transformadores permite la medicion contemporanea e independiente de las tensiones de aislamiento



dei nuclei ai vertici di un triangolo equilatero e da un trasformatore monofase di tensione allacciato fra il neutro del primo e la terra, contenuti nella stessa cassa. Nello schema qui riprodotto sono indicati i valori delle tensioni fra i vari morsetti.

V_1 V_2 V_3 V_4 sempre costanti anche in caso di fase a terra corrispondono alla tensione generata dagli alternatori.

T_1 T_2 T_3 in condizioni normali uguali a V_1 V_2 V_3, in caso di fase a terra variabili fra O e V_1.

T_4 in condizioni normali uguale a zero; in caso di squilibrio di isolamento e contatto a terra variabile fra O e V_1.

of its windings. It consists of a three-phase voltage transformer, the magnetic circuit of which is spread over the three phases by placing the cores at the ankes of an equilateral triangle, and of a single-phase voltage transformer connected between the neutral point of the former and the earth, both transformers being placed in the same container.

The diagram below gives the values of the voltages between the different terminals.

V_1 V_2 V_3 V_4 always constant also in the case of a phase-to-earth fault, correspond to the voltage generated by the alternators.

T_1 T_2 and T_3 are equal to V_1 V_2 and V_3 in normal conditions and fluctuate between O and V_1 in the case of a phase-to-earth fault.

T_4 in normal conditions, is equal to zero, in case of unbalanced insulation and earth contact, it fluctuates between O and V_1.

entre cada fase y la tierra, sirve para la eliminacion de pequeñas cargas electrostaticas y puede quedarse constantemente bajo tension, aun en el caso de que una de las lineas primarias este a tierra, sin que por eso los devanados se encuentren sometidos a gradientes de tension peligrosos para el aislamiento.

El Mod. 3TVT se compone de un transformador trifasico de tension, en el que los nucleos del circuito magnetico estan puestos a los lados de un triangulo equilatero, mientras la medicion existiente entre neutro y tierra es llevada a cabo por medio de un transformador monofasico de tension situado en la misma caja del grupo de medida. En el plano reproducido más arriba, estan indicados los valores de las tensiones entre las varias bornas.

V_1 V_2 V_3 y V_4 permanecen siempre constantes aun en caso de contacto a tierra y corresponden a la tension existiente en las bornas de los generadores.

T_1 T_2 T_3 en condiciones normales son siempre iguales a V_1 V_2 V_3, en caso de linea a tierra, pueden variar entre O y V_1. T_4 normalmente es igual a O; en caso de desquilibrio en el aislamiento o de contacto a tierra, varia entre O y V_1.

MOD. TAPO (TOP) OIL IMMERSED PASS-THROUGH CURRENT TRANSFORMER
TRANSFORMADORES DE INENSIDAD PASANTES EN ACEITE MOD. TAPO

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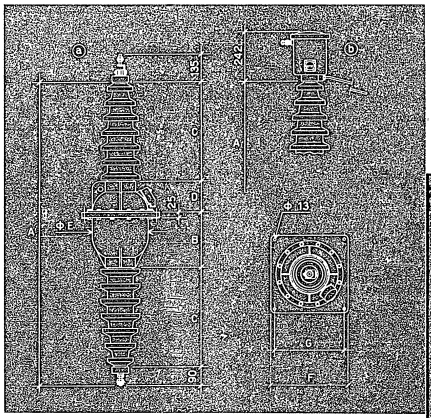
PER INTERNO ED ESTERNO
FOR INDOOR AND OUTDOOR
PARA INTERIOR Y EXTERIOR



a) - Tipo per interno
- Indoor type
- Tipo para interior

b) - Tipo per esterno
- Outdoor type
- Tipo para exterior

TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tension nominal KV	Peso del tipo ad 1 nucleo Weight of the single-core type Poids du type à 1 noyau Kg.	A	B	A	B	C	D	E	F	G
			1 nucleo 1 core 1 noyau		2 nuclei 2 cores 2 noyaux						
TAPO 45	45	70 ~	1180	255	1285	360	350	135	252	356	326
TAPO 60	60	90 ~	1470	270	1575	375	480	150	272	376	346
TAPO 80	80	110 ~	1714	272	1849	407	600	152	312	420	390

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TRASFORMATORI DI CORRENTE A PASSANTE IN OLIO PER INTERNO E PER ESTERNO MOD. TAPO

Sono trasformatori di corrente combinati con un isolatore passante a quantità minima di olio. Gli avvolgimenti sono isolati fortemente con carta impregnata e trattati in autoclave sotto alto vuoto, con procedimento analogo a quello per l'impregnazione dei cavi.
Con ciò si è ottenuto di sottrarre all'olio ogni funzione di isolamento lasciandogli soltanto quella di mantenere impregnati convenientemente gli avvolgimenti e di ridurre a valori trascurabili le distanze fra le pareti della cassa e gli avvolgimenti, riducendo notevolmente la quantità d'olio contenuta. Ciò è particolarmente vantaggioso nel caso di incendio.
Essi possono avere 1 o 2 rapporti di trasformazione. In quest'ultimo caso, se il dispositivo di cambio di rapporto è posto sul primario, i trasformatori possono essere installati solo in posizione verticale. Nel caso invece che il rapporto di trasformazione sia unico, il trasformatore può essere installato anche orizzontalmente.
A richiesta essi possono essere forniti con due o più nuclei magnetici ed altrettanti circuiti secondari indipendenti aventi caratteristiche predeterminate

MOD. TAPO (CTOP) OIL PASS-THROUGH CURRENT TRANSFORMERS FOR INDOOR AND OUTDOOR INSTALLATION

These current transformers are combined with an oil filled passthrough insulator. The windings are highly insulated with oil impregnated paper and treated in an autoclave under vacuum with a process similar to the one used for the impregnation of cables.
It has thus been possible to deprive the oil of its typical insulating purpose, its only function being here of keeping the windings suitably impregnated, and of reducing the distances between the walls of the box and the windings to negligible values; the oil contents are reduced to a very low quantity indeed.
This is of far from negligible advantage in case of fire.
These transformers may have 1 or 2 transformation rations. In the latter case, if the ratio changing device is placed on the primary, the transformers can only be placed vertically.
If there is one transformation ratio, the transformer may also be installed horizontally.
Upon request, the transformers can be supplied with two or more magnetic cores with a corresponding number of secondary circuits having predetermined features.

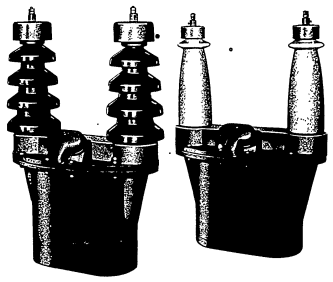
TRANSFORMADORES DE INTENSIDAD TIPO DE PASANTE EN ACEITE PARA INTERIOR Y EXTERIOR MOD. TAPO

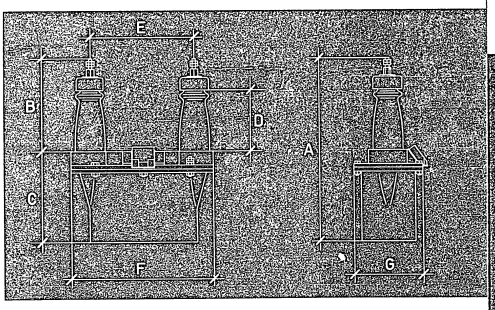
Son transformadores de intensidad combinados con un aislador pasante de mínima cantidad de aceite. Los arrollamientos son fuertemente aislados con papel impregnado y tratados en tanques de cierre vacío, con procedimientos análogos a los que se emplean para la impregnación de los cables.
Con eso se ha conseguido quitar al aceite toda función de aislamiento, dejándole solamente la función de mantener debidamente impregnados los arrollamientos, reduciendo a cantidades transcurables los contenidos de aceite. Eso es particularmente ventajoso en caso de incendio.
Estos transformadores pueden llevar 1 o 2 relaciones de transformación. En este último caso, si el dispositivo para el cambio de la relación está colocado en el primario, los transformadores pueden ser instalados solo en posición vertical.
En el caso de que la relación de transformación sea única, el transformador puede ser instalado aún horizontalmente.
A petición, pueden ser suministrados con dos o más núcleos magnéticos y otros tantos circuitos secundarios independientes.

MOD. TV (VT) VOLTAGE TRANSFORMERS
TRANSFORMADORES DE TENSION MOD. TV

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER ISTERNO ED ESTERNO
FOR INDOOR AND OUTDOOR
PARA INTERIOR Y EXTERIOR





TRASFORMAT TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal KV	Peso approssimativo Approximate weight Peso aproximado Kg.	Per interno For indoor Para interior A	B	Per esterno For outdoor Para exterior A	B	C	D	E	F	G
TV 15	15	30	445	220	475	250	225	150	260	362	188
TV 20	20	35	560	270	590	300	290	200	260	362	188
TV 30	30	65	655	320	685	350	335	250	330	445	235

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TRASFORMATORI DI TENSIONE PER INTERNO E PER ESTERNO MOD TV

Sono trasformatori a quantità minima di olio. Gli avvolgimenti sono isolati fortemente con carta impregnata e trattati in autoclave sotto alto vuoto, con procedimento analogo a quello per l'impregnazione dei cavi.

Con ciò si è ottenuto di sottrarre all'olio ogni funzione di isolamento lasciandogli soltanto quella di mantenere impregnati convenientemente gli avvolgimenti e di ridurre a valori trascurabili le distanze fra le pareti della cassa e gli avvolgimenti, riducendo a quantitativo trascurabile il contenuto di olio. Ciò è particolarmente vantaggioso nel caso di incendio.

Questi trasformatori possono essere costruiti sia del tipo per interno, sia del tipo per esterno.

MOD. TV (VT) VOLTAGE TRANSFORMERS FOR INDOOR AND OUTDOOR INSTALLATION

These voltage transformers require a very small quantity of oil. The windings are highly insulated with oil impregnated paper and treated in an autoclave under vacuum with a process similar to the one used for the impregnation of cables.

It has thus been possible to deprive the oil of its typical insulating purpose, its only function being here of keeping the windings suitably impregnated, and of reducing the distances between the walls of the box and the windings to negligible values; the oil contents are reduced to a very small quantity indeed. This is a far from negligible advantage in case of fire.

These transformers are obtainable in outdoor and indoor models.

TRANSFORMADORES DE TENSION MOD. TV PARA INSTALACION INTEMPERIE Y AL INTERIOR

Son transformadores de mínima cantidad de aceite. Los arrollamientos son fuertemente aislados con papel impregnado y tratados en tanques de elevado vacio, con procedimientos análogos a los que se emplean para la impregnación de los cables.

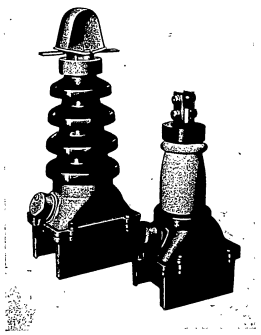
Con eso se ha conseguido quitar al aceite toda función de aislamiento dejándole solamente la función de mantener debidamente impregnados los arrollamientos y de reducir a valores transcurables las distancias entre las paredes de las cubas y los arrollamientos, reduciendo a cantidades transcurables los contenidos de aceite; eso es particularmente ventajoso en los casos de encendio.

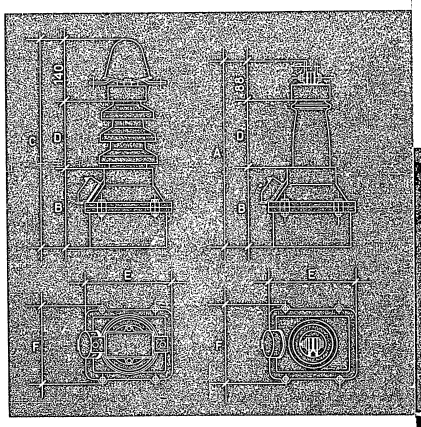
Estos transformadores pueden ser construidos de tipo para interior y de tipo para intemperie.

MOD. TA (CT) CURRENT TRANSFORMERS
TRANSFORMADORES DE INTENSIDAD MOD. TA

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER ISTERNO ED ESTERNO
FOR INDOOR AND OUTDOOR
PARA INTERIOR Y EXTERIOR





TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal	Peso del tipo ad 1 nucleo Weight of the one-core type Peso del tipo de un núcleo	1 nucleo 1 core 1 núcleo			2 nuclei 2 cores 2 núcleos				
	KV	Kg.	A	B	C	A	B	C	D	E	F
TA 15	15	15~	418	180	470	483	245	535	150	195	180
TA 20	20	20~	468	180	520	533	245	585	200	195	180
TA 30	30	25~	548	210	600	618	280	670	250	230	195

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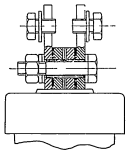
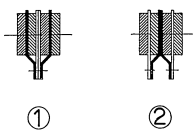
TRASFORMATORI DI CORRENTE MOD. TA PER INTERNO E PER ESTERNO

Sono trasformatori di corrente a quantità minima di olio. Gli avvolgimenti sono isolati fortemente con carta impregnata e trattati in autoclave sotto alto vuoto, con procedimento analogo a quello per l'impregnazione dei cavi.
Con ciò si è ottenuto di sottrarre all'olio ogni funzione di isolamento lasciandogli soltanto quella di mantenere impregnati convenientemente gli avvolgimenti e di ridurre a valori trascurabili le distanze fra le pareti della cassa e gli avvolgimenti, riducendo a quantitativo trascurabile il contenuto di olio. Ciò è particolarmente vantaggioso nel caso di incendio.
Questi trasformatori possono essere costruiti sia del tipo per interno, sia del tipo per esterno.
Essi hanno generalmente due rapporti di trasformazione ed il dispositivo per il cambio del rapporto sui morsetti primari è particolarmente semplice come si rileva dalla illustrazione.
A richiesta, possono essere forniti con due o più nuclei magnetici ed altrettanti circuiti secondari indipendenti.





1) - Collegamento in parallelo
Shunt connection
Conexión en paralelo

2) - Collegamento in serie
Series connection
Conexión en serie

MOD. TA (CT) CURRENT TRANSFORMERS FOR INDOOR AND OUTDOOR INSTALLATION

These current transformers require a very small quantity of oil. The windings are highly insulated with oil impregnated paper and treated in an autoclave under vacuum with a process similar to the one used for the impregnation of cables
It has thus been possible to deprive the oil of its typical insulating purpose, its only function being here of keeping the windings suitably impregnated, and of reducing the distances between the walls of the box and the windings to negligible values; the oil contents are reduced to a very small quantity indeed. This is a far from negligible advantage in case of fire.
These transformers are obtainable in outdoor and indoor models.
They generally have two transformation ratios and the device for changing the ratio on the primary terminals is very simple, as the figure at the side shows.
Upon request, these transformers can be supplied with two or more magnetic cores with a corresponding number of separate secondary circuits.

TRANSFORMADORES DE INTENSIDAD MOD. TA PARA INSTALACION INTEMPERIE Y AL INTERIOR

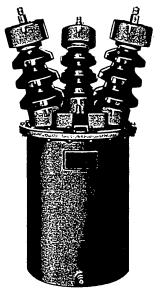
Son transformadores de mínima cantidad de aceite.
Los arrollamientos son fuertemente aislados con papel impregnado y tratados en tanques de elevado vacío con procedimientos análogos a los que se emplean para la impregnación de los cables.
Con eso se ha conseguido quitar al aceite toda función de aislamiento dejándole solamente la función de mantener debidamente impregnados los arrollamientos y de reducir a valores transcurables las distancias entre las paredes de las cubas y los arrollamientos reduciendo a cantidades transcurables los contenidos de aceite. Eso es particularmente ventajoso en los casos de incendio.
Estos transformadores pueden ser construidos de tipo para interior y de tipo para intemperie y llevan generalmente dos relaciones de transformación y el dispositivo para el cambio de relación en los bornes primarios es particularmente sencillo, como puede apreciarse del dibujo anexo
A petición, pueden ser suministrados con dos o más nucleos magneticos y otros tantos circuitos secundarios independientes.

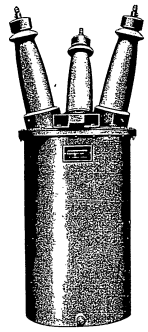
2320 | TRASFORMATORI DI TENSIONE MOD. 3 TVT

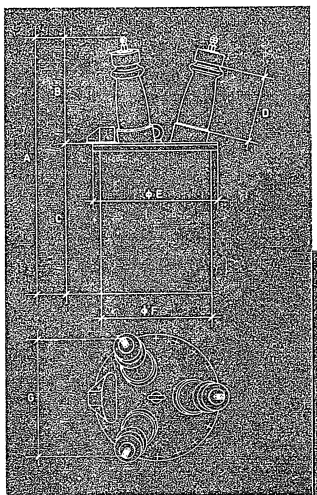
MOD. 3TVT (3VTG) VOLTAGE TRANSFORMERS
TRANSFORMADORES DE TENSION MOD. 3TVT

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER INTERNO ED ESTERNO
FOR INDOOR AND OUTDOOR
PARA INTERIOR Y EXTERIOR







TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal	Peso approssimativo Approximate weight Peso aproximado	Per interno For indoor Para interior		Per esterno For outdoor Para exterior					
	KV	Kg	A	B	A	B	C	D	ΔE	ΔF	G
3TVT 15	15	60	655	270	685	300	385	150	320	283	270
3TVT 20	20	80	795	320	825	350	475	200	333	293	290
3TVT 30	30	125	935	370	965	400	565	250	385	348	330

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TRASFORMATORI TRIFASE DI TENSIONE E DI TERRA PER INTERNO E PER ESTERNO MOD 3TVT

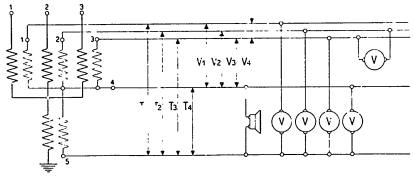
Si tratta di un complesso di trasformatori di tensione mediante il quale è possibile la misura della tensione tra le fasi di un impianto trifase, fra ciascuna fase ed il punto neutro dell'impianto stesso, sia questo isolato o no, e tra detto neutro e la terra, in modo che i valori delle tensioni secondarie corrispondano esattamente alle tensioni generate dagli alternatori anche in caso di contatto a terra Questo complesso consente inoltre la misura contemporanea ed indipendente delle tensioni di isolamento di ciascuna fase rispetto alla terra, serve per eliminare piccole cariche statiche a terra, e può rimanere costantemente sotto tensione anche nel caso che V_1 sia una delle fasi primarie in contatto con la stessa, senza che aumenti la sollecitazione elettrica fra le spire del suo avvolgimento. E' costituito da un trasformatore trifase di tensione avente il circuito magnetico equilibrato sulle 3 fasi mediante disposizione

MOD 3TVT (3VTG) THREE-PHASE VOLTAGE AND EARTH LEAKAGE TRANSFORMERS

This is a set of voltage transformers allowing to measure the voltage between the phases of a three-phase plant, between each phase and the neutral point of the plant whether insulated or not, and between the aforesaid neutral point and the earth so as to make sure that the values of the secondary voltages correspond exactly to the voltages generated by the alternators also in the case of an earth contact. With this set it is also possible to measure, either simultaneously or independently, the insulation voltage of each phase with respect to the earth, it eliminates small static earth charges and can be constantly under tension also if one of the primary phases is in contact with the earth, without causing any increase of the electrical stress between the turns

TRANSFORMADORES TRIFASICOS DE TENSION Y DE TIERRA PARA INSTALACION AL INTERIOR Y AL EXTERIOR MOD 3TVT

Este modelo se compone de un grupo de transformadores de tension, el cual en una linea trifasica permite la medicion de las tensiones existientes entre fases y entre cada fase y el neutro. Esta medicion es posible tanto con neutro aislado como con nuetro puesto a tierra, de modo que los valores medidos en los segundarios de dichos transformadores corresponden exactamente a las bornas de los generadores, aun en el caso de que se produzca un contacto a tierra Ademas, este grupo de transformadores permite la medicion contemporanea e independiente de las tensiones de aislamiento



dei nuclei ai vertici di un triangolo equilatero e da un trasformatore monofase di tensione allacciato fra il neutro del primo e la terra, contenuti nella stessa cassa Nello schema qui riprodotto sono indicati i valori delle tensioni fra i vari morsetti.

V_1 V_2 V_3 V_4, sempre costanti anche in caso di fase a terra corrispondono alla tensione generata dagli alternatori.

T_1 T_2 T_3 in condizioni normali uguali a V_1 V_2 V_3, in caso di fase a terra variabili fra O e V_4

T_4 in condizioni normali uguale a zero, in caso di squilibrio di isolamento e contatto a terra variabile fra O e V_1.

of its windings It consists of a three-phase voltage transformer, the magnetic circuit of which is spread over the three-phases by placing the cores at the apices of an equilateral triangle, and of a single-phase voltage transformer connected between the neutral point of the former and the earth, both transformers being placed in the same container

The diagram below gives the values of the voltages between the different terminals

V_1 V_2 V_3 V_4, always constant also in the case of a phase-to-earth fault, correspond to the voltage generated by the alternators.

T_1 T_2 and T_3 are equal to V_1 V_2 and V_3 in normal conditions and fluctuate between O and V_4 in the case of a phase-to-earth fault

T_4 in normal conditions, is equal to zero, in case of unbalanced insulation and earth contact, it fluctuates between O and V_1.

entre cada fase y la tierra, sirve para la eliminacion de pequeñas cargas electrostaticas y puede quedarse constantemente bajo tension, aun en el caso de que una de las lineas primarias esté a tierra, sin que por eso los devanados se encuentren sometidos a gradientes de tension peligrosos para el aislamiento

El Mod. 3TVT se compone de un transformador trifasico de tension, en el que los nucleos del circuito magnetico estan puestos a los lados de un triangulo equilatero, mientras la medicion existiente entre neutro y tierra es llevada a cabo por medio de un transformador monofasico de tension situado en la misma caja del grupo de medida En el plano reproducido más arriba, estan indicados los valores de las tensiones entre las varias bornas.

V_1 V_2 V_3 y V_4 permanecen siempre constantes aun en caso de contacto a tierra y corresponden a la tension existiente en las bornas de los generadores.

T_1 T_2 T_3 en condiciones normales son siempre iguales a V_1 V_2 V_3; en caso de linea a tierra, pueden variar entre O y V_4 T_4 normalmente es igual a O, en caso de desquilibrio en el aislamiente o de contacto a tierra, varia entre O y V_1.

2330 | TRASFORMATORI DI CORRENTE a passante in olio MOD. TAPO

MOD. TAPO (TOP) OIL IMMERSED PASS-THROUGH CURRENT TRANSFORMER
TRANSFORMADORES DE INTENSIDAD PASANTES EN ACEITE MOD. TAPO

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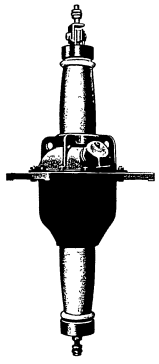
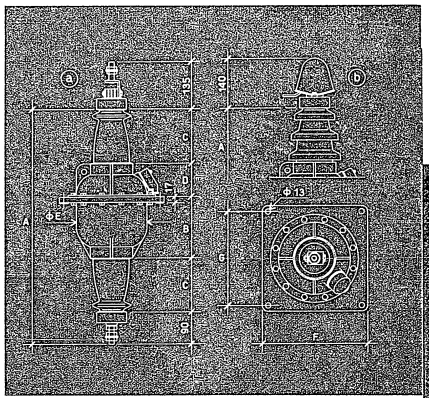
DI BATTAGLIA TERME S.p.A.

PER INTERNO ED ESTERNO
FOR INDOOR AND OUTDOOR
PARA INTERIOR Y EXTERIOR



a) - Tipo per interno
- Indoor type
- Tipo para interior

b) - Tipo per esterno
- Outdoor type
- Tipo para exterior



TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal	Peso del tipo ad 1 anello Weight of the single-core type Peso del tipo de 1 nucleo			1 anello 1 core 1 nucleo		2 anelli 2 cores 2 nucleos				
	KV	Kg.		A	B	A	B	C	D	ø E	F	G
TAPO 15	15	30~		656	173	731	248	150	93	200	295	265
TAPO 20	20	40~		776	188	860	272	200	98	210	305	275
TAPO 30	30	50~		900	200	985	285	250	110	230	330	300

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TRASFORMATORI DI CORRENTE A PASSANTE IN OLIO PER INTERNO E PER ESTERNO MOD. TAPO

Sono trasformatori di corrente combinati con un isolatore passante a quantità minima di olio. Gli avvolgimenti sono isolati fortemente con carta impregnata e trattati in autoclave sotto alto vuoto, con procedimento analogo a quello per l'impregnazione dei cavi.
Con ciò si è ottenuto di sottrarre all'olio ogni funzione di isolamento lasciando gli soltanto quella di mantenere impregnati convenientemente gli avvolgimenti e di ridurre a valori trascurabili le distanze fra le pareti della cassa e gli avvolgimenti, riducendo notevolmente la quantità d'olio contenuta. Ciò è particolarmente vantaggioso nel caso di incendio.
Essi possono avere 1 o 2 rapporti di trasformazione. In quest'ultimo caso, se il dispositivo di cambio di rapporto è posto sul primario, i trasformatori possono essere installati solo in posizione verticale. Nel caso invece che il rapporto di trasformazione sia unico, il trasformatore può essere installato anche orizzontalmente.
A richiesta essi possono essere forniti con due o più nuclei magnetici ed altrettanti circuiti secondari indipendenti aventi ed caratteristiche predeterminate.

MOD. TAPO (CTOP) OIL PASS-THROUGH CURRENT TRANSFORMERS FOR INDOOR AND OUTDOOR INSTALLATION

These current transformers are combined with an oil filled passthrough insulator. The windings are highly insulated with oil impregnated paper and treated in an autoclave under vacuum with a process similar to the one used for the impregnation of cables.
It has thus been possible to deprive the oil of its typical insulating purpose, its only function being here of keeping the windings suitably impregnated, and of reducing the distances between the walls of the box and the windings to negligible values; the oil contents are reduced to a very low quantity indeed.
This is a far from negligible advantage in case of fire.
These transformers may have 1 or 2 transformation rations. In the latter case, if the ratio changing device is placed on the primary, the transformers can only be placed vertically.
If there is one transformation ratio, the transformer may also be installed horizontally.
Upon request, the transformers can be supplied with two or more magnetic cores with a corresponding number of secondary circuits having predetermined features.

TRANSFORMADORES DE INTENSIDAD TIPO DE PASANTE EN ACEITE PARA INTERIOR Y EXTERIOR MOD. TAPO

Son transformadores de intensidad combinados con un aislador pasante de mínima cantidad de aceite. Los arrollamientos son fuertemente aislados con papel impregnado y tratados en tanques de elevado vacío, con procedimientos análogos a los que se emplean para la impregnación de los cables.
Con eso se ha conseguido quitar al aceite toda función de aislamiento, dejándole solamente la función de mantener debidamente impregnados los arrollamientos, reduciendo a cantidades transcurribles los contenidos de aceite. Eso es particularmente ventajoso en caso de incendio.
Estos transformadores pueden llevar 1 o 2 relaciones de transformación. En este último caso, si el dispositivo para el cambio de la relación está colocado en el primario, los transformadores pueden ser instalados solo en posición vertical.
En el caso de que la relación de transformación sea única, el transformador puede ser instalado aún horizontalmente.
A petición, pueden ser suministrados con dos o más núcleos magnéticos y otros tantes circuitos secundarios independientes.

TRASFORMATORI DI CORRENTE A SECCO MOD. TAS

MOD. TAS (CTO) DRY CURRENT TRANSFORMERS
TPANSFORMADORES DE INTENSIDAD EN SECO MOD. TAS

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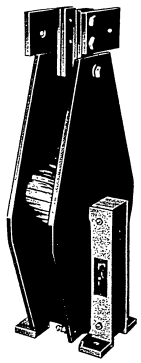
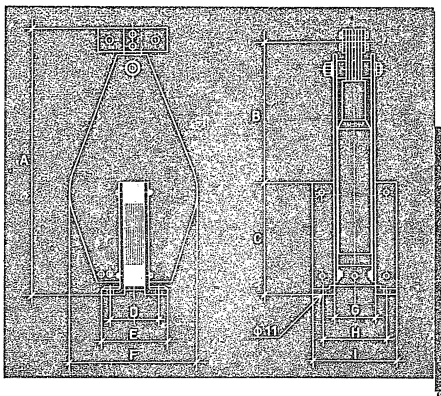
PER INTERNO
FOR INDOOR
PARA INTERIOR





TRASFORMAT TRANSFORMER TRANSFORMADOR	Tensione nominale Rated voltage Tensión nominal KV	Peso approssimativo Approximate weight Peso aproximado Kg	A	B	C	A	B	C	D	E	F
TAS 15	15	15	450	258	192	85	120	220	75	110	145
TAS 20	20	25	550	305	225	90	130	250	87	122	162
TAS 30	30	40	615	357	258	90	130	290	90	126	166

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TRASFORMATORI DI CORRENTE A SECCO PER INTERNO - MOD. TAS

Sono trasformatori di corrente specialmente adatti per ambienti in cui non può essere tollerata nel modo più assoluto la presenza di olio.
Il loro isolamento è costituito da carta impregnata di vernice e da uno spessore d'aria sufficiente a sopportare da solo la tensione di prova.
Essi possono avere uno o due rapporti di trasformazione uno doppio dell'altro, ottenuti mettendo in serie od in parallelo le bobine primarie per mezzo di uno speciale dispositivo.
Possono essere installati in qualunque posizione.

MOD. TAS (CTD) DRY CURRENT TRANSFORMERS FOR INDOOR INSTALLATION

These current transformers are particularly recommended for premises in which presence of oil cannot be tolerated.
Their insulation consists of varnish impregnated paper and an air cushion sufficient to withstand alone the test voltage.
These transformers may have one or two transformation ratios, one double of the other, obtained by series or parallel connection of the primary coils by means of a special device.
They may be installed in any position

TRANSFORMADORES DE INTENSIDAD EN SECO MOD. TAS PARA INSTALACION AL INTERIOR

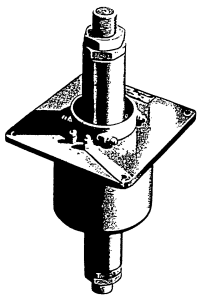
Son transformadores de corriente particularmente aptos para ambientes en que no puede ser tolerada absolutamente la presencia de aceite.
Su aislamiento está constituido por papel impregnado de barníz y por un espesor de aire suficiente para soportar todas las tensiones de prueba.
Pueden tener una o dos relaciones de transformación, una doble de la otra, conseguidas poniendo en serie o paralelo las bobinas primarias por medio de un dispositivo especial.
Pueden ser instalados en cualquier posición.

2350 | TRASFORMATORI DI CORRENTE A SECCO MOD. TAP

MOD. TAP (CTP) DRY CURRENT TRANSFORMERS
TRANSFORMADORES DE INTENSIDAD EN SECO MOD TAP

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

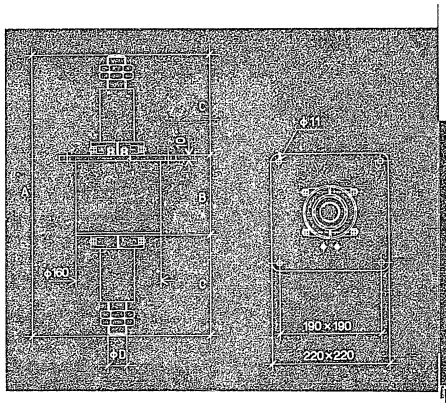
PER INTERNO
FOR INDOOR
PARA INTERIOR



Questo trasformatore viene costruito anche nei tipi per esterno-esterno ed interno esterno

This transformer is also available in the outdoor-outdoor and indoor outdoor types

Este transformador puede ser construido aun en los tipos exterior-exterior e interior-exterior



TRASFORMAT. TRANSFORMER TRANSFORMADOR	Tensione nominale isolamento Nominal insulation tensión nominal	Peso del tipo col 1 nucleo Weight of the 1-core-unit type Peso del tipo de 1 núcleo	1 nucleo 1 unit 1 núcleo		2 nuclei 2 units 2 núcleos		C
	KV	Kg.	A	B	A	B	C
TAP 10	10	15~	530	150	630	250	190
TAP 15	15	20~	630	150	730	250	240
TAP 20	20	25~	730	150	830	250	290

Amp.	750—950	1000—1200	1250—1500	1600—2000
⌀ D	30 MB	33 MB	36 MB	42 MB

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TRASFORMATORI DI CORRENTE
A PASSANTE - A SECCO
PER INTERNO - MOD. TAP

Sono trasformatori di corrente a secco che servono anche da isolatori passanti.

Gli avvolgimenti sono fortemente isolati dalla massa per mezzo di tubi di carta bachelizzata che servono anche da passanti.

A richiesta, possono essere forniti con due o più nuclei magnetici ed altrettanti circuiti secondari indipendenti.

Possono essere installati tanto verticali che orizzontali.

MOD. TAP (CTP)
DRY PASS - THROUGH
CURRENT TRANSFORMERS
FOR INDOOR INSTALLATION

These are dry current transformers acting also as pass-through insulators.

The windings are highly insulated from the earth by means of tubes of bakelite-treated paper, these tubes act also as pass-through insulators.

Upon request, the transformers can be supplied with two or more cores and a corresponding number of independent secondary circuits.

They may be installed either vertically or horizontally.

TRANSFORMARDORES
DE INTENSIDAD PASANTES
EN SECO MOD. TAP
PARA INTERIOR

Son transformadores de corriente en seco que sirven tambien de aisladores pasantes.

Los arrollamientos son fuertemente aislados por medio de tubos de papel bakelizados, que sirven tambien de pasantes.

A petición, pueden ser suministrados con dos o más nucleos y otros tantos circuitos secundarios independientes.

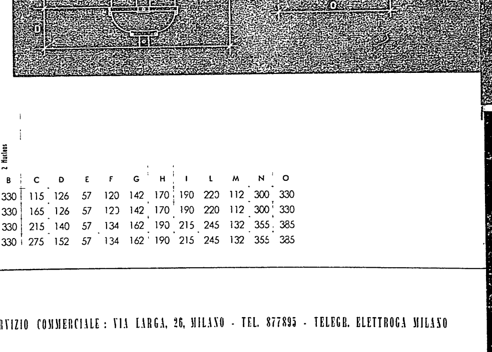
Pueden ser instalados tanto verticales que horizontales.

2360 | TRASFORMATORI DI CORRENTE A SECCO MOD. TADP

MOD. TADP (CTDP) DRY CURRENT TRANSFORMERS
TRANSFORMADORES DE INTENSIDAD EN SECO MOD TADP

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER INTERNO
FOR INDOOR
PARA INTERIOR



TRASFORMAT. / TRANSFORMER / TRANSFORMADOR	Tensione nominale / Rated voltage / Tension nominal KV	Peso approssimativo / Approximate weight / Peso aproximado Kg.	1 Nucleo / 1 Core / 1 Nucleo A	1 Nucleo / 1 Core / 1 Nucleo B	2 Nuclei / 2 Cores / 2 Nucleos A	2 Nuclei / 2 Cores / 2 Nucleos B	C	D	E	F	G	H	I	L	M	N	O
TADP 10	10	25~	712	230	812	330	115	126	57	120	142	170	190	220	112	300	330
TADP 15	15	30~	812	230	912	330	165	126	57	120	142	170	190	220	112	300	330
TADP 20	20	40~	940	230	1040	330	215	140	57	134	162	190	215	245	132	355	385
TADP 30	30	50~	1084	230	1184	330	275	152	57	134	162	190	215	245	132	355	385

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sezionatori

ISOLATING SWITCHES - SECCIONADORES

5

TRASFORMATORI DI CORRENTE A SECCO - A DOPPIO PASSANTE PER INTERNO - MOD. TADP

Sono trasformatori di corrente a secco che servono anche da isolatori passanti.
Gli avvolgimenti sono fortemente isolati dalla massa per mezzo di tubi di carta bachelizzata che servono anche da passanti.
Essi possono avere uno o due rapporti di trasformazione, uno doppio dell'altro, ottenuti mettendo in serie od in parallelo le bobine primarie per mezzo di uno speciale dispositivo.
A richiesta, possono essere forniti con due o più nuclei magnetici ed altrettanti circuiti secondari indipendenti.
Possono essere installati tanto verticali che orizzontali.

MOD. TADP (CTDP) DRY DOUBLE PASS-THROUGH CURRENT TRANSFORMERS FOR INDOOR INSTALLATION

These are dry current transformers acting also as pass-through insulators.
The windings are highly insulated from the earth by means of tubes of bakelite-treated paper, these tubes act also as pass-through insulators.
They may have one or two transformation ratios, one double of the other, obtained by setting the primary coils either in series or in parallel by means of a special device.
Upon request, the transformers can be supplied with two cores and as many independent secondary circuits.
They may be installed either vertically or horizontally.

TRANSFORMADORES DE INTENSIDAD EN SECO DE DOBLE PASANTE MOD. TADP PARA INSTALACION AL INTERIOR

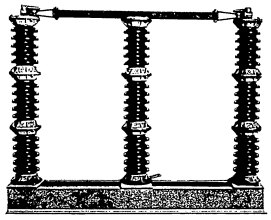
Son transformadores de corriente en seco que sirven tambien de aisladores pasantes.
Los arrollamientos son fuertemente aislados por medio de tubos de papel bakelizado, que sirven tambien de pasantes.
Pueden tener una o dos relaciones de transformación, una doble de la otra, conseguidas poniendo en serie o paralelo las bobinas primarias por medio de un dispositivo especial.
A petición, pueden ser suministrados con dos o más nucleos magnéticos y otrostantos circuitos secundarios independientes.
Pueden ser instalados tanto vertica les que horizontales.

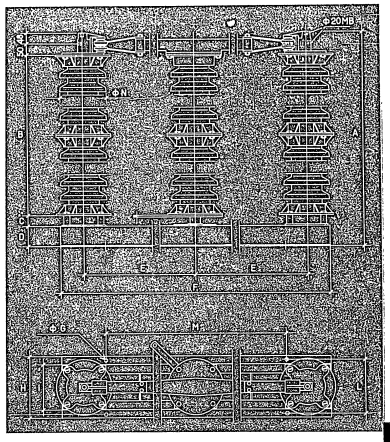
3110 | SEZIONATORI A ROTAZIONE MOD. S3N - S3R

MOD. S3N - S3R ROTATING PILLAR ISOLATING SWITCHES
SECCIONADORES DE ROTACION MOD. S3N - S3R

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER ESTERNO - PER 400 E 630 A
FOR OUTDOOR - FOR 400 AND 630 A
PARA EXTERIOR - PARA 400 Y 630 A





Serie normale Normal type Serie normal S3N	Serie rinforzata Reinforced type Serie reforzada S3R	Tensione nominale Rated voltage Tensión nominal KV	N. degli isolatori portanti Number of units in stack N. de los aisladores de soporte	Isolatore montato Supporting insulator Aislador montado	Peso di un polo Weight of one pole Peso de un polo Kg.	∠N
S3N 45		45	1	50 NE	100~	210
S3R 45		45	1	50 RE	120~	245
S3N 60		60	1	70 NE	130~	210
S3R 60		60	1	70 RE	150~	245
S3N 80		80	2	50 NE	195~	210
S3R 80		80	2	50 RE	240~	245
S3N 120		120	2	70 NE	250~	210
S3R 120		120	2	70 RE	285~	245
S3N 150		150	3	50 NE	290~	210
S3R 150		150	3	50 RE	350~	245

KV	A	B	C	D	E	F	∠G	H	I	L	M
45	656	420	48	90	500	1210	13	272	200	240	
60	796	560	48	90	600	1410	13	272	200	240	
80	1136	840	48	150	700	1630	13	288	220	250	
120	1466	1120	48	200	825	1910	17	316	230	270	
150	1606	1260	48	200	900	2060	17	316	230	270	

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SEZIONATORI A ROTAZIONE MOD. S3N - S3R

Questo sezionatore può essere manovrato con facilità anche con la neve e con le normali incrostazioni di ghiaccio.
I contatti sono del tipo a sfera, a forte pressione registrabile, pressione ottenuta da una grossa molla contenuta entro alle due metà della sfera di contatto.
Il contatto puntiforme è quello che ha dato i migliori risultati pratici, che si mantiene inalterato nel tempo perchè ad ogni manovra si pulisce per lo sfregamento e perchè, essendo tutta la pressione concentrata in un'area molto piccola, assicura un contatto deciso.
Gli isolatori sono particolarmente robusti e costituiti da elementi intercambiabili.
Il comando è generalmente previsto a mano ma, a richiesta, può essere fornito anche a distanza, elettrico od elettro-pneumatico.
Sugli stessi isolatori di questi sezionatori possono essere montate anche delle lame di messa a terra provviste del relativo comando, ed eventuale blocco meccanico tra terra e linea.

MOD S3N - S3R ROTATING PILLAR ISOLATING SWITCH

This isolating switch is easily operated also under snow and normal coating of ice.
The contacts are of the ball type with a strong adjustable pressure obtained by means of a large spring placed between the two halves of the contact balls.
The point-to-point contacts have always given the best results, they do not suffer from wear and tear; the friction caused by each operation cleans them automatically and a firm contact is ensured by the fact that the pressure is concentrated in a very small area.
The insulators are exceptionally strong and consist of interchangeable units.
The control is usually by hand but, upon request it can also be by electric or electro-pneumatic remote control.
Earthing blades may also be mounted on the insulators of these isolating switches, and be provided with a corresponding control and eventually a mechanical interlocking device earth to line.

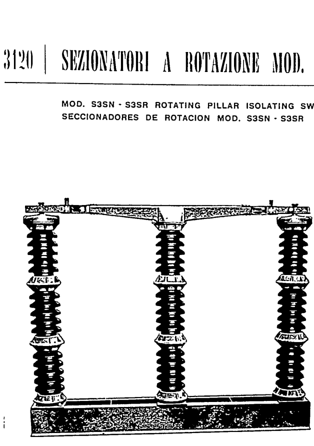
SECCIONADORES DE ROTACION MOD. S3N - S3R

Este seccionador puede ser maniobrado fácilmente aún en el caso de encontrarse cubierto de nieve y con las normales capas de hielo.
Los contactos del tipo de esfera están sometidos a una presión ajustable, lograda por medio de un resorte muy fuerte ubicado en el interior de las dos calotas de contacto.
Los contactos de esfera son los que han alcanzado los mejores resultados prácticos; en efectos, la zona en que se produce el paso de la corriente queda siempre limpia y por consiguiente con una resistencia de contacto muy baja, gracias al rozamiento producido al efectuarse cada maniobra.
Los aisladores están compuestos por elementos intercambiables de construcción muy solida.
La maniobra por lo general se efectua manualmente; sin embargo, a petición del Cliente, puede efectuarse tambien por medio de mando a distancia de tipo eléctrico o neumatico.
A lado de los aisladores de dichos seccionadores pueden armarse las cuchillas de tierra, equipadas con su mando y eventualmente con un dispositivo de bloqueo entre el mando de los seccionadores de linea y él de los seccionadores de tierra.

3120 | SEZIONATORI A ROTAZIONE MOD. S3SN - S3SR

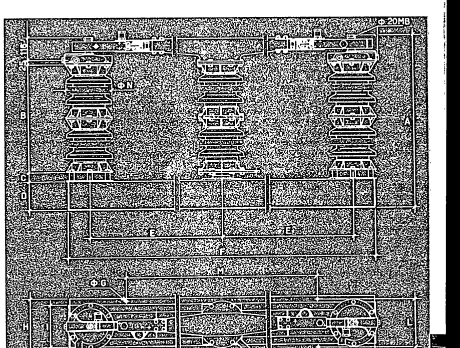
MOD. S3SN - S3SR ROTATING PILLAR ISOLATING SWITCHES
SECCIONADORES DE ROTACION MOD. S3SN - S3SR

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.



PER ESTERNO - PER 400 E 630 A
FOR OUTDOOR - FOR 400 AND 630 A
PARA EXTERIOR DE 400 Y 630 A

TIPO A CONTATTO SNODATO
TYPE WITH ARTICULATED ARM
TIPO DE CONTACTO ARTICULADO



Serie normale / Normal type / Serie normal S3SN	Serie rinforzata / Renforced type / Serie reforzada S3SR	Tensione nominale / Rated voltage / Tension nominal KV	N. degli isolatori portanti / Number of units in stack / N. de los aisladores de suporte	Isolatore portante / Supporting insulator / Aislador de soporte	Peso di un polo / Weight of one pole / Peso de un polo Kg.	ØN
S3SN	60	60	1	70 NE	150~	210
S3SR	60	60	1	70 RE	175~	245
S3SN	80	80	2	50 NE	210~	210
S3SR	80	80	2	50 RE	260~	245
S3SN	120	120	2	70 NE	265~	210
S3SR	120	120	2	70 RE	305~	245
S3SN	150	150	3	50 NE	305~	210
S3SR	150	150	3	50 RE	370~	245
S3SR	220	220	4	70 RE	740~	245

KV	A	B	C	D	E	F	ØG	H	I	L	M
60	839	560	48	90	600	1410	13	272	200	240	
80	1179	840	48	150	700	1630	13	288	220	250	
120	1509	1120	48	200	825	1910	17	316	230	270	
150	1649	1260	48	200	900	2060	17	316	230	270	
220	2733	2240	52	300	1300	2900	21	460	350	400	

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SEZIONATORI A ROTAZIONE MOD S3SN - S3SR

Questo sezionatore è del tipo a braccio snodato.

Con questo sistema si è ottenuto una dolcezza di manovra molto maggiore in quanto il contatto mobile, che in posizione di sezionatore aperto è tenuto ad angolo, rispetto all'asse del braccio, da una molla, viene a trovarsi accanto a quello fisso prima che la rotazione della colonna centrale sia terminata.

Si è così ottenuta anche una maggior pulizia dei contatti poichè nell'ultima fase di chiusura il contatto mobile non solo compie una parziale rotazione attorno a quello fisso, ma avanza anche contemporaneamente fino a trovarsi sullo stesso asse del braccio del sezionatore.

Questo sezionatore può essere manovrato con facilità anche con la neve e con le normali incrostazioni di ghiaccio.

Gli isolatori sono particolarmente robusti e costituiti da elementi intercambiabili.

Il comando è generalmente previsto a mano ma, a richiesta, può essere fornito anche a distanza, elettrico od elettropneumatico.

Sugli stessi isolatori di questi sezionatori possono essere montate anche delle lame di messa a terra provviste del relativo comando, ed eventuale blocco meccanico tra terra e linea.

MOD. S3SN - S3SR ROTATING PILLAR ISOLATING SWITCHES

The isolating switches of this type have articulated arms, which makes easier every closing and opening operation.

In fact, when the switch is open the moving contact is kept, by means of a spring, at a certain angle with respect to the arm.

Thus, while closing, the moving contact touches the stationary one before the rotation of the central pillar has been completed.

Consequently the operation of making contact is distributed along a wider angle than in other types of switches; the torque applied to the rotating pillar being proportionally decreased.

The result of this construction, is also a better cleaning of the contacts, since in the last part of the closing operation, the moving contact rotates and moves forward along the stationary one until it becomes aligned with the main arm of the switch.

This isolating switch is easily operated also under snow and normal coating of ice.

The insulators are exceptionally strong and consist of interchangeable units.

The control is usually by hand but, upon request, the switch can also be supplied with electric or electro-pneumatic remote control.

Earthing blades may also be mounted on the insulators of these isolating switches, blades provided with a Control device and eventual mechanical interlocking earth to line.

SECCIONADORES DE ROTACION MOD. S3SN - S3SR

Estos seccionadores tienen brazos articulados. Con este sistema en el momento en que acaba la operación de cierre del seccionador y el momento en que empieza la operación de apertura, el trabajo se distribuye sobre un ìngulo de rotación mucho mayor que si los brazos fuesen de una sola pieza. Por consiguiente se logra una notable reduccion del esfuerzo que acompaña las mamobras arriba citadas.

Además el mismo sistema asegura una mayor limpieza de las superficies de contacto, puesto que en la ultima parte de la operación de cierre, el contacto móvil efectua un avance hacia el contacto fijo y una rotación al rededor de su eje.

Este seccionador puede maniobrarse facilmente aún si se encontrase cubierto de nieve o de una normal capa de hielo.

Los aisladores son particularmente solidos y están todos formados por elementos intercambiables.

Por lo general el mando es del tipo manual; sin embargo, a petición del Cliente, se puede proporcionar un mando de distancia, eléctrico o eléctroneumatico.

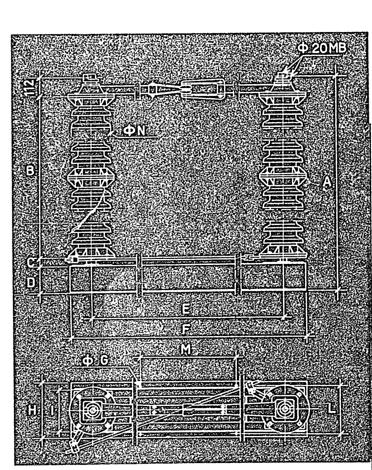
A lado de los aisladores de estos seccionadores pueden armarse las cuchillas de tierra, equipadas con su mando y eventualmente con un dispositivo de bloqueo entre el mando de los seccionadores de linea y él de los seccionadores de tierra

3130 | SEZIONATORI A ROTAZIONE MOD. S2N - S2R

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

MOD. S2N - S2R ROTATING PILLAR ISOLATING SWITCHES
SECCIONADORES DE ROTACION MOD. S2N - S2R

PER ESTERNO - PER 400 E 630 A
FOR OUTDOOR - FOR 400 AND 630 A
PARA EXTERIOR - PARA 400 Y 630 A



Serie normale / Normal type / Serie normal	Serie rinforzata / Reinforced type / Serie reforzada	Tensione nominale / Rated voltage / Tension nominal	N. degli isolatori portanti / Number of units in stack / N. de los aisladores de soporte	Isolatore portante / Supporting insulator / Aislador de soporte	Peso di un polo / Weight of one pole / Peso de un polo	
S2N	S2R	KV			Kg.	N
S2N 45		45	1	50 NE	80~	210
	S2R 45	45	1	50 RE	95~	245
S2N 60		60	1	70 NE	95~	210
	S2R 60	60	1	70 RE	110~	245
S2N 80		80	2	50 NE	155~	210
	S2R 80	80	2	50 RE	185~	245
S2N 120		120	2	70 NE	190~	210
	S2R 120	120	2	70 RE	215~	245
S2N 150		150	3	50 NE	220~	210
	S2R 150	150	3	50 RE	265~	245
	S2R 220	220	4	70 RE	500~	245

KV	A	B	C	D	E	F	∅G	H	I	L	M
45	670	420	48	90	800	1010	13	272	200	240	
60	810	560	48	90	900	1110	13	272	200	240	
80	1150	840	48	150	1000	1230	13	288	220	250	
120	1480	1120	48	200	1400	1660	17	316	230	270	
150	1620	1260	48	200	1600	1860	17	316	230	270	
220	2704	2240	52	300	2300	2600	21	460	350	400	

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SEZIONATORI A ROTAZIONE MOD. S2N - S2R

Questo sezionatore può essere manovrato con facilità anche con la neve e con le normali incrostazioni di ghiaccio.
I contatti sono del tipo a sfera, a forte pressione registrabile, pressione ottenuta da una grossa molla contenuta entro alle due metà della sfera di contatto.
Il contatto puntiforme è quello che ha dato i migliori risultati pratici, che si mantiene inalterato nel tempo perchè ad ogni manovra si pulisce per lo sfregamento e perchè, essendo tutta la pressione concentrata in un'area molto piccola, assicura un contatto deciso.
Sulla sommità di ciascuna delle due colonne rotanti, in asse con la stessa, vi è un contatto a spina girante entro ad un morsetto a tulipano di tipo simile a quello che generalmente si usa per gli interruttori e che oppone una resistenza praticamente trascurabile alla rotazione della colonna.
Gli isolatori sono particolarmente robusti e costituiti da elementi intercambiabili.
Il comando è generalmente previsto a mano ma, a richiesta, può essere fornito anche a distanza, elettrico od elettropneumatico.
Sugli stessi isolatori di questi sezionatori possono essere montate anche delle lame di messa a terra provviste del relativo comando, ed eventuale blocco meccanico tra terra e linea.

MOD. S2N - S2R ROTATING PILLAR ISOLATING SWITCHES

This isolating switch can easily be operated also under snow and normal coating of ice.
The contacts are of the ball type with a strong adjustable pressure obtained by means of a large spring placed between the two halves of the contact ball.
Point-to-point contacts have always given the best results; they do not suffer from wear and tear; the friction caused by each operation cleans them automatically and a firm contact is ensured by the fact that the pressure is concentrated in a very small area.
On top of each of the rotating pillars and coaxially to it, there is a plug contact revolving inside a tulip-shaped terminal similar to the type generally used for circuit breakers and opposing a practically negligible resistance to the rotation of the pillar.
The insulators are exceptionally strong and consist of interchangeable units.
The control is usually by hand but, upon request, it can also be supplied with electric or electro-pneumatic remote control.
Earthing blades can also be mounted on the insulators of these isolating switches, and be provided with a corresponding control and eventual mechanical interlocking between earth and line.

SECCIONADORES DE ROTACION MOD. S2N - S2R

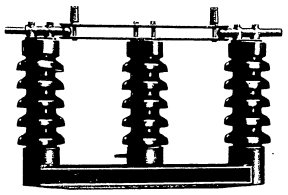
Este seccionador puede maniobrarse fácilmente aún si se encontrase cubierto de nieve o de una normal capa de hielo.
Los contactos del tipo de esfera están sometidos a una presión ajustable, lograda por medio de un resorte muy fuerte ubicado en el interior de las dos calotas de contacto.
Los contactos de esfera son los que han alcanzado los mejores resultados prácticos; en efectos, la zona en que se produce el paso de la corriente queda siempre limpia y por consiguiente con una resistencia de contacto muy baja, gracias al rozamiento producido al efectuarse cada maniobra.
En la cumbre de cada columna giradora y en el eje de la misma, existe un contacto constituido por un perno pivotante en una mordaza en forma de tulipán semejante a las empleadas en los interruptores. Este contacto opone una resistencia muy baja a la rotación de la columna.
Los aisladores están compuestos por elementos intercambiables de construcción muy solida.
La maniobra por lo general se efectua manualmente; sin embargo, a petición del Cliente, puede efectuarse tambien por medio de mando a distancia de tipo eléctrico o neumatico.
A lado de los aisladores de dichos seccionadores pueden armarse las cuchillas de tierra, equipadas con su mando y eventualmente con un dispositivo de bloqueo entre el mando de los seccionadores de linea y el de los seccionadores de tierra.

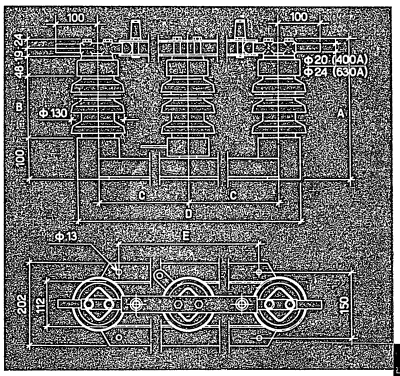
3200 | SEZIONATORI A ROTAZIONE MOD. S3N

MOD. S3N ROTATING PILLAR ISOLATING SWITCHES
SECCIONADORES DE ROTACION MOD. S3N

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER ESTERNO - PER 400 E 630 A
FOR OUTDOOR - FOR 400 AND 630 A.
PARA EXTERIOR - PARA 400 Y 630 A.





Serie normale Normal type Serie normal	Tensione nominale Rated voltage Tension nominal	Isolatore portante Supporting insulator Aislador de soporte	Peso di un polo Weight of one pole Peso de un polo	A	B	C	D	E max
	KV		Kg					
S3N 15	15	15 NE	25 ~	341	150	220	542	380
S3N 20	20	20 NE	28 ~	391	200	250	602	440
S3N 30	30	30 NE	32 ~	441	250	290	682	520

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SEZIONATORI A ROTAZIONE MOD. S3N

Questo sezionatore può essere manovrato con facilità anche con la neve e con le normali incrostazioni di ghiaccio.
I contatti sono del tipo a sfera a forte pressione. Il contatto sulla sfera è ottenuto da due lame fortemente premute contro di essa da apposite molle a spirale. Il contatto puntiforme è quello che ha dato i migliori risultati pratici, che si mantiene inalterato nel tempo perchè ad ogni manovra si pulisce per sfregamento e perchè, essendo tutta la pressione concentrata in un'area molto piccola, assicura un contatto deciso.
Il comando è generalmente previsto a mano ma, a richiesta, può essere fornito anche a distanza, elettrico od elettropneumatico.
Sugli stessi isolatori di questi sezionatori possono essere montate anche delle lame di messa a terra provviste del relativo comando, ad eventuale blocco meccanico tra terra e linea.

MOD. S3N ROTATING PILLAR ISOLATING SWITCHES

This isolating switch can easily be operated also under snow and normal coating of ice.
The contacts are of the ball type with a strong adjustable pressure obtained by means of a large spring placed between the two halves of the contact ball.
Point-to-point contacts have always given the best results; they do not suffer from wear and tear; the friction caused by each operation cleans them automatically and a firm contact is ensured by the fact that the pressure is concentrated in a very small area.
The control is usually by hand but, upon request, it can also be supplied with electric or electro-pneumatic remote control.
Earthing blades can also be mounted on the insulators of these isolating switches and be provided with a corresponding control and eventual mechanical interlocking between earth and line.

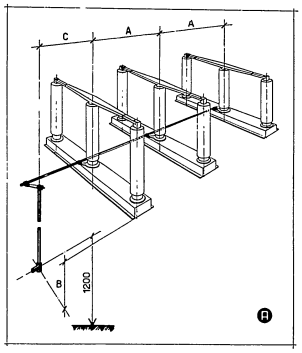
SECCIONADORES DE ROTACION MOD. S3N

Este seccionador puede ser maniobrado facilmente aún en el caso de encontrarse cubierto de nieve y con las normales capas de hielo.
Los contactos son del tipo de esfera a fuerte presión.
El contacto acontece apretando la esfera entre dos laminas por medio de resortes de espiral.
Los contactos del tipo de esfera son los que han alcanzado los mejores resultados prácticos; en efectos la zona en que se produce el paso de la corriente queda siempre limpia y por consiguiente con una resistencia de contacto muy baja, gracias al rozamiento producido al efectuarse cada maniobra.
La maniobra por lo general se efectúa manualmente; sin embargo, a petición de Cliente, puede efectuarse tambien por medio de mando a distancia de tipo eléctrico o neumatico.
A lado de los aisladores de dichos seccionadores pueden armarse las cuchillas de tierra, equipadas con su mando y eventualmente con un dispositivo de bloqueo entre el mando de los seccionadores de linea y él de los seccionadores de tierra.

3220 | COMANDI PER SEZIONATORI A 3 COLONNE

OPERATING MECHANISMS FOR 3-PHASE DISCONNECTING SWITCHES
MANDOS PARA SECCIONADORES DE 3 COLUMNAS

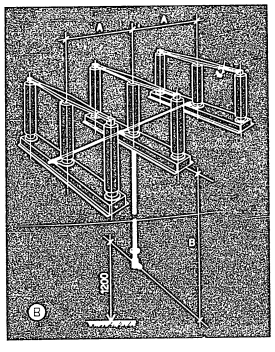
OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

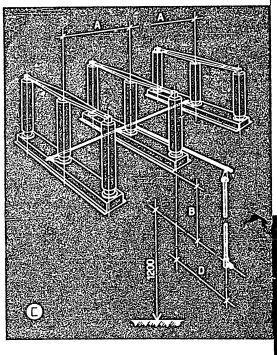


A) COMANDO LATERALE
Side control
Mando lateral

B) COMANDO DIRETTO
Direct control
Mando directo

C) COMANDO FRONTALE
Front control
Mando frontal





Le quote A, B, C, D sono stabilite dal Cliente

A, B, C, D values are fixed by the Customer

Los valores A, B, C, D quedan establecidos por el Cliente

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SISTEMI DI COMANDO PER SEZIONATORI A 3 COLONNE

La scelta del tipo di comando di sezionatori, ove non vi siano particolari necessità, è consigliabile ricercarla fra i sistemi indicati nel presente foglietto stabilendo di volta in volta i valori in millimetri delle distanze A - B - C - D.
Nel foglietto è indicato un comando della terna da eseguirsi a mano. Rimane però stabilito che, con le stesse sistemazioni, si può applicare ogni tipo di comando a distanza. Le manovre per i comandi a distanza sono sempre corredate di comando a mano la cui distanza da terra rimane sempre di mm. 1200 che è quella più indicata per avere una buona posizione di manovra.

OPERATING MECHANISM FOR 3-PHASE ISOLATING SWITCHES

If there are no special requirements, the type of control for the isolating switches should be chosen among the systems indicated on this page the values in inches or millimetres of the distances A - B - C - D being specified every particular time.
The figure shows a hand control in all three cases, however any type of remote control can be applied with the same arrangements. Remote control is always accompanied by hand control, situated at a distance of 1200 mm. from the ground, this being the most satisfactory distance for good operating position.

DE MANDOS PARA SECCIONADORES DE 3 COLUMNAS

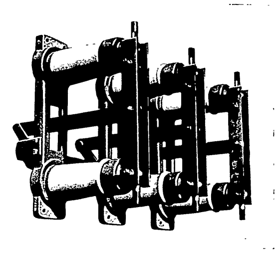
En el caso de que no existiesen necesidades particulares para el mando de los seccionadores, es aconsejable escojer un tipo de maniobra entre lás indicadas en el presente folleto, estableciendo cada vez el valor en milímetros de las cotas. A. B. C. D.
En los croquis el mando indicado es de tipo manual; sin embargo es claro que con las mismas disposiciones puede ser aplicado cualquier tipo de mando a distancia. Las maniobras para los mandos a distancia están todas provistas tambien de mando a mano, encontrandose este ultimo siempre a una altura de 1200 mm. sobre el suelo, altura que es la más apropiada para un facil manejo de los seccionadores.

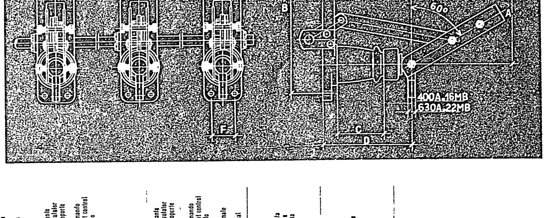
3230 | COLTELLI SEPARATORI A CERNIERA MOD. SCN - SCR

MOD. SCN - SCR HINGED ISOLATING SWITCHES
CUCHILLAS DESCONNECTADORAS TIPO DE CHARNELA MOD. SCN - SCR

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

PER INTERNO - PER 400 E 630 A
FOR INDOOR - FOR 400 AND 630 A
PARA INTERIOR - PARA 400 Y 630 A





Serie rinforzata / Reinforced type / Serie reforzada	Isolatore portante / Supporting insulator / Aislador de soporte	Peso senza comando / Weight without control / Peso sin mando Kg.	Serie normale / Normal type / Serie normal	Isolatore portante / Supporting insulator / Aislador de soporte	Peso senza comando / Weight without control / Peso sin mando Kg.	Tensione nominale / Rated voltage / Tension nominal KV	Serie rinforzata / Reinforced type / Serie reforzada B	F	ØH	Serie normale / Normal type / Serie normal B	F	ØH	A	C	D	ØE	G norm.
SCR 10	10 R	29~	SCN 10	10 N	21~	10	336	70	95	316	50	75	200	100	190	11	240
SCR 15	15 R	33~	SCN 15	15 N	25~	15	386	70	95	366	50	75	250	150	245	11	240
SCR 20	20 R	38~	SCN 20	20 N	30~	20	436	70	95	438	50	75	300	200	295	13	280
SCR 30	30 R	48~	SCN 30	30 N	40~	30	536	70	120	556	64	95	400	250	345	13	350
	—		SCN 45	45 N	55~	45	—	—	—	740	100	120	550	350	450	13	450
—	—		SCN 60	60 N	80~	60	—		—	930	110	150	700	480	590	17	600
-	—	—	SCN 80	80 N	105~	80	-		—	1080	110	150	850	600	710	17	800

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COLTELLI SEPARATORI A CERNIERA MOD. SCN - SCR

Si tratta di un tipo di sezionatore estremamente semplice che si manovra con uno sforzo ridottissimo.
I contatti sono del tipo a sfera a forte pressione. Il contatto sulla sfera è ottenuto da due lame fortemente premute contro di essa da apposite molle a spirale. Il contatto puntiforme è quello che ha dato i migliori risultati pratici, che si mantiene inalterato nel tempo perchè ad ogni manovra si pulisce per sfregamento e perchè, essendo tutta la pressione concentrata in un'area molto piccola, assicura un contatto deciso.
Sugli stessi isolatori di questi sezionatori possono essere montate anche delle lame di messa a terra provviste del relativo comando, ed eventuale blocco meccanico tra terra e linea.

MOD. SCN - SCR HINGED ISOLATING SWITCHES

This is an extremely simple type of isolating switch, very easy to operate.
The contacts are of the strong pressure ball type. The contact on the ball is obtained by means of two blades pressed heavily upon it by spiral springs.
Point-to-point contacts have always given the best results, they do not suffer from wear and tear: the friction caused by each operation cleans them automatically and a firm contact is ensured by the fact that the pressure is concentrated in a very small area.
Earthing blades can also be mounted on the insulators of these isolating switches and be provided with a corresponding control and eventual mechanical interlocking between earth and line.

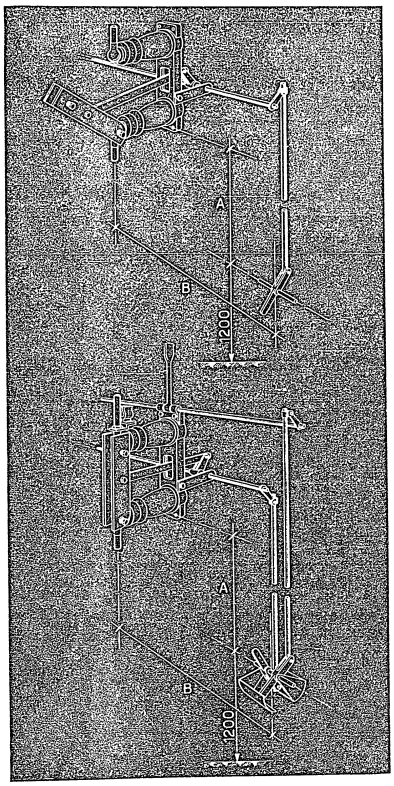
CUCHILLAS SECCIONADORAS DE CHARNELA MOD. SCN - SCR

Trátase de un tipo de seccionador extremadamente sencillo cuya operación es alcanzada por un esfuerzo muy reducido.
Los contactos son del tipo a esfera a fuerte presión.
El contacto acontece apretando la esfera entre dos laminas por medio de resortes de espiral.
Los contactos del tipo de esfera son los que ha alcanzado los mejores resultados prácticos; en efectos la zona en que se produce el paso de la corriente queda siempre limpia y por consiguiente con una resistencia de contacto muy baja, gracias al rozamiento producido al efectuarse cada maniobra.
A lado de los aisladores de dichos seccionadores pueden armarse las cuchillas de tierra, equipadas con su mando y eventualmente con un dispositivo de bloqueo entre el mando de los seccionadores de linea y el de los seccionadores de tierra.

3250 | COMANDI A MANO PER SEZIONATORI MOD. SCN - SCR

HAND CONTROL FOR MOD. SCN - SCR ISOLATING SWITCHES
MANDOS MANUALES PARA SECCIONADORES MOD SCN - SCR

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.



LE QUOTE (A) E (B) SONO STABILITE DAL CLIENTE

(A) AND (B) VALUES ARE FIXED BY THE CUSTOMER

LAS COTAS (A) Y (B) HAN DE SER DETERMINADAS POR EL CLIENTE

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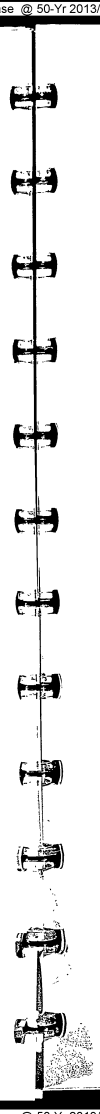

isolatori

INSULATORS - AISLADORES

COLTELLI SEPARATORI A CERNIERA MOD. SCN - SCR

Si tratta di un tipo di sezionatore estremamente semplice che si manovra con uno sforzo ridottissimo.
I contatti sono del tipo a sfera a forte pressione. Il contatto sulla sfera è ottenuto da due lame fortemente premute contro di essa da apposite molle a spirale.
Il contatto puntiforme è quello che ha dato i migliori risultati pratici, che si mantiene inalterato nel tempo perchè ad ogni manovra si pulisce per sfregamento e perchè, essendo tutta la pressione concentrata in un'area molto piccola, assicura un contatto deciso.
Sugli stessi isolatori di questi sezionatori possono essere montate anche delle lame di messa a terra provviste del relativo comando, ed eventuale blocco meccanico tra terra e linea.

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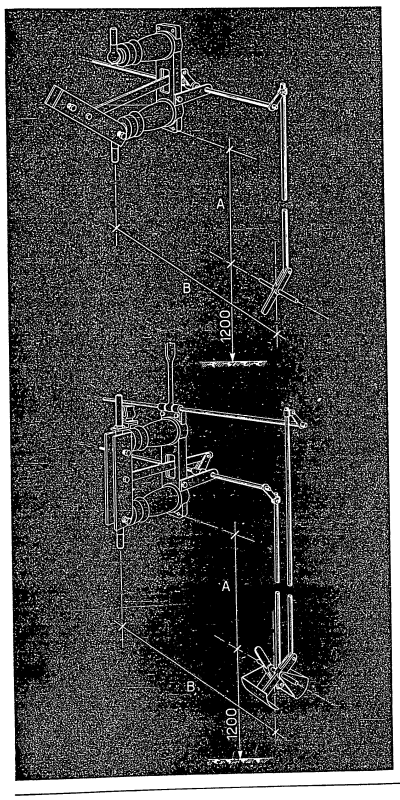
El contacto acontece apretendo la esfera entre dos laminas por medio de resortes de espiral.
Los contactos del tipo de esfera son los que ha alcanzado los mejores resultados prácticos; en efectos la zona en que se produce el paso de la corriente queda siempre limpia y por consiguiente con una resistencia de contacto muy baja, gracias al rozamiento producido al efectuarse cada maniobra.
A lado de los aisladores de dichos seccionadores pueden armarse las cuchillas de tierra, equipadas con su mando y eventualmente con un dispositivo de bloqueo entre el mando de los seccionadores de linea y el de los seccionadores de tierra.

3250 | COMANDI A MANO PER SEZIONATORI MOD. SCN - SCR

HAND CONTROL FOR MOD. SCN - SCR ISOLATING SWITCHES
MANDOS MANUALES PARA SECCIONADORES MOD. SCN - SCR

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.



LE QUOTE (A) E (B) SONO STABILITE DAL CLIENTE

(A) AND (B) VALUES ARE FIXED BY THE CUSTOMER

LAS COTAS (A) Y (B) HAN DE SER DETERMINADAS POR EL CLIENTE

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isolatori

INSULATORS - AISLADORES

4100 | ISOLATORI PASSANTI PER TRASFORMATORI MOD. PT

MOD. PT BUSHING INSULATORS FOR POWER TRANSFORMERS
AISLADORES PASANTES PARA TRANSFORMADORES MOD. PT

OFFICINE ELETTRO MECCANICHE GALILEO
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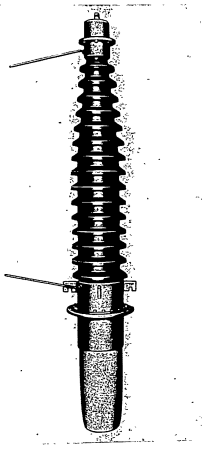

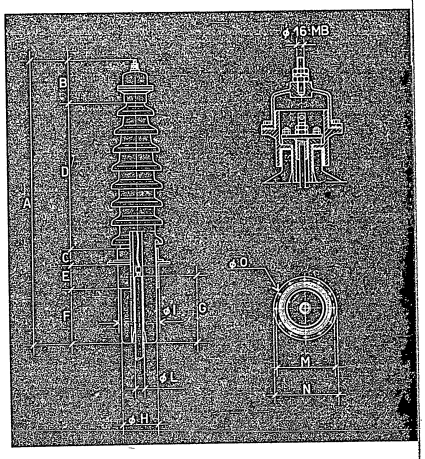

ISOLATORE INSULATOR AISLADOR	Tensione nominale Rated voltage Tension nominal KV	Peso approssimativo Net approximate weight Peso aproximado Kg.	A	B	C	D	E	F	G	ø H	ø I	ø L	M	N	ø O
PT 60	60	60	965	205	75	475	60	150	180	150	172	28	240	270	13 (n. 12)
PT 80	80	70	1110	180	70	600	60	200	230	150	172	28	240	270	13 (n. 12)
PT 120	120	150	1780	200	140	900	160	380	480	220	245	38	330	360	13 (n. 16)
PT 150	150	220	2370	260	180	1250	200	480	560	250	275	43	350	390	13 (n. 20)
PT 220	220	400	3180	300	180	1800	200	700	750	330	360	48	440	480	13 (n. 24)

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ISOLATORI PASSANTI PER TRASFORMATORI TIPO SENZA CALOTTA INFERIORE

Si tratta di isolatori passanti in porcellana particolarmente adatti per trasformatori di potenza; essi hanno le caratteristiche di poter essere montati e smontati dall'esterno senza bisogno di aprire il trasformatore e di non avere alcuna parte metallica sotto tensione dalla parte che rimane all'interno del cassone. Ciò facilita l'isolamento del trasformatore e porta ad economizzare nelle distanze interne.

Il conduttore proveniente dal trasformatore deve essere convenientemente isolato, preferibilmente con nastratura di carta impregnata, sino ad assumere un diametro di poco inferiore al foro della porcellana. All'estremità del cavo isolato, che è così venuto a formarsi e che deve essere tenuto un poco più basso della flangia di appoggio degli isolatori, si fissa un morsetto al quale verrà connessa una treccia flessibile munita di terminale da fissarsi alla calotta superiore dell'isolatore stesso, introdotta entro al-l'asta tubolare per mezzo di una cordicella, prima di montare l'isolatore sulla sue sede.

A scelta questi isolatori possono essere riempiti con lo stesso olio del trasformatore, se si tiene alto il livello del compensatore, o con olio indipendente, se il compensatore non si può piazzare ad altezza sufficiente.

BUSHING INSULATORS FOR POWER TRANSFORMERS MODEL WITHOUT LOWER CAP

These porcelain bushing insulators are particularly suitable for power transformers; one of their features is that they can be mounted and disassembled from outside, without having to open the transformer; also the portion inside the box has no live metal part.

This facilitates the insulation of the transformer and makes it possible to reduce the distances inside

The lead from the transformer must be suitably insulated, preferably by means of a strip of impregnated paper until it reaches a diameter only slighly smaller than the hole in the porcelain; at the end of the insulated cable — which has thus been formed and which must be kept a little below the supporting flange of the insulators — is provided a connector, to which is linked a flexible plaited copper wire. The other end of this wire has to be attached to the insulator's upper cap, and has to be inserted into the tubular bushing by means of a thin cord before the insulator is mounted.

According to the customer's preference, these insulators may be filled with the same oil of the transformer, if the level of the compensator is placed high up, or with thein own oil, if the compensator cannot be placed high enough.

AISLADORES PASANTES PARA TRANSFORMADORES TIPO SIN CALOTA INFERIOR

Estos aisladores pasantes en porcelana son particularmente indicados para instalación en los transformadores de potencia; pueden montarse y desarmarse desde el exterior sin necesidad de abrir al transformador y se distinguen por no tener en el interior de cajón ninguna parte metálica bajo tensión.

Dicho particular facilita el aislamiento del transformador y permite una reducción de las distancias interiores.

El conductor que arranca del transformador tiene que ser apropriadamente aislado, preferiblemente con cinta de papel impregnado, hasta tomar un diametro de muy poco inferior al hueco existente en la porcelana.

La salida del transformador una vez así preparada, será cortada a la altura de la arandela de apoyo del aislador y, por medio de una borna, prolongada con un conductor flexible en cobre hasta llegar al terminal superior del aislador.

El conductor flexible será introducido en el interior del aislador por medio de una soga antes de montar el aislador en su apoyo.

Los aisladores del tipo arriba indicado pueden ser rellenados con el mismo aceite del transformador bajo condición que el deposito compensador esté a una altura suficiente; de otra manera el aislador tendrá que ser rellenado con aceite independiente.

4110 | ISOLATORI PASSAMURO

PASS-THROUGH INSULATORS
AISLADORES PASANTES

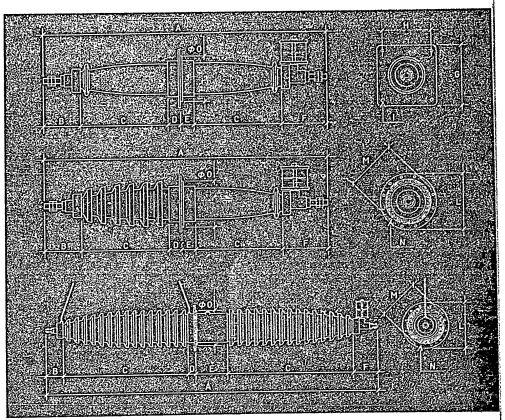
OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A

PER MONTAGGIO ORIZZONTALE
FOR HORIZONTAL MOUNTING
PARA MONTAJE HORIZONTAL

Tipo per interno-interno 45 e 60 kV
Type for indoor-indoor 45 and 60 kV
Tipo para interior-interior 45 y 60 kV

Tipo per interno esterno 45 e 60 kV
Type for indoor-outdoor 45 and 60 kV
Tipo para interior-exterior 45 y 60 kV

Tipo per interno o per esterno 80÷150 kV
Type for indoor or for outdoor 80÷150 kV
Tipo para interior o para exterior 80÷150 kV



Tensione nominale Rated voltage Tensión nominal KV	Peso approssimato Approximate weight Peso aproximado Kg.	A circa	B	C	D	E circa	F	G	H	I	L	M	N	ØO
45	30-35	1135	150	350	50	55	180	230	170	n. 4ø13	240	215	n. 8ø11	185
60	50-55	1460	150	480	60	110	180	270	200	n. 4ø13	275	250	n. 12ø11	215
80	60	1700	150	600	60	110	180	—	—	—	275	250	n. 12ø11	215
120	210	2505	175	900	75	275	180	—	—	—	420	370	n. 12ø17	320
150	325	3205	175	1250	75	275	180	—	—	—	450	400	n. 12ø17	340

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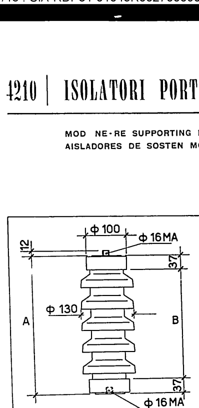
4210 | ISOLATORI PORTÁNTI MOD. NE-RE

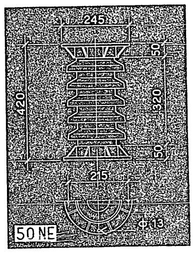
OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

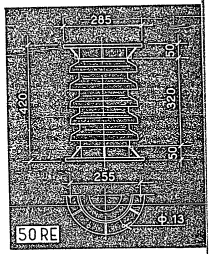
MOD NE-RE SUPPORTING INSULATORS
AISLADORES DE SOSTEN MOD. NE-RE

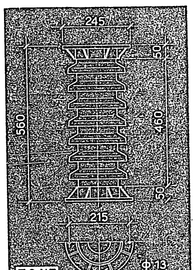
PER ESTERNO
FOR OUTDOOR
PARA EXTERIOR

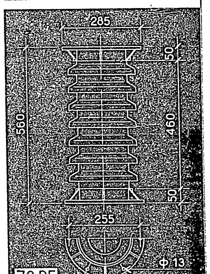


	A	B
15 NE	224	150
20 NE	274	200
30 NE	324	250









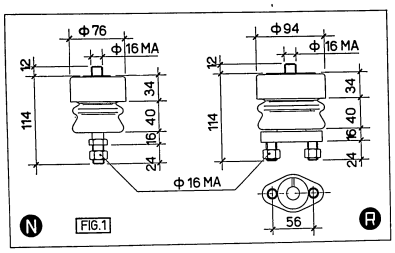
Tensione nominale / Rated voltage / Tension nominal KV	N. degli isolatori / N. of units in stack / N. de los aisladores	Serie normale / Normal type / Serie normal	Serie rinforzata / Reinforced type / Serie reforzada	Tensione d'arco a secco / Flashover voltage, dry / Tension del arco en seco KV	Tensione d'arco sottopioggia / Flashover voltage, wet / Tension del arco bajo lluvia KV	Peso approssimativo / Approximate weight / Peso aproximado Kg.
15	1	15 NE	—	75	60	4
20	1	20 NE	—	90	75	5
30	1	30 NE	—	110	90	6
45	1	50 NE	50 RE	140	120	23-30
60	1	70 NE	70 RE	180	155	30-36
80	2	50 NE	50 RE	270	230	46-60
120	2	70 NE	70 RE	350	290	60-72
150	3	50 NE	50 RE	420	350	69-90
220	4	—	70 RE	620	530	144

4220 | ISOLATORI PORTANTI MOD. N-R

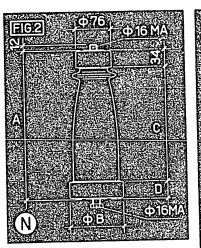
MOD. N-R SUPPORTING INSULATORS
AISLADORES DE SOSTEN MOD N-R

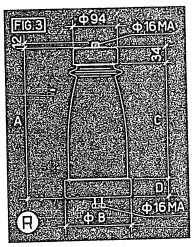
OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.

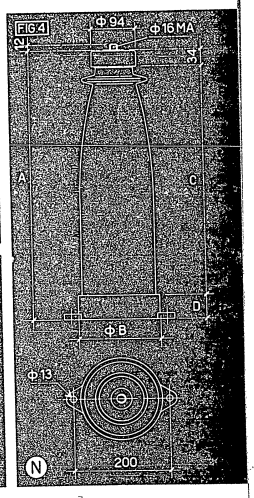
PER INTERNO
FOR INDOOR
PARA INTERIOR



Tensione nominale Rated voltage Tensión nominal KV	Tipo Type Tipo	Peso approssimativo Approximate weight Peso aproximado Kg.	Fig.	A	⌀B	C	D
3	N	1,3-2	1	—	—	—	—
3	R	2	1	—			
10	N	2,2	2	171	94	103	34
10	R	3,5	3	171	114	100	37
15	N	2,8	2	221	94	153	34
15	R	4,2	3	221	114	150	37
20	N	3,5	2	271	94	203	34
20	R	4,5	3	271	114	200	37
30	N	5	2	321	114	250	37
30	R	6	3	321	140	250	37
45	N	7	2	431	140	360	37
60	N	11,5	4	564	170	480	50
80	N	16	4	684	170	600	50







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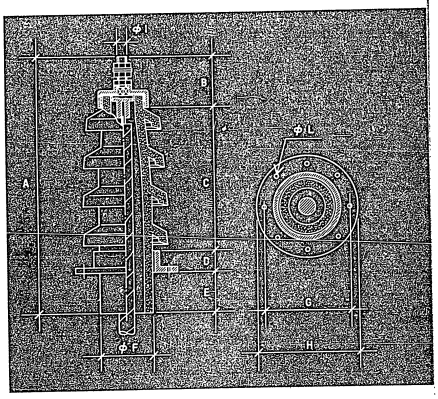
OFFICINE ELETTROMECCANICHE GALILEO - SERVIZIO COMMERCIALE: VIA LARGA, 26, MILANO - TEL. 877895 - TELEGR. ELETTROGA MILANO

4300 | ISOLATORI PASSANTI PER TRASFORMATORI MOD. PT

MOD. PT BUSHING INSULATORS FOR POWER TRANSFORMERS
AISLADORES PASANTES PARA TRANSFORMADORES MOD. PT

OFFICINE ELETTRO MECCANICHE GALILEO
DI BATTAGLIA TERME S.p.A.



ISOLATORE INSULATOR AISLADOR	Tensione nominale Rated voltage Tensión nominal KV	Peso approssimativo Approximate weight Peso aproximado Kg.	A	B	C	D	E	ø F	G	H	ø I	ø L
PT 10	10÷12	5	270	90	100	45	35	75	123	145	10 MA	11 (n. 4)
PT 15	15÷18	7	330	90	150	45	45	75	123	145	10 MA	11 (n. 4)
PT 15 R	15÷18	10	335	90	150	45	50	95	150	180	16 MB	11 (n. 8)
PT 30	30÷35	13	455	90	250	50	70	120	175	205	16 MB	11 (n. 8)
PT 45	45÷52	20	590	90	350	50	100	120	175	205	16 MB	11 (n. 8)

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DON'T MISS THE

FINMECCANICA GROUP

Pavallion at the Italian Industrial Fair

In terms of number of employees, importance of plants and volume of sales, the "Finmeccanica" Group is among Italy's largest industrial complexes. The Group's 35 operating companies employ 72,000 people, or more than one third of the total employment in Italian mechanical industries employing more than 1,000 people each. These Companies operate more than 50 plants, with an installed power of 270,000 KW and approximately 22,000 machines and machine tools, a great many of which are of recent costruction and meet the most advanced technical requirements. The Group's sales have increased four-fold since 1958, and in 1957 totaled 260 billion Lire ($416 million), or more than one sixth of the aggregate value of Italy's mechanical production.

The Group's main production activities may be classified as follows:

Shipbuilding, Aircraft construction and repair, Railroad and city transit rolling stock, Motor vehicles, Tractors and farm machinery, Electrical machinery, Thermal machinery (Diesel engines, steam turbines and boilers), Industrial machinery and plants, Machine tools, Textile machinery, Metal fabrication, Optical and precision mechanical products, Electronic equipment.

As it can be seen the Group's activity, while extending to many branches of the mechanical industry, concentrates primarily on the production of capital goods. And it can be stated with certainty that, under this aspect, there is no other industrial complex in Italy which can offer such a broad range of products.

Within the framework of the Group's production activities, shipbuilding is by far the most important, accounting for about two thirds of Italy's total production capacity (at present estimated at around 450,000 gross tons). This branch comprises Italy's three largest shipbuilding industries (Ansaldo, Cantieri Riuniti dell' Adriatico and Navalmeccanica), with facilities at Genoa, La Spezia, Leghorn, Trieste and Naples, and other smaller industries specializing in ship repair work. This large group builds naval and merchant vessels of every type and tonnage. The Group's shipyards, modernly equipped and using the most advanced technical practices and methods, constitute a reason for legitimate pride for Italy, a country with a long and glorious shipbuilding tradition. The Group also plays a major role in other production activities, such as motor vehicle production (handled by one of the Group's largest industries, Alfa Romeo, a Company enjoying worldwide reputation); electrical machinery (with Ansaldo San Giorgio, which has played a predominant role in the development of Italy's power industry, and is well known internationally through the large power plants it has built in many parts of the world); production of railroad rolling stock (about one fifth of Italy's total capacity); motors and engines (more than one third of Italy's total production); electronic equipment (with the Group occupying a leading position among Italy's electronic industries); aircraft construction and repair (more than one fifth of Italy's total capacity).

The "Finmeccanica" Group occupies a position of special importance in the picture of Italian exports. To obtain an idea of the tremendous contribution it made to Italy's balance of trade it will suffice to note that foreign sales of Finmeccanica's operating companies, which have been increasing at a very fast pace, particularly in the last few years, have reached in 1957 a total of approximately 85 billion Lire ($ 136 million); it should also be noted that the Group's exports go to all parts of the world.

Almost all of the Group's sectors contribute in the development of exports. A predominant role is played, naturally, by sales of means of transportation (ships, motor vehicles, railroad rolling stock, etc.). Considerably important are also the sales of machinery of all types and of industrial plants. In this connection it should be noted (and this is of interest above all to economically underdeveloped countries) that the activity of Finmeccanica's industries is not confined to the construction of equipment and the erection of plants, but may extend, as it did in several countries, to the initial phase of operation of the new plants.

The steadily growing foreign sales organization now comprises nine Group Delegations and 275 Agents, Representatives and Correspondents stationed in every part of the globe: 112 in Europe, 35 in Africa, 65 in America, 53 in Asia and 10 in Oceania. Lastly, it should be recalled that Finmeccanica is one of the holding companies of IRI (Istituto per la Ricostruzione Industriale, or Institute for Industrial Recovery), a public agency which manages most of the Italian State's stock holdings and which controls enterprises employing almost 230,000 people. The Institute controls most of the major national banks, the majority of the line shipping, more than half of the national telephone system, about 70 o/o of the steel production, over 27 o/o of the electric power production, all radio and TV broadcasting services and many other enterprises in the chemical, mining and transport industries, etc.

LIST OF THE GROUP'S COMPANIES

Aghi Zebra San Giorgio, Alfa Romeo, Ansaldo, Ansaldo Coke, Ansaldo Fossati, Ansaldo San Giorgio, Arsenale Triestino, Avis, Cantieri Navali E Officine Meccaniche Di Venezia, Cantieri Riuniti Dell'Adriatico, Delta, Elettrodomestici San Giorgio, Fabbrica Macchine Industriali, Filotecnica Salmoiraghi, Fonderie E Officine San Giorgio Pra, Gas Compressi, Industria Meccanica napoletana, Industrie Meccaniche aeronautiche Meridionali Aerfer, Marconi Italiana, Microlambda, Motomeccanica, Navalmeccanica, Nuova San Giorgio, Officine Allestimento E Riparazioni Navi, Officine Elettromeccaniche Pugliesi, Officine Meccaniche Ferroviarie Pistoiesi, Ossinitriga, Oto Melara, S.A. Fonderie Officine Di Gorizia, Societa' Esercizio Bacini Napoletani, Societa' Veneziana Esercizio Bacini, Spica, Stabilimenti Di S. Eustacchio, Stabilimenti Meccanici Di Pozzuoli, Termomeccanica Italiana.

For More Information Contact 44, Via Torino - Rome, Italy.

B-2201

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