

ROZA®



Transformers







ROZA[®]
Transformers

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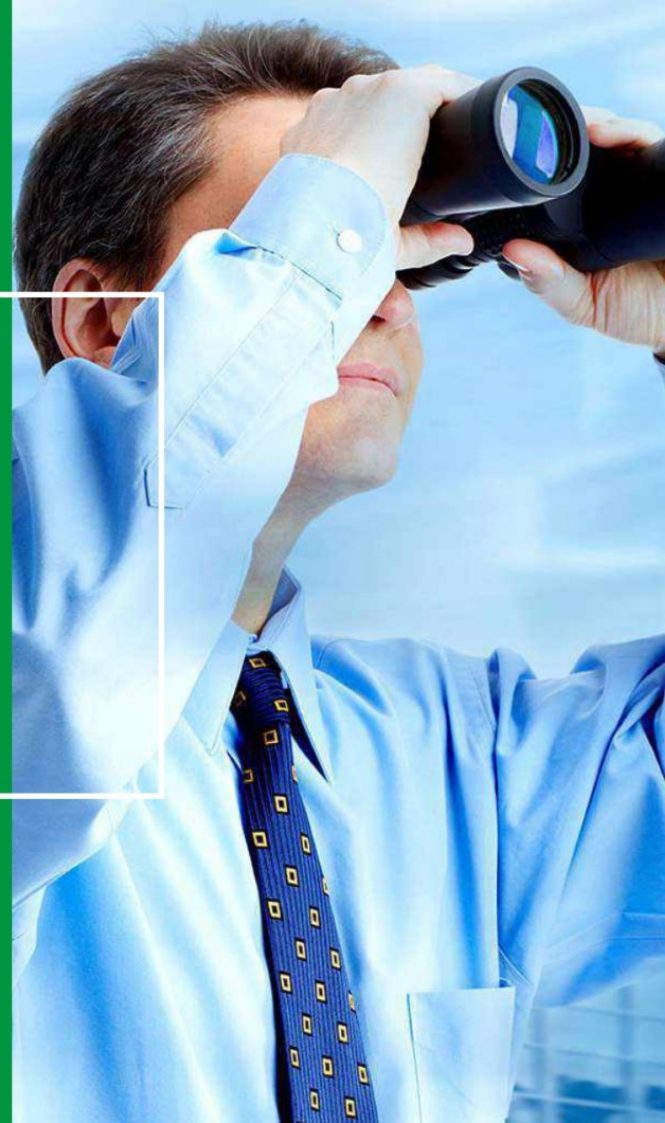
Roza Transformers was established in Şanlıurfa in 2014 by well experienced electrical engineers as an importer and Exporter Company of Electric and Electronics Engineering products, Communication equipment, Process equipment, Agriculture, Textile, Automotive and Food products. After getting enough background and good support of our customers we started to manufacture oil immersed transformers with power in range of 25 to 7500 kVA with high voltages up to 36kV. Our close target is to produce medium power transformers with 31 MVA / 36kV and Dry Type of Transformers.

We mainly produce and supply hermetically sealed and conservator type distribution transformers to our customers and optimize our designs according to the customers requirements. We supply semi finished transformers to our partners in different parts of the world and offer them a special technical support for their assembly, oil filling, testing and installation.

Honesty, quality and customer satisfaction are the cornerstones of our factory. Our aim is a continuous improvement and development by providing optimum design in our production which fulfil all our customers requirements by using high quality machines and experienced workers.

WHO
WE ARE
WHO
WE ARE

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MISSION
VISION
VALUES

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VISION
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Mission

The most important mission for us is to exceed our customers' expectations in quality, efficiency, timely deliveries, and cost-effective innovative of high standards products in the transformer industry.

Our production is within the perspective of understanding customer's requirements & applications and strive to fulfil their present and future expectations by ensuring maximum satisfaction to their demands and needs. To achieve this, our work place particular emphasis on newest eco-friendly technology by providing maximum sensitivity and minimum damage on the environment as well as well safety and growth of every employee while performing the job.

Vision

Our Vision is to be a well-known and reliable brand both in Turkey and around the world in the manufacturing of transformers by focusing on innovation technology, effectiveness, efficiency and high-quality standards at a cost that can compete in the global transformer market. Our vision is to become one of the leaders in the industry of transformers by helping our customers in their sustainable growth in their business. In our years of experience we have understood that there is no company when there is no customer. Customers are our true partners and their suggestions are very important to us. Our main vision is to keep each and every customer of us happy and satisfied in terms of quality, better delivery and reasonable prices.

Values

Customer satisfaction, commitment of all members of the company, being creative, innovative, competitive, honest and hard-working, fast decision-making, continuous growth, professionalism and well managed approach, providing reasonable prices without compromising ethical values in the quality of our products.





QUALITY
POLICY

**QUALITY
POLICY**

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Quality Policy

In order to guarantee our future, we have to ensure customer and employee satisfaction. The goods and after-sales services are provided pursuant to conditions and schedules prescribed beforehand with the customers.

Environment & Work Safety

The sustainable growth and safety of our employees contributes to reach and meet the expectations of our customers. As we grow in technology, we focus on the quality of our product simultaneously we minimise the damages effect to the environment by complying quality legislation, administrative regulations and legal requirements and following the recommendation of minimizing the pollution in other leave better world and good environment for the generations to come.

Quality Certificates: ISO 45001, 9001, 14001

Tests Certificates: Type Test KEMA Certificates, International Laboratory Test Reports, Factory Acceptance Test Reports.





Distribution Transformers

A distribution transformer is a transformer that provides the final voltage transformation in the electric power distribution system, stepping down the voltage used in the distribution lines to the level used by the customer. Roza Transformers is able to produce transformers in the range of 25kVA up to 7500kVA with high voltage up to 36kv according to customer requests, specifications and specified standards as one or three phased, oil immersed with ONAN, ONAF, ODAF , OFAF, OWAF cooling systems, . Transformers can be with open air expansion tanks, or hermetically sealed. We produce transformers with off-load tap changers or on-load tap changers, with cable box or protection box and with bushings with ceramic insulators or with resin type plug-in bushings.

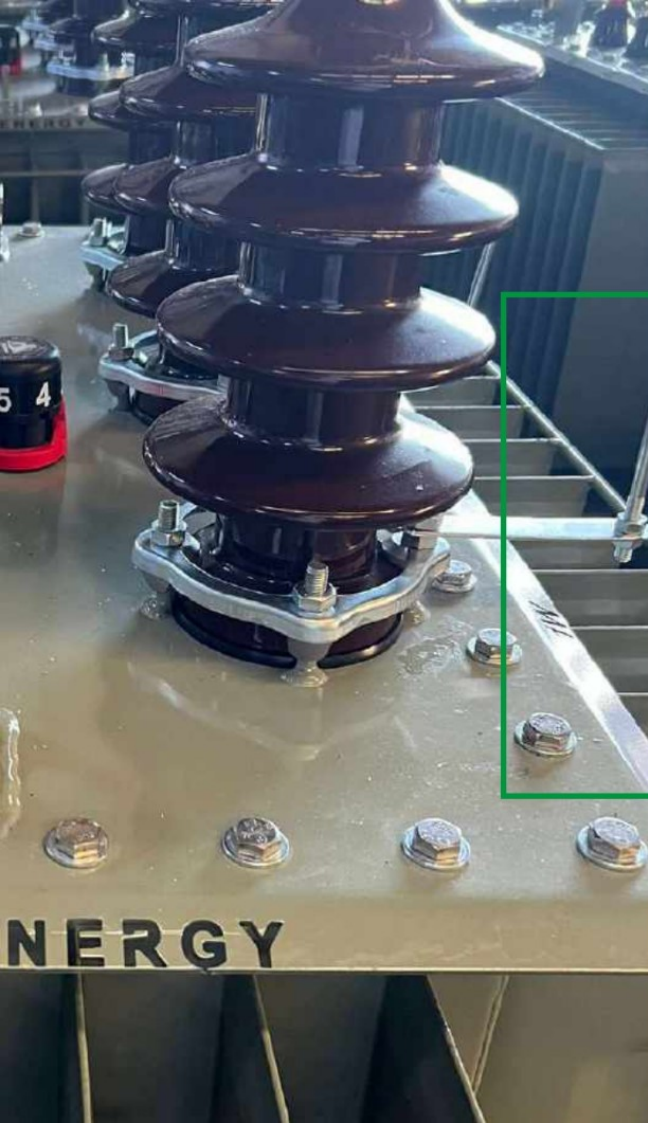
Distribution transformers produced in Roza Transformers fulfil customer's requests, contract requirements, national voltage levels or technical standards such as TS, IEC, BS, DIN, ANSI, ENEL, ENDOSA, CSA. etc. Each transformer is shipped after been subjected to all the routine tests or any special or type test requested by customers.

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Power Transformers

Power transformers are useful for the step up and step-down applications in transmission network of higher voltages in electricity transmission lines, industrial plants, power generation, centres and electrical internal needs. We are preparing our facility to do manufacturing of power transformers up to 31 MVA and high voltages up to 36kV according to national and international, IEC 60076 & other international standards.

Design Parameters checked and guaranteed during our production :

- Rated Power of the Transformers
- Rated Voltage up to 36 kV. We are producing double primary /secondary voltage, Double Power transformers as per our client's request.
- Tank Type: Hermetically Sealed or Conservator Type.
- Frequency: 50Hz or 60 Hz
- Copper or aluminium conductor as per request
- Method of cooling: Oil Natural Air Natural (ONAN) / Oil Natural Air Forced (ONAF)
- Vector Group: Yzn, Dyn, Yyn or Customized and the polarity is selected according to the customers requests.
- Applicable Standards: IS, IEC, ANSI, JIS, DIN, BS Etc.
- Geographical Conditions: Concerned country's conditions (Altitude, Humidity, Temperature values etc.)
- Impedance Values: as per customers request or international standards.
- Noise Level: calculated as per Customer request

Transformers have a wide range of technical characteristics such as power, voltage, regulation that why our well experienced engineer in design happily offer various solutions through our strategic alliances globally and meet any customer's needs and satisfactions.



Customised Special Type Transformers

Special Type Transformers are designed and manufactured for special areas of use in line with the customer demand and international standard powers and voltages. It operates under extreme currents and reactive loads under special operating conditions for special purposes. Due to the special working conditions required on this kind of transformers, their designs are handled specially and are considered as the highest point of the transformer sector due to the knowledge required by design and production technology, workmanship experience, care and sensitivity. Roza Transformers can produce this transformer up to 7.5MVA as power and high voltage up to 36kv, three phase or single phase, Oil expansion tank or hermetically sealed, 50Hz or 60 Hz Frequency, ONAN, ONAF or Customized Cooling Type, Yzn, Dyn or Customized Vector Group, with Off-Load or On-Load Tap Changer, used both external and internal, IS, IEC, ANSI, JIS, DIN, BS Etc...as applicable standards and Geographical Conditions: Concerned country's conditions (Altitude, Humidity, Temperature values etc.).

The main fields of use for such transformers include; Solar Power, Wind Power, Railway Systems, Mining Operations, Cruise Ships, Pump Stations, Paper Mills, Nuclear Power Stations, Oil Refineries, Crane Applications; and, all industrial facilities requiring DC systems that why these transformers; should be durable due to heavy duty operating conditions, should be designed with special technical solutions since harmonic frequencies increase thermal, mechanical and dielectric stresses, must have multiple secondary coils based on differing phase angles, must have reactive durability, must have low malfunction rate; and, provide consistent operation.



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Semi-Finished Transformers

With our extensive well experienced team of both electrical & mechanical engineers, Roza Transformers is producing semi-finished transformers to the Distribution Transformers factories / assembling factories such as

- Transformer Finished Corrugated Tank Produced according to the customer projects (Painted or Not Painted)
- Corrugated Panels to be used in fabrication of Tank Produced according to the customer projects.
- New Core assembled as per the customer's project
- Transformers LV and HV Windings
- Transformer Accessories

Except the supply of transformers or semi-finished/ accessories, we can work together and support your team in electrical and mechanical designs of oil immersed distribution transformers and supplying transformer manufacturing machines like drying oven, oil treatment machines, LV and HV winding manual/semi-automatic machines and automated test laboratory for transformers up to 7500kVA, 36kV.





LV & HV Windings

In distribution and power transformers, windings are made of two components conductor and the insulation materials both provide maximum strength to axial and radial forces and increases the resistance of the winding against overvoltage impulses. LV (low voltage) windings are generally from a foil or paper insulated flat conductor.

HV (high voltage) windings are however an enamel insulated round wire conductor or a paper insulated round or flat conductor. Copper or Aluminium conductor is used in the transformer windings. Whether the conductive material is copper, or aluminium varies accordingly to the current, voltage, specifications of the respective country and customer requirements. In between the layers of a coil, a special insulating material with increased insulation and high oil absorption is used, such as a craft paper, shellac paper (DDP, DPP) roll pressboards, etc. and this method provides gap-free, solid, coils with excellent properties.

All components of insulation are made from electrical grade insulating board; processed to ensure electrical and mechanical stability throughout the temperatures found in operational service. High technology with modern winding machines and manufacturing with qualified technicians ensure that each winding is able to withstand the excessive axial forces, which may result from external sources.

A close-up photograph of a transformer winding machine. The machine is winding a large coil of red copper wire. The wire is tightly packed and forms a cylindrical shape. The machine has a large metal drum and a winding head. The background is slightly blurred, showing industrial equipment.

LV & HV WINDINGS

LV & HV WINDINGS

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MAGNETIC
CORE
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Magnetic Core

The Magnetic core is made up from cold-rolled, grains-oriented (CRGO) and low-loss electrical silicon steel. Core steel can be in different thicknesses and qualities and are made up from high-quality silicon steel such as M3, M4, M5, MOH, ZDKH85, ZDKH95 and Amorphous steel, quality levels depending on the no-load losses requested by customer, warranted iron losses (no load losses) and applicable specifications. Being highly sensitive, all sheets used in magnetic circuit are cut and stored by CNC controlled cutting machine and magnetic circuit is formed by allocating these sheets.

Cutting and allocating of magnetic circuit is handled by a method called step-lab core construction and which reduces iron losses, noise level and vibrations to the minimum level.

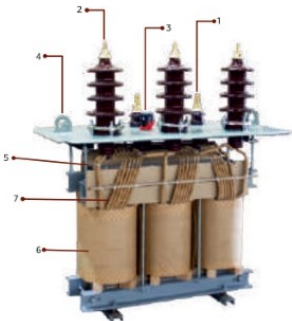




Active Part & Assembly

The active part of a transformer consists of the core, coils, upper cover, tap changer, bushings, and protection and connection members on the upper cover. The coils are mounted by squeezing against the core and each other by means of laths in order to carry the radial forces, and the upper yoke is arranged. Connections of the active part can be made on the upper cover or directly on side walls of the tank as well.

Assembly is process of assembling the core and the winding up to the end of production. When assembling the active part, the transformer must have a structure to provide the best strength to resist the predicted short circuit mechanical forces. Therefore, strength stability is increased by additional measures during the construction of the active part.



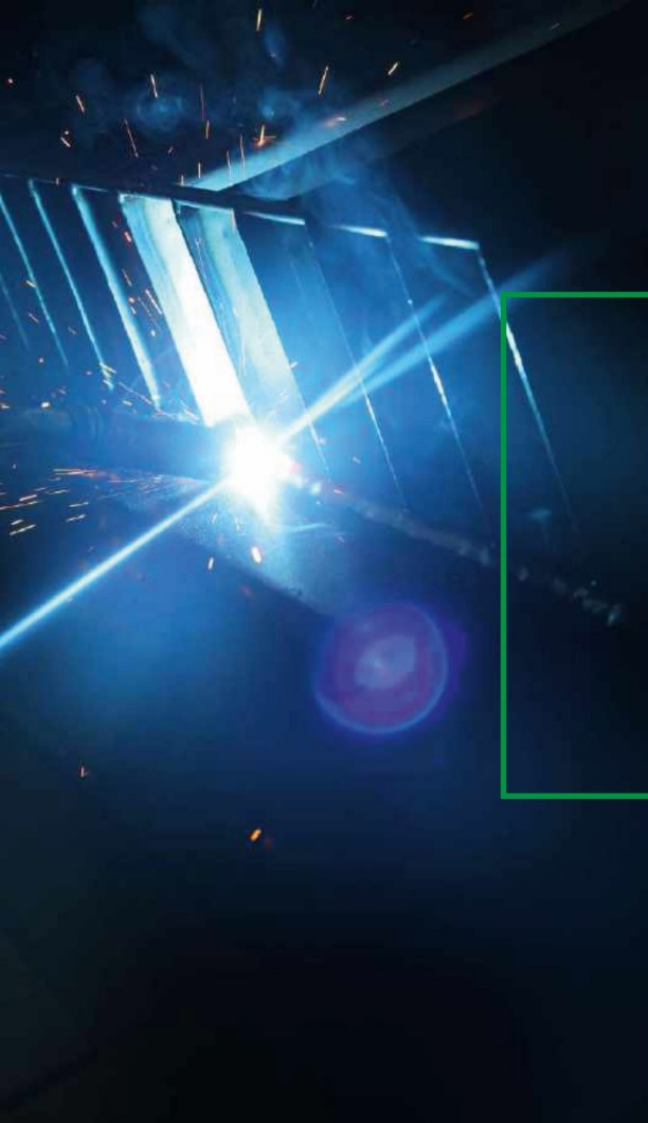
1. LV Bushing
2. HV Bushing
3. Tap Changer
4. Lifting Lugs
5. Magnetic Core
6. Windings
7. Connection Cables

ACTIVE PART & ASSEMBLY

ACTIVE PART & ASSEMBLY

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TANKS &
TOP COVER

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Tanks & Top Cover

The transformer tanks (lower pan and side walls) and top cover are made by using black sheet metal with high quality which is electrically welded. Cooling surfaces of distribution transformers up to 4000kVA consist of corrugated walls and these walls also form sides of transformer tank while for the bigger transformer radiators are used instead of corrugated wall panels.

After welding, each tank should be subjected to oil-leakage test (pressure test) that's why the pressure is applied to every tank after production. The pressure is designed to have a vacuum resistance of 0.35 bar for corrugated wall and 1 bar for transformers with radiators. All surfaces of the tank to get in contact with oil are cleaned by sanding and special chemical cleaning methods for surface preparation prior to painting. Tanks and top covers finished are sandblasted according to the DIN standards. If the customer has special requirements or various demands for sandblasting, our company has facilities to meet these.

Top Cover arrangement is created according to the contract or customer demand and all connection elements on the top cover and High Voltage bushing arching horns are made of stainless or anti-corrosive special coated material.





Painting

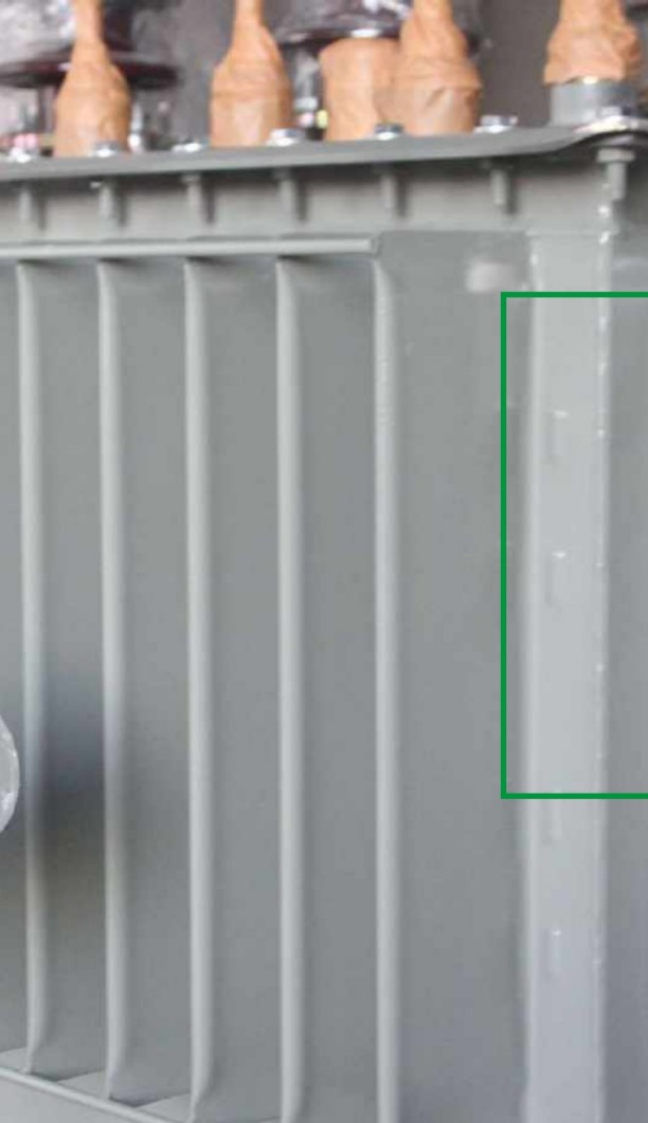
Tanks are painted with one coat of primer and one final coat of paint with a total thickness not less than 105 μ (microns) and more coats can be done as per the customer request. Although the RAL 7033 known as cement grey is used as a standard, non-standard paints are also used depending on the client's request. The method used to paint are pouring or spraying. While substances are selected from first-class materials that can endure working and environmental conditions for a long time.

Transformers in different applications (zinc coating), different film thicknesses and different colors can be offered according to customer demand. Also, hot-dip galvanized tanks can be manufactured if requested.

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DRYING AND
OIL FILLING

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Drying and Oil Filling

The active part through with the assembly operation is dried in a special high-vacuum drying ovens at 110-120 degrees for a period of time, and they are placed in the tank and filled with filtered oil in the vacuum chamber. Since the drying operation takes away the moisture in the materials making up the active part, it is a very important process for the insulation and cooling of the transformer.





Buchholz, Gas Collecting and Warning Relay

This relay collects the gases formed by low and high density discharges and arcs to occur within transformer. Relays can be of single or double contact. Warning and opening signals can be obtained depending on the amount of gas collected in relay. Thus, it ensures that the defect within transformer is noticed prior to any major damage. Besides, in case the oil level decreases, due to any reason, so as not to fill completely the relay, the latter informs such situation via warning signal.

Hermetic Protective Relay

It is used in hermetic transformers totally closed to atmosphere. It is applied in transformers with a power equal or above 630 KVA. It is a single relay that includes oil level gauge, temperature gauge, Buchholz relay, as well as extra pressure relay.

Winding Temperature Thermometer

It is used in power transformers. It gives the temperature to occur on windings according to current temperature relation depending on the current passing on windings. It issues alarm or opening signal depending on the prescribed temperature value



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Oil Level Gauge

In transformers with an expansion tank open to atmosphere, the magnetically functioning oil level gauges are used in order to track and check oil level in expansion tank. Magnetic oil level gauges can have single or double electrical contact. Contact oil level gauges inform the unexpected sudden changes in oil level in form of warning and opening signals. If required, prismatic oil level gauges can also be applied.

Dehumidifier

It is used in transforms with an expansion tank open to atmosphere, and mounted on expansion tank. By means of silica gel within, it absorbs the moisture and dust in the air, and enhances the operating safety of transformer. Silica gel amount varies depending on the oil amount within transformer.

Oil Temperature Indicator

It is possible to track and check transformer oil upper temperature by means of thermometers placed in thermometer pockets on the cover or lateral surfaces of tank. Thermometers of none, single or double electrical contact with maximum indicator can be applied. Contact thermometers issue warning and opening signals in case the heat in transformer exceeds the stipulated values.





Test

In order to check design and production, all routine tests, foreseen by standards, are applied without a change on all transformers we produce. Test criteria are given in standards. Type tests and other special tests are also implemented upon customer request.

Routine tests are held pursuant to IEC recommendations (or other production standards).

Quality Control

In the course of transformer production, it is important to conduct input and process controls, and to obtain their results. Throughout the production process, the compliance with standards is ensured via tight controls regarding present instructions.

The operability of these procedures and instructions is always presented to our customers in the Quality Control Manual. Quality control operations are carried out by the manufacturing and quality control experts, and the necessary documents and statistical data are elaborated.

TEST &
QUALITY
CONTROL

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IMPLEMENTED
TESTS

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Routine Tests

- Measurement of winding resistances,
- Measuring of insulation resistances,
- Transformer Turns ratio measurement and connection group-polarity determination,
- Induced voltage test,
- Applied-voltage test,
- Measurement of no-load loss and no-load current
- Measurement of Load Losses and Impedance of transformers
- Oil Breakdown Voltage Test
- Leakage test.

Type Tests

- Temperature increase test,
- Lightning impulse voltage test,
- Short circuit withstand test.
- Measurement of audible noise level,
- Mechanical strength test against short circuits.
- Transformer Tank lifetime test

Special Tests

- Capacity and insulation loss factor measurement (Double test),
- Measuring painting thickness





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Standarts And Specifications
Ablicable Standards for Oil Immersed Transformers,
National and International Standards

Turkey	TS
International	IEC, CENELEC
Germany	VDE
Great Britain	BS
USA	ANSI, NEMA
Austria	ÖVE
France	NF
Belgium	NBN
Netherlands	NEN
Denmark	OS
Italy	OEI
Sweden	SEN
Norway	NSAV

Tolerances

Size	Tolerances
No-Load losses	±%15
Load losses	±%15
Total losses	±%10
Impedance voltage	+/- %10
No-load current	±%30
Rated voltage ratio	+/- %0,5
Sound power level	+

Rated Voltage

HV -Rated Voltage		
Voltage Class	Rated Class	Maximum System Voltage
	kV	kV
3 N	3,3	3,6
	5,5 ; 6,3 ; 6,6	7,2
10 N	10 ; 10,5 ; 11	12
	15 ; 15,8	17,5
20 N	20 ; 22	24
	30 ; 31,5 ; 33 ; 34,5	36
LV - Rated Voltage (for Distribution Transformer)		
1 N	Or Other LV voltage on requested	1,1

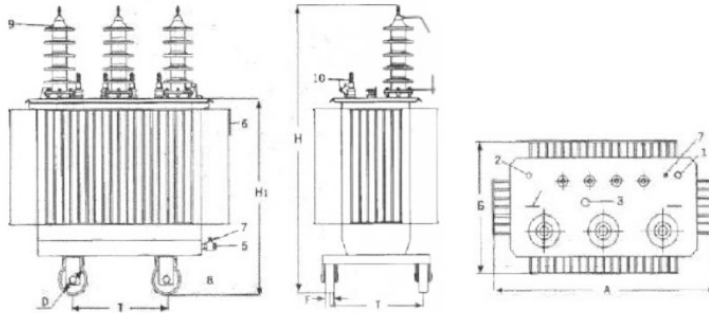
LV - Rated Voltage for Power Transformers is as the requested of our customer

Rated Voltage

HV -Rated Voltage	
Test Voltage / Effective Value 50 Hz. 1 min.	Test Voltage / Basic Impulse Level Voltage 1,2/50 µS
kV	kV
10	40
20	60
28	75
38	95
50	125
70	170
LV - Rated Voltage (for Distribution Transformer)	
3	

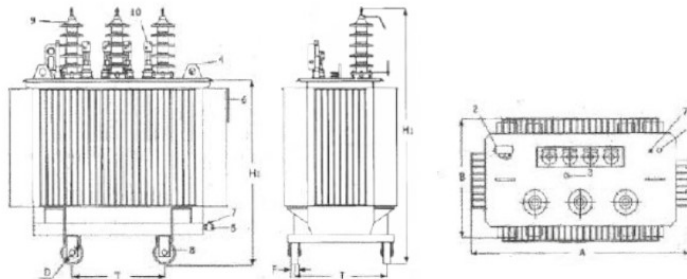
LV - Rated Voltage for Power Transformers is as the requested of our customer

There - Phase Transformers 25 - 2.000 kVA Design Hermetically Sealed Type



25 - 400 kVA

- 1) Oil Filling Plug
- 2) Thermometer Pocket
- 3) Tap Changer Drive
- 4) Lifting Lugs
- 5) Oil Drain Valve
- 6) Earthing Terminals
- 7) Rating Plate
- 8) Wheels
- 9) H.V. Bushings
- 10) L.V. Busings



500 - 2500 kVA

- 1) Oil Filling Plug
- 2) Thermometer Pocket
- 3) Tap Changer Drive
- 4) Lifting Lugs
- 5) Oil Drain Valve
- 6) Earthing Terminals
- 7) Rating Plate
- 8) Wheels
- 9) H.V. Bushings
- 10) L.V. Busings

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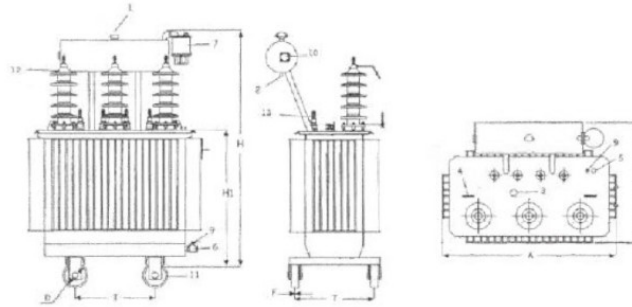
Three - Phase Transformers 20 - 2.500 kVA Design With Conservator Tank



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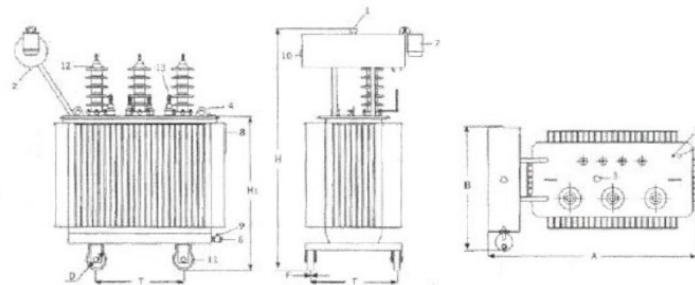
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25 - 200 kVA

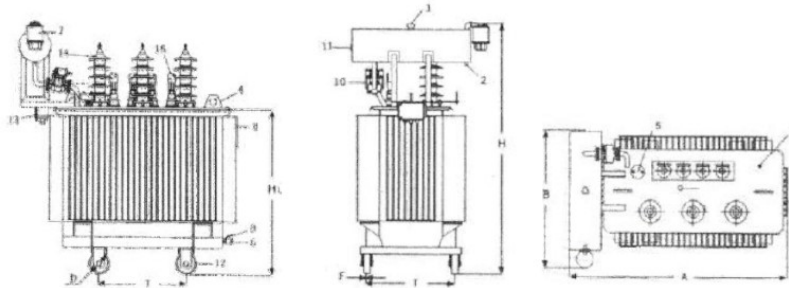
- 1) Oil Filling Plug
- 2) Oil Drain Plug
- 3) Tap Changer Drive
- 4) Lifting Lugs
- 5) Thermometer Pocket
- 6) Oil Drain Valve
- 7) Dehydrating Breather
- 8) Rating Plate
- 9) Earthing Terminals
- 10) Oil Level Indicator
- 11) Wheels
- 12) H.V. Bushings
- 13) L.V. Bushings



250 - 400 kVA

- 1) Oil Filling Plug
- 2) Oil Drain Plug
- 3) Tap Changer Drive
- 4) Lifting Lugs
- 5) Thermometer Pocket
- 6) Oil Drain Valve
- 7) Dehydrating Breather
- 8) Rating Plate
- 9) Earthing Terminals
- 10) Oil Level Indicator
- 11) Wheels
- 12) H.V. Bushings
- 13) L.V. Bushings

There - Phase Transformers 25 - 5.000 kVA Design With Conservator Tank



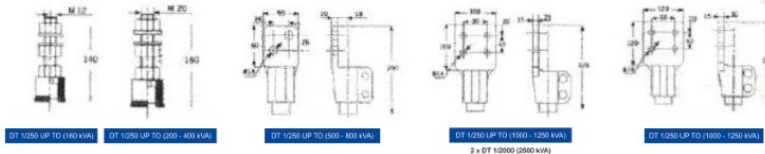
500 - 2500 kVA

- 1) Oil Filling Plug
- 2) Oil Drain Plug
- 3) Tap Changer Drive
- 4) Lifting Lugs
- 5) Thermometer With Contact
- 6) Oil Drain Valve
- 7) Dehydrating Breather
- 8) Rating Plate
- 9) Earthing Terminals
- 10) Buchholz Relay
- 11) Oil Level Indicator
- 12) Wheels
- 13) Terminal Box
- 14) H.V. Bushings
- 15) L.V. Busings

Dimension Drawings 1,2,3,4,5. Dimensions of under carriage in mm.

kVA	25 - 400	500 - 800	1000 - 1600	2000 - 2500
T	520	670	820	1070
ØD	125	160	200	200
F	50	50	70	70

Low Voltage Connections, Drawings 1,2,3,4,5. Dimensions of under carriage in mm.



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Technical Specifications,
Dimensions & Weights of
Standard Transformers

Power	HG	LV	Conn. Grp.	UK	T. amb.	No Load los.	Load los.	Noise Level	Tank	A Length	B Width	C Height	Tot. Weight	Oil W.
kVA	kV	kV	%	°C	W	W	dB(A)	Type	mm	mm	mm	kg	kg	
25	10,5	0.400	Dyn 11	4	40	115	600	53	G	900	660	1115	415	100
25	11	0.433	Dyn 11	4	45	115	600	53	G	900	700	1120	440	120
50	10,5	0.400	Dyn 11	4	40	190	1100	55	G	960	700	1225	510	125
50	11	0.433	Dyn 11	4	45	190	1100	55	G	1000	700	1225	520	130
50	15	0.400	Dyn 11	4	40	190	1100	55	G	960	700	1230	530	135
50	15	0.400	Dyn 11	4	40	190	1100	55	HD	1050	800	1150	550	140
50	20	0.400	Dyn 11	4	50	145	875	52	G	1000	700	1300	570	140
50	33	0.400	Dyn 11	4,5	40	230	1250	52	G	1100	800	1330	560	160
50	33	0.400	Dyn 11	4,5	40	230	1250	52	HD	1100	800	1250	580	170
63	11	0.416	Dyn 11	4	50	250	830	53	GDD	1000	700	1500	700	170
75	20	0.400	Dyn 11	4	50	305	1600	56	GDD	1000	700	1300	800	175
100	10,5	0.400	Dyn 11	4	40	320	1750	59	GDD	1050	730	1280	765	180
100	11	0.416	Dyn 11	4	50	330	1420	59	GDD	1100	730	1320	820	190
100	11	0.433	Dyn 11	4	45	320	1750	59	GDD	1060	730	1320	770	185
100	15	0.400	Dyn 11	4	40	320	1750	59	GDD	1100	800	1340	765	180
100	15	0.400	Dyn 11	4	40	320	1750	59	HD	1180	900	1250	780	170
100	20	0.400	Dyn 11	4	50	260	1475	56	GDD	1130	820	1360	880	205
100	33	0.400	Dyn 11	4,5	40	380	1950	56	GDD	1130	820	1430	725	210
100	33	0.400	Dyn 11	4,5	40	380	1950	56	HD	1200	900	1300	750	205
100	33	0.415	Yzn 11	4,5	50	220	1400	56	GDD	1300	800	1480	850	240
120	20	0.400	Dyn 11	4	50	440	2250	59	GDD	1080	730	1510	925	235
160	10,5	0.400	Dyn 11	4	40	450	2350	62	GDD	1070	800	1400	930	215
160	11	0.416	Dyn 11	4	50	500	1600	62	GDD	1200	800	1450	1170	260
160	15	0.400	Dyn 11	4	40	460	2350	62	GDD	1150	800	1430	930	215
160	15	0.400	Dyn 11	4	40	460	2350	62	HD	1200	960	1350	920	210
160	33	0.400	Dyn 11	4,5	40	520	2550	59	GDD	1250	850	1560	1050	310
160	33	0.400	Dyn 11	4,5	40	520	2550	59	HD	1250	1000	1400	1100	305
200	11	0.433	Dyn 11	4	45	550	2650	63	GDD	1225	775	1500	1170	330
200	20	0.400	Dyn 11	4	50	635	2980	62	GDD	1300	800	1500	1160	315
250	10,5	0.400	Dyn 11	4	40	650	3250	64	GDD	1420	900	1500	1145	245
250	11	0.416	Dyn 11	4	50	600	3000	64	GDD	1400	900	1500	1310	310
250	15	0.400	Dyn 11	4	40	650	3250	65	GDD	1480	800	1500	1145	245
250	15	0.400	Dyn 11	4	40	650	3250	65	HD	1350	960	1420	1100	240
250	33	0.400	Dyn 11	4,5	40	780	3500	62	GDD	1500	820	1600	1225	330
250	33	0.400	Dyn 11	4,5	40	780	3500	62	HD	1400	1000	1450	1335	330
250	33	0.415	Dyn 11	4,5	45	520	3000	62	GDD	1500	950	1650	1400	325
315	11	0.433	Dyn 11	4	45	770	3900	66	GDD	1350	850	1550	1420	360
315	11	0.433	Dyn 11	4	45	770	3900	66	GDR	1550	1225	1150	1630	420
400	10,5	0.400	Dyn 11	4	40	930	4600	66	GDD	1650	950	1600	1680	385
400	11	0.416	Dyn 11	4	50	850	4100	66	HD	1650	960	1600	1810	425
400	15	0.400	Dyn 11	4	40	930	4600	66	GDD	1670	950	1650	1780	445
400	15	0.400	Dyn 11	4	40	930	4600	66	HD	1600	1050	1700	1750	440
400	20	0.400	Dyn 11	4,5	50	1120	4900	65	GDD	1650	900	1600	1650	410
400	33	0.400	Dyn 11	4,5	40	1120	4900	65	GDD	1670	960	1640	1750	430
400	33	0.400	Dyn 11	4,5	40	1120	4900	65	HD	1670	1050	1750	1695	455
400	33	0.415	Dyn 11	4,5	45	840	4200	65	GDD	1650	1050	1650	1900	405
400	36	0.400	Dyn 11	4,5	40	1250	6750	70	GDROT	2000	1000	2650	3200	880
500	11	0.433	Dyn 11	4	45	1100	5500	69	GDR	1800	1300	1350	2280	585
630	11	0.415	Dyn 11	4	45	1000	5700	70	GDD	1800	1100	1950	2500	465
630	11	0.416	Dyn 11	6	50	970	6000	68	HD	1925	1100	1600	2630	580
630	15	0.400	Dyn 11	4	40	1300	6500	70	GDD	1680	1100	1930	2285	495
630	15	0.400	Dyn 11	4	40	1300	6500	70	HD	1660	1050	1780	2200	480
630	10,5	0.400	Dyn 11	4	40	1300	6500	70	GDD	1680	1100	1850	2225	490
630	20	0.400	Dyn 11	4,5	50	1450	6650	67	GDD	1650	1020	1800	2430	570
630	33	0.400	Dyn 11	4,5	40	1450	6650	67	GDD	1680	1120	1950	2305	570
630	33	0.400	Dyn 11	4,5	40	1450	6650	67	HD	1700	1100	1800	2550	570
630	33	0.415	Dyn 11	4,5	45	1000	5700	67	GDD	1850	1140	2000	2550	560

Power	HG	LV	Conn. Grp.	UK	T. amb.	No Load los.	Load los.	Noise Level	Tank	A Length	B Width	C Height	Tot. Weight	Oil W.
kVA	kV	kV	%	°C	W	W	dB(A)	Type	mm	mm	mm	kg	kg	
800	10.5	0.400	Dyn 11	6	40	1500	8500	71	GDD	1900	1050	1950	2780	580
800	11	0.433	Dyn 11	6	45	1500	8500	71	GDR	2100	1450	1500	2800	850
800	15	0.400	Dyn 11	6	40	1500	8500	72	GDD	1900	1070	1950	2780	580
800	15	0.400	Dyn 11	6	40	1500	8500	72	HD	2100	1160	1840	2700	560
800	33	0.400	Dyn 11	6	40	1750	8700	68	GDD	1820	1080	2030	2710	690
800	33	0.400	Dyn 11	6	40	1750	8700	68	HD	2100	1200	1950	2705	675
1000	10.5	0.400	Ydn 11	6	40	1700	10500	73	GDD	2050	1125	2100	3420	870
1000	10.5	0.400	Dyn 11	6	40	1700	10500	73	GDD	2100	1125	2100	3230	830
1000	11	0.416	Dyn 11	6	45	1400	9000	73	GDD	2000	1250	2100	3450	640
1000	11	0.433	Dyn 11	6	45	1700	10500	73	GDR	2380	1530	1600	3300	715
1000	15	0.400	Dyn 11	6	40	1700	10500	73	GDD	2000	1200	2100	3175	695
1000	15	0.400	Dyn 11	6	40	1700	10500	73	HD	2100	1200	2000	3100	680
1000	20	0.400	Dyn 11	6	50	1700	10500	68	GDD	2000	1200	2120	3200	750
1000	33	0.400	Dyn 11	6	40	2000	10500	68	GDD	2000	1100	2150	3175	810
1000	33	0.400	Dyn 11	6	40	2000	10500	68	HD	2100	1250	2050	3525	965
1000	33	0.415	Dyn 11	6	45	1400	9000	68	GDD	2060	1250	2180	3500	850
1000	33	0.400	Dyn 11	6	40	1800	12000	67	GDR/CTC	2980	1500	3030	4950	1400
1250	10.5	0.400	Dyn 11	6	40	2100	13000	74	GDD	2100	1200	2250	3600	970
1250	11	0.416	Dyn 11	6	45	1750	11500	74	GDR	2400	1600	1780	3830	850
1250	15	0.400	Dyn 11	6	40	2100	13000	74	GDD	2100	1200	2300	3610	975
1250	15	0.400	Dyn 11	6	40	2100	13000	74	HD	2100	1350	2100	3550	960
1250	31.5	6.3	YNd 5	5.5	40	1950	14000	74	GDD	2150	1150	2300	3975	1035
1250	31.5	31.5	Dyn 11	6	40	2250	13000	74	GDR/CTC	3100	1600	2900	6700	2100
1250	33	0.400	Dyn 11	6	40	2250	13000	74	GDD	2100	1250	2300	3520	930
1250	33	0.400	Dyn 11	6	40	2250	13000	74	HD	2100	1400	2150	3520	930
1600	10.5	0.400	Dyn 11	6	40	2600	17000	76	GDD	2100	1250	2370	3580	940
1600	15	0.400	Dyn 11	6	40	2600	17000	76	GDD	2100	1250	2350	4155	985
1600	11	0.416	Dyn 11	6	40	2400	15500	76	HD	2100	1400	2150	4100	960
1600	20	0.400	Dyn 11	6	50	2000	12000	71	GDD	2400	1300	2380	5150	1100
1600	33	0.400	Dyn 11	6	40	2800	17000	71	GDD	2100	1250	2380	4085	1105
1600	33	0.400	Dyn 11	6	40	2800	17000	71	HD	2100	1450	200	4000	1105
1600	34.5	6.3	Dyn 11	6	40	2300	17000	70	GDR/CTC	3300	1850	2275	7000	2000
2000	10.5	0.400	Dyn 11	6	40	3000	21000	74	GDD	2350	1300	2380	5350	1180
2000	15	0.400	Dyn 11	6	40	3000	21000	74	GDD	2350	1300	2380	5250	1190
2000	11	0.416	Dyn 11	6	40	2850	19780	74	HD	2200	1450	2200	5200	1150
2000	33	0.400	Dyn 11	6	40	3000	21000	74	GDD	2420	1320	2420	5150	1220
2000	33	0.400	Dyn 11	6	40	3000	21000	74	HD	2200	1500	2250	5050	1220
2500	15	0.400	Dyn 11	6	40	3600	23000	76	GDD	2400	1350	2400	6500	1450
2500	15	0.400	Dyn 11	6	40	3600	23000	76	HD	2300	1500	2250	6300	1400
2500	33	0.400	Dyn 11	6	40	3800	24000	76	GDD	2480	1410	2490	7000	1650
2500	33	0.400	Dyn 11	6	40	3800	24000	76	HD	2300	1550	2300	6800	1650
2500	33	0.400	Dyn 11	6	40	3800	24000	76	GDR/CTC	3350	1450	2890	9000	2600
3150	20	6	Yyn 0	6	40	4500	29000	74	GDR	2700	2350	2800	8250	1550
3150	33	6.3	Dyn 11	7	40	3500	27000	74	GDR	2900	2000	2900	8250	1550
3150	34.5	11	Dd0	6	40	3500	27000	74	GDR	2515	1860	2820	8600	1600
5000	33	15.8	Dyn 11	7	40	6500	38000	78	GDR	3170	2350	3125	11800	2500
5500	33	6.3	YNd 11	7	40	6000	41000	78	GDR	3100	2300	3200	12500	2500
6250	34.5	6.3	Yyn0	7.6	40	7700	45000	79	GDR	3435	2410	3260	13650	3000
12500	33	6.3	Dyn 5	10	45	10000	65000	80	GDR/CTC	3580	2900	3780	21500	4300
12500	33	15.8	Dyn 11	10	40	10000	65000	80	GDR	3600	2700	3750	21750	4500
15000	33	11	Dyn 11	11.8	40	12000	75000	80	GDR/CTC	4185	3130	3750	27800	6600

G With expansion tank
 GDD With wave wall and expansion tank
 HD Hermetic Type (Totally Closed with Wave Wall)
 GDR With Expansion Tank and Radiator
 GDR/CTC With Radiator and Load Tap Changer
 GDR/CTCF With Radiator, Fan, and Load Tap Changer

These values are sampled through formerly produced transformers.

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Different Rated Power Transformers Fuse, Cable, And Current Table



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RATED CURRENT				HV FUSE			LV BARS mm ²	LV MAIN CABLE			T.M. AUTOMATIC SWICH		Current Transformer	Main Counter A	Ampere Meter A
0.4 kV	10.5 kV	15 kV	30 kV	10.5 kV A	15 kV A	30 kV A		Under Ground mm ²	On the Pillar mm ²	Cable Type	Current Rating A	T.M Winding A			
58	2.2	1.5	0.8	6	6	6	20x3	4x16	4x16	NY Y	3x63	50-63	-	3x100	3x100
91	3.46	2.43	1.2	10	6	6	20x3	4x25	4x25	NY Y	3x100	80-100	-	3x100	3x100
115	4.4	3.08	1.6	16	6	6	20x3	3x25+16	3x25+16	NY Y	3x125	100-125	3x150/5	x/5	3x150/5
144	5.5	3.85	1.9	16	10	6	40x3	3x35+16	3x50+25	NY Y	3x160	125-160	3x200/5	x/5	3x200/5
180	6.87	4.81	2.3	20	16	6	40x3	3x50+25	3x70+35	NY Y	3x200	160-200	3x250/5	x/5	3x250/5
231	8.8	6.16	3.1	25	16	10	40x3	2(3x50/25) 3x70+35	3x95+50	NY Y	3x250	200-250	3x250/5	x/5	3x250/5
289	11	7.7	3.8	25	16	10	40x3	3x120+70	3x150+70	NY Y	3x300	250-300	3x400/5	x/5	3x400/5
361	13.75	9.63	4.8	30	20	10	40x3	3x150/70	2(3x70+35)	NY Y	3x400	300-400	3x400/5	x/5	3x400/5
455	17.32	12.13	6.07	40	25	16	40x3	3x185/95	2(2x95+50)	NY Y	3x500	400-500	3x600/5	x/5	3x600/5
578	22	15.41	7.7	40	30	16	40x5	3x240/120	2(3x150+70)	NY Y	3x600	480-600	3x800/5	x/5	3x800/5
723	27.5	19.26	9.63	63	50	20	40x10	Copper Bars 40x10	Aluminium Bars 50x10		3x800	700-800	3x800/5	x/5	3x800/5
910	34.6	24.3	12.15	63	50	30	50x10	50x10	60x10		3x1000	800-1000	3x1000/5	x/5	3x1000/5
1156	44	30.82	15.4	80	63	30	60x10	60x10	80x10		3x1200	1000-1400	3x1200/5	x/5	3x1200/5
1445	55	38.53	19.2	100	80	40	80x10	80x10	100x10		3x1600	1400-1600	3x1600/5	x/5	3x1600/5
1804	68.73	48.15	24.08	125	100	50	100x10	100x10	2(80x10)		3x2000	1600-2150	3x2000/5	x/5	3x2000/5
2312	88	61.6	30.8	160	160	160	2x80x10	2x80x10	2(100x10)		3x2500	2150-2500	3x2500/5	x/5	3x2500/5

Accessories on the Transformer

Protection and Monitoring Devices	PCS.	Standards Explanation	25	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500
LV Bushings	4	DIN 42530	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
HV Bushings and arching horns	3	DIN 42531	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Plug-in Bushings	3		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Oil Load Tap Changer																						
HV-5 Positions	1		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
HV-3-11 Positions			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
On Load Tap Changer	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Buchholz Relay	1	Except Hermetic	X	X	X	X	X	X	X	X	X	X	X	X	+	+	+	+	+	+	+	+
Thermometer Pocket	1		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Alcohol Thermometer	1		+	+	+	+	+	+	+	+	+	+	+	+	X	X	X	X	X	X	X	X
Oil Thermometer with Contacts	1		X	X	X	X	X	X	X	X	X	X	X	X	+	+	+	+	+	+	+	+
Pressure Relief Valve	1	Hermetic Design	+	+	+	+	+	+	+	+	+	+	+	+	+	X	X	X	X	X	X	X
Hermetic Protect Relay (DGPTZ)	1	Hermetic Design	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+
Oil Level Indicator-No Contact	1		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Oil Level Indicator-With Conta	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dehydrating Breather		Except Hermetic	X	X	X	X	X	X	X	X	X	X	X	X	+	+	+	+	+	+	+	+
Oil Drain Valve	1	DIN 42551-A22	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-
Oil Drain Valve		DIN 42551-A31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+
Oil Drain Valve	4	DIN 42551-A40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reversible Wheels	2		X	X	X	X	X	X	X	X	X	X	X	+	+	+	+	+	+	+	+	+
Lifting Lugs	1		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Oil Filling Nippel	2		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Earthing Terminals	1		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rating Plate	1		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Tank with Radiators	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Corrugated Tank			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Terminal Box			X	X	X	X	X	X	X	X	X	X	X	X	+	+	+	+	+	+	+	+
LV-HV Cable Boxes			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hot-Dip Galvanizing			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Standard Design (+) On request against surcharge (X) Not available (-)

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