MAKSAN

MALATYA MAKİNA SANAYİİ A.Ş.

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- MAKSAN Company, established in the city of Malatya in 1974, manufactures power and distribution transformers under the license agreement of British firm Bonar-Long at its 120,000 square meter outdoor and 12,000 indoor facilities. R&D group of MAKSAN perfected its own brand name products in a short time prove the acumen in cutting edge technologies, delivering high quality products.
- Challenging innovations by using the best manufacturing equipments & machineries, MAKSAN earned its reputation as the hallmark of transformer industry.
- With more than 40 years of experience in the transformer production sector, MAKSAN not only sells its products to the domestic market, but also exports them to three different continents.
- MAKSAN has manufactured more than 80.000 transformers in 40 years for various sectors, public, private enterprises and output capacity of MAKSAN 3,500 MVA or 5,000 pieces of transformers per year.


DİKKAT !!!

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POWER and DISTRIBUTION TRANSFORMERS

According to the customer's purchase order specification, MAKSAN has manufactured transformers in various power and voltage and also to meet special purposes.
MAKSAN's product groups are as follows:

- 25-2500 kVA distribution transformers with conservator tank or hermetically sealed type. H.V. - L.V. Terminals: Open type, plug-in type, outside cone type or with H.V. - L.V. terminal box type
- 2500-31500 kVA mid-tension power transformers
- Transformers with on-load tap changer, manually operated or with automatic voltage regulator at various voltages and powers
- Auto transformers
- Step-up and step-down power transformers for power plant and power stations
- Transformers with electrostatic shielded and neutral-earthing transformers

MAKSAN products meet and exceed the local standards of TS EN 60076 and international standards of IEC 60354, DIN 42500-BS 50464.

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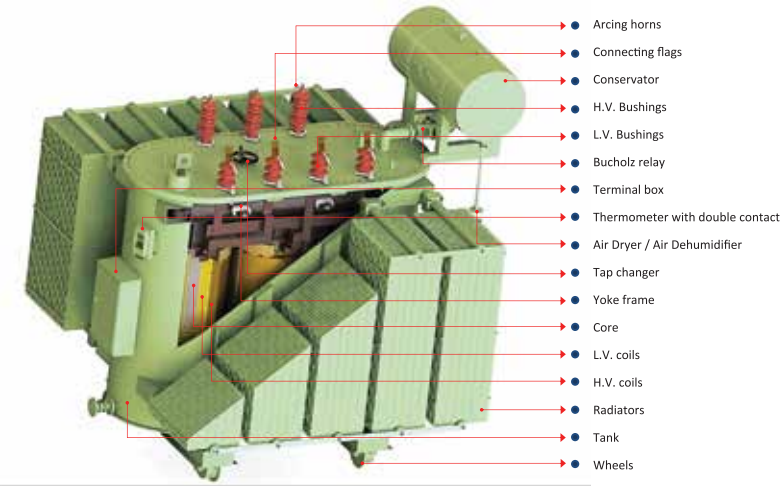
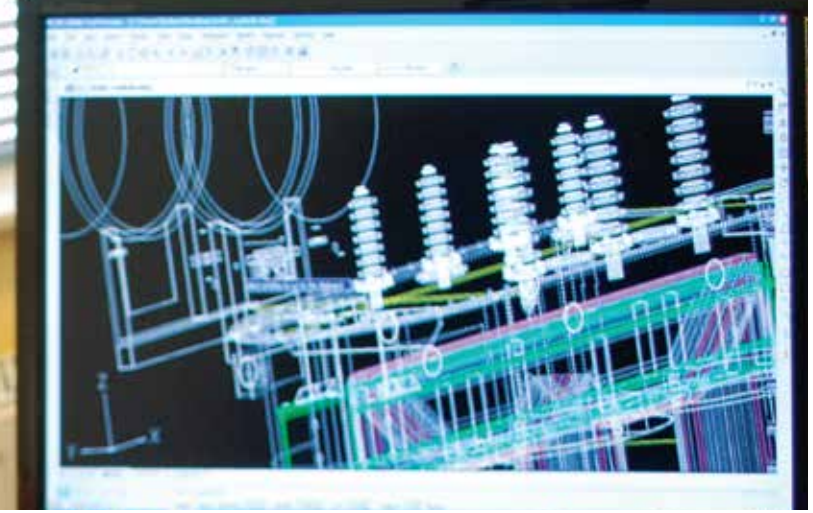
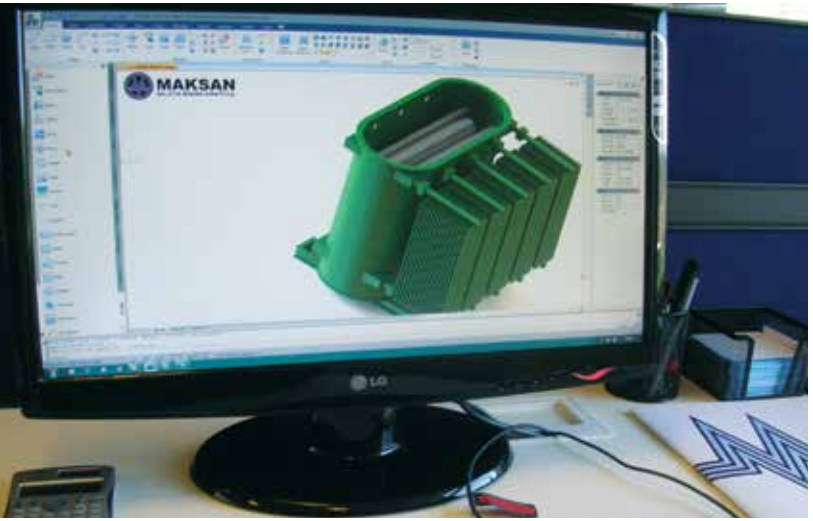
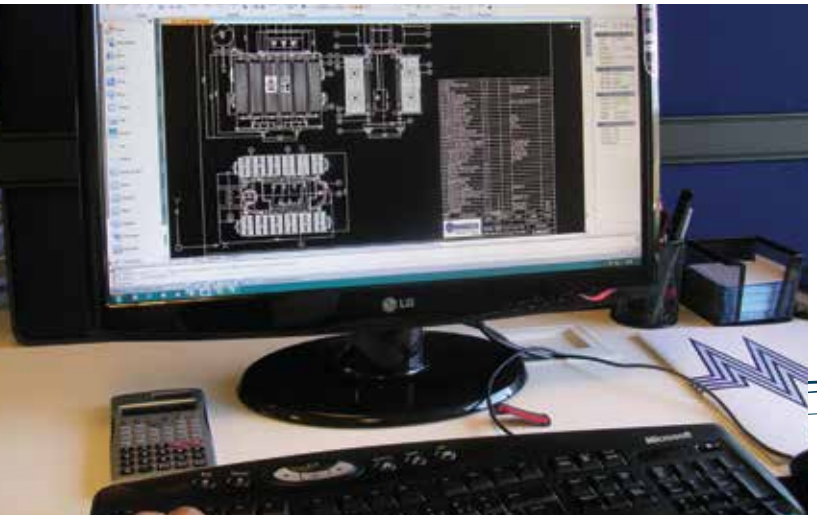
STANDARD TRANSFORMER SPECIFICATIONS



GENERAL SPECIFICATION OF STANDARD TRANSFORMERS	
Voltage type	3 phase alternative
Operating frequency	50 Hz
Service type	Continuous service
Altitude of installation place	Below 1,000m, unless specified otherwise
Voltage regulation range	With 5 steps off-load tap changer at HV side
Over voltage	Continuous operating under 5% over voltage
Temporary over load	According to IEC 60354
Cooling method	Oil natural, air natural (ONAN)
Heating limit of winding	65 K according to TS EN 60076 and IEC 60076
Vector groups and connection	Yzn or Dyn vector group for rated power up to 200 kVA, Dyn vector group for rated power 250 kVA and above. Connection: 5 or 11
Iron and copper losses, short circuit impedance, voltage, exciting current	As specified in TS and international standards, IEC-DIN-BS







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DESIGN

Together with the experienced staff working in project and product development department, MAKSAN designs efficient, durable and long lasting transformers in line with customer requirements and specifications. It is our key policy to maintain the products with high efficiency standards. To achieve this target, all design and production processes are carried out via latest technology with high-quality materials. In order to manufacture high quality new products, our research and development team works on customer specifications and tailor –made designs. Our experienced R&D team always keeps up with innovations in design to achieve worldwide excellence.

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TECHNICAL SPECIFICATIONS

Core

Core, being the kernel and the key element of the transformers, is made of grain oriented magnetic silicon steel sheets. MAKSAN produces core either by using conventional materials or highly magnetic permeable materials (HB) that vary according to specifications of the project. MAKSAN inventories contain high level HB material at all times.

This makes it possible for MAKSAN to design and produce rational, low level loss transformers which are durable to high magnetic induction. With the European made equipments, roll sheet metal slitting and cut-to-length-line machines, MAKSAN shapes the main frame for core production. Potential deformations, which occur during the opening of the roll, slitting and length cutting processes, are perfectly corrected by using additional annealing furnace process.

The material recovery systems used in MAKSAN production lines are rarely found & applied at other transformer producers. Advance designs with high precision yield production of low level loss transformer cores which are extremely resistant to high magnetic flux density.

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TECHNICAL SPECIFICATIONS

Coils

Cylindrical coils are used in power and distribution transformers since they possess a significant endurance as opposed to the power generated in the course of short circuit events. Except for the HV (High Voltage) coils used in small type distribution transformers, LV (Low Voltage) and HV conductors are isolated in wire insulator machines with very high insulation materials. In coil production, environmental friendly, cellulose containing insulator materials are used. Conductors are exposed to additional insulation processes according to their specific functionalities. Transformers gain enhanced robustness to the excessive atmospheric stress as the wires are isolated in two dimensions by using horizontal and vertical conductor insulator machines. Owing to pay extreme attention to the mentioned issues, MAKSAN makes a significant difference among other transformer manufacturers. LV coils in distribution transformers are produced by using flat or band material; however, HV coil production is achieved by using flat or round conductors. In power transformers, layer winding, folded winding, radial channeled winding etc. are the primary techniques used in MAKSAN production facility.

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TECHNICAL SPECIFICATIONS

Tank & Cover

Not including the radiators and the corrugated walls, all of the parts for tank and cover production for power and distribution transformers are made in our plant.
Tanks and covers are manufactured at a faster speed with high-tech equipments in accordance with the technical parameters and drawings of the specific project with high quality standards. Prior to body coating of the tanks, detailed leakage test is applied. In line with customer demands, bushing coverage and cable box production is also available in the standards of TS, IEC and BS.

Paint

After passing through the testing process successfully, transformer tanks need to be refined from lubricant, dirt and dust in order to enhance the contact of the dyestuff to adhere to the metal surface. For this reason, tanks and all metal components are exposed to sand blasting process. Metal parts are undercoated with special safety primers once or several times. Since transformer tanks are subject to tough air conditions for long years, they are coated with 105 micron thick, climate retardant paints.

Assembly and Drying

Building components which are the active part of the transformers are assembled in the installation phase. Coils are placed in the core. Tap changer, bushings and all other connections are assembled. Some parts are subjected to additional isolation against excessive stress. Active part is reinforced to gain extra mechanical durability. Following the installation process, active part is subjected to drying process in vapour phase vacuum furnace (vacuum furnace with solvent vapour). Conventional drying procedure takes five times longer than drying in vapour phase vacuum furnaces. The more time drying process takes, the insulation materials used in transformers is aged more. Reducing the drying period by using vapour phase operated vacuum furnaces constitutes an obstacle against the aging of the isolation materials. Spraying with the solvent stream eliminates the undesired lubricant, dirt, dust and trash on all over the surface and the cavities of the transformer. It is extremely important for hermetic and power transformer production to use high level vacuum performance solvent vapour phase operated vacuum furnaces. MAKSAN takes advantage of solvent vapour phase operated vacuum furnaces in production and reparation of transformers at all times.

Following drying process, transformers are automatically filled with transformer oil under high level vacuum (below 0.1 millibar).

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TECHNICAL SPECIFICATIONS

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Accessories

Magnetic and mechanical oil level indicator

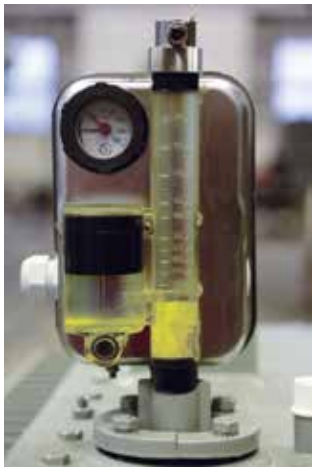
These instruments are primarily used for detection of levels of oil used for cooling and isolation purposes. These are mainly prismatic indicator, magnetic indicator and contact-magnetic indicator types. Level can be monitored on a point scaled indication. Single indicators are used in distribution transformers with the conservator tanks; however mechanical alarm-switched indicators are used in power transformers as a standard. In case of a customer request, mechanical type alarm-switched oil level indicator can be installed on distribution transformer.

Air Dryer/ Air Dehumidifier

Transformer oil should be well protected from ambient air & humidity in order to preserve its functionality. Air dryers are installed on a specific surface of the conservator tanks to supply dry air with the system. According to the customers' requests, rubber made flexible "atmoseal" technique is used in order to cut the contact of transformer oil with the air in power transformers.

Pressure Relief Valve

In case of a rapid overload and short circuit situations, increase in internal pressure is undesirable. Both hermetic type distribution and power transformers are equipped with "Pressure Relief Valves" to avoid internal pressure rise above the envisaged maximal values. Pressure valves in power transformers are made of mechanical type with double contact, alarm and tripping. Small capacity distribution transformers have contactless pressure relief valves. Distribution transformers with conservator tank included are also applicable to be equipped with "Pressure Relief Valves" for customer requests.



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Accessories

Buchholz Relay

In the event of a malfunction or a defect on the active part of the transformer, this may cause a sudden temperature increase, which leads to a gas formation inside the tank. "Buchholz/Gas" relay is installed between tank and conservator tank junction, signals give alarm or tripping, depending on the level of gas accumulated. This alarm mechanism conserves the system and prevents further damages. The accessory is mainly used for transformers with conservator tanks that work at and over 630 kVA power range. On customers requests, this equipment can also be furnished with smaller power rate transformers.

Oil Temperature Indicator With Contacts

Transformer oil temperature, being higher than a specific value, is not a desired situation during the operation and usually the oil temperature exceeds the applicable range. This accessory functions not only as an alarm signal with its first level contact but also sends tripping signal to circuit breaker opening between source and transformer at the second level contact. These functions keep the transformer safe and prevent it from further damages. Transformers rated power 630 kVA and above are equipped with oil temperature indicator with double contacts as a standard. Small transformers can also be equipped with oil temperature indicator with double contact for customer requests.

Protection Device/ Hermetic Protection Relay

This is a compact protection and security device that handles pressure, temperature and gas exit protections all together. It is applied for hermetic transformers with power rate from 630 kVA to 2500 kVA and it is mounted top of the cover of the transformer tank. On the customer request, the low-level power rate transformers can also be equipped with this protection relay as well.


MAKSAN

Power	Rated Voltage	No Load Current Io	Load Losses	No Load Losses	Short Circuit Voltage	CosØ= 0,8		CosØ= 1	
						Full Load Regulation	Full Load Efficiency	Full Load Regulation	Full Load Efficiency
kVA	kV	%	W	W	%Uk	%	%	%	%
25	6,3-10,5	2,50	550	65	4	3,773	97,02	2,255	97,60
	15,8	2,50	550	65	4	3,773	97,02	2,255	97,60
	33	3,15	700	110	4,5	4,360	96,11	2,862	96,86
40	6,3-10,5	2,40	650	80	4	3,512	97,77	1,691	98,21
	15,8	2,40	650	80	4	3,512	97,77	1,691	98,21
	33	2,92	900	135	4,5	4,153	96,87	2,325	97,48
50	6,3-10,5	2,30	750	90	4	3,446	97,94	1,568	98,35
	15,8	2,30	750	90	4	3,446	97,94	1,568	98,35
	33	2,76	1050	160	4,5	4,086	97,06	2,179	97,64
63	6,3-10,5	2,25	900	110	4	3,407	98,04	1,498	98,42
	15,8	2,25	900	110	4	3,407	98,04	1,498	98,42
	33	2,62	1225	195	4,5	4,012	97,26	2,026	97,80
80	6,3-10,5	2,20	1050	125	4	3,342	98,20	1,383	98,55
	15,8	2,20	1050	125	4	3,342	98,20	1,383	98,55
	33	2,50	1400	225	4,5	3,913	97,52	1,835	98,01
100	6,3-10,5	2,10	1250	145	4	3,306	98,29	1,322	98,62
	15,8	2,10	1250	145	4	3,306	98,29	1,322	98,62
	33	2,27	1650	270	4,5	3,859	97,66	1,737	98,12
125	6,3-10,5	2,00	1475	175	4	3,264	98,38	1,253	98,70
	15,8	2,00	1475	175	4	3,264	98,38	1,253	98,70
	33	2,14	1900	330	4,5	3,787	97,82	1,609	98,25
160	6,3-10,5	1,90	1700	210	4	3,193	98,53	1,136	98,82
	15,8	1,90	1700	210	4	3,193	98,53	1,136	98,82
	33	2,00	2150	390	4,5	3,686	98,05	1,435	98,44
200	6,3-10,5	1,90	2025	255	4	3,162	98,58	1,087	98,87
	15,8	1,90	2025	255	4	3,162	98,58	1,087	98,87
	33	1,90	2575	470	4,5	3,652	98,10	1,380	98,50
250	6,3-10,5	1,60	2350	300	4	3,117	98,69	1,015	98,95
	15,8	1,60	2350	300	4	3,117	98,69	1,015	98,95
	33	1,80	3000	550	4,5	3,600	98,26	1,294	98,60
315	6,3-10,5	1,50	2800	365	4	3,084	98,76	0,964	99,01
	15,8	1,50	2800	365	4	3,084	98,76	0,964	99,01
	33	1,70	3575	670	4,5	3,559	98,34	1,229	98,67
400	6,3-10,5	1,50	3250	430	44	3,034	98,86	0,889	99,09
	15,8	1,50	3250	430	4	3,034	98,86	0,889	99,09
	33	1,70	4150	790	4,5	3,498	98,48	1,133	98,78
500	6,3-10,5	1,40	3950	520	4	3,020	98,89	0,866	99,11
	15,8	1,40	3950	520	4	3,020	98,89	0,866	99,11
	33	1,60	4850	950	4,5	3,455	98,56	1,066	98,85
630	6,3-10,5	1,40	4600	600	4	2,980	98,98	0,807	99,18
	15,8	1,40	4600	600	4	2,980	98,98	0,807	99,18
	33	1,60	5500	1100	4,5	3,392	98,71	0,970	98,96
800	6,3-10,5	1,30	6000	650	6	4,264	98,97	0,927	99,18
	15,8	1,30	6000	650	6	4,264	98,97	0,927	99,18
	33	1,50	7000	1300	6	4,350	98,72	1,051	98,97
1000	6,3-10,5	1,20	7600	770	6	4,271	98,96	0,937	99,17
	15,8	1,20	7600	770	6	4,271	98,96	0,937	99,17
	33	1,40	8900	1450	6	4,360	98,72	1,066	98,98
1250	6,3-10,5	1,20	9500	950	6	4,271	98,97	0,937	99,17
	15,8	1,20	9500	950	6	4,271	98,97	0,937	99,17
	33	1,40	11500	1750	6	4,381	98,69	1,095	98,95
1600	6,3-10,5	1,10	12000	1200	6	4,264	98,98	0,927	99,18
	15,8	1,10	12000	1200	6	4,264	98,98	0,927	99,18
	33	1,30	14500	2200	6	4,371	98,71	1,082	98,97
2000	6,3-10,5	1,10	15000	1450	6	4,264	98,98	0,927	99,18
	15,8	1,10	15000	1450	6	4,264	98,98	0,927	99,18
	33	1,20	18000	2700	6	4,367	98,72	1,075	98,98
2500	6,3-10,5	1,0	18500	1750	6	4,257	99,00	0,917	99,20
	15,8	1,0	18500	1750	6	4,257	99,00	0,917	99,20
	33	1,1	22500	3200	6	4,367	98,73	1,075	98,98

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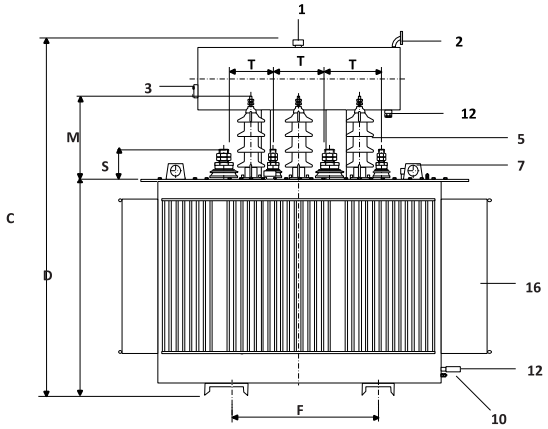
TECHNICAL DATA OF DISTRIBUTION TRANSFORMERS FOR STANDARD OIL IMMERSED WITH / WITHOUT CONSERVATOR (HERMETICALLY-SEALED) TYPE

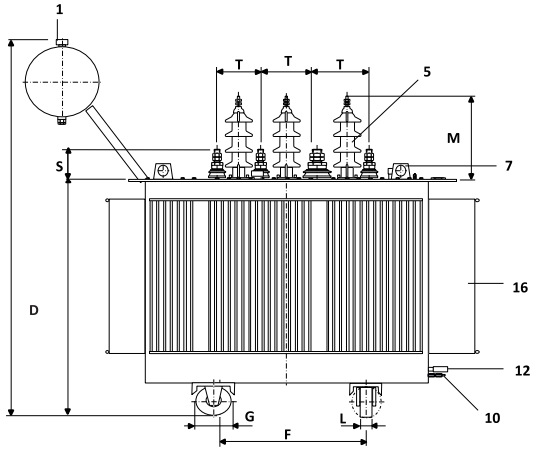
Vector Groups :
25÷200 kVA = Yzn 5÷11 - Dyn 5÷11
250÷2500 kVA = Dyn 5÷11

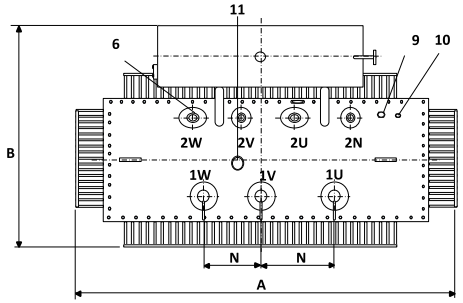
Three Phase
Oil immersed
With Conservator Type,
25 - 2500 kVA
Transformers
Technical drawings

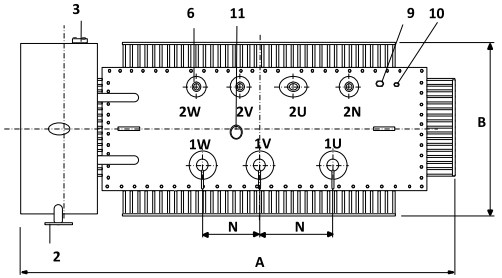
25 - 200 kVA



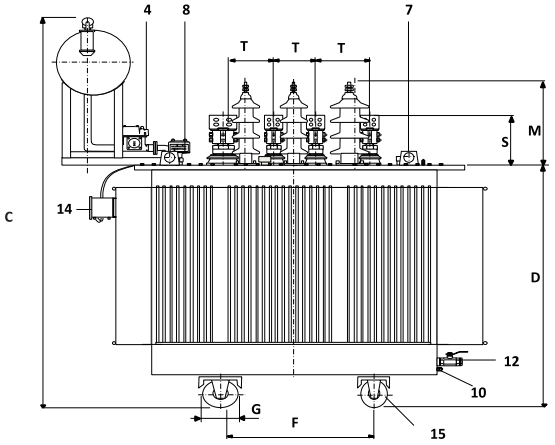
250 - 400 kVA

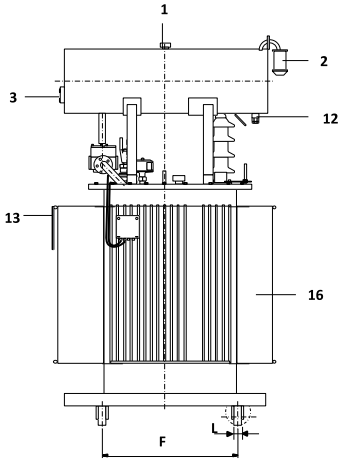


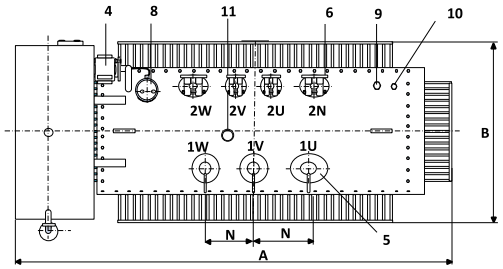




500 - 2500 kVA







1 - Oil filling pipe
2 - Silicagel for dehydrating breather
3 - Oil level indicator
4 - Buchholz relay
5 - H.V.Bushings
6 - L.V.Bushings
7 - Lifting lugs
8 - Double contact thermometer
9 - Thermometer pocket
10- Earthing screws
11- Off load tap changer
12- Oil drain screws
13- Rating plate
14- Terminal box
15- Wheels
16- Corrugated walls

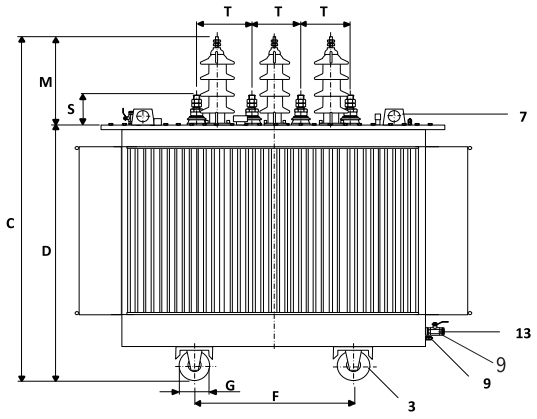
Power	Voltage	Oil Weight	Active Part Weight	Total Weight	Length A	Width B	Heigth C	D	F	ØG	L	M	N	S	T
kVA	kV	kg	kg	kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
25	6,3-10,5	130	295	540	935	680	1170	700	520			310	210	138	150
	15,8	130	295	540	935	680	1245	700				385	220		
	33	120	225	410	920	730	1365	720				485	290		
40	6,3-10,5	150	400	650	975	730	1230	760	520			310	265	138	150
	15,8	150	400	650	975	730	1305	760				385	265		
	33	145	305	540	905	785	1450	805				485	330		
50	6,3-10,5	170	440	685	1000	750	1240	770	520			310	265	138	150
	15,8	170	440	685	1000	750	1315	770				385	265		
	33	155	345	570	920	800	1470	825				485	330		
63	6,3-10,5	190	495	760	1025	750	1280	810	520			310	265	138	150
	15,8	190	495	760	1025	750	1355	810				385	265		
	33	165	380	625	935	800	1490	845				485	330		
80	6,3-10,5	210	555	840	1055	750	1325	850	520			310	265	138	150
	15,8	210	555	840	1055	750	1400	850				385	265		
	33	180	420	685	955	810	1510	865				485	330		
100	6,3-10,5	240	665	980	1100	750	1385	910	520			310	265	138	150
	15,8	240	665	980	1100	750	1460	910				385	265		
	33	200	480	780	980	815	1540	895				485	350		
125	6,3-10,5	255	800	1155	1150	750	1425	950	520			310	265	138	150
	15,8	255	800	1155	1150	750	1500	950				385	265		
	33	220	555	890	1010	820	1575	930				485	350		
160	6,3-10,5	280	975	1345	1210	750	1480	1000	520			310	265	138	150
	15,8	280	975	1345	1210	750	1555	1000				385	265		
	33	245	650	1015	1060	830	1620	970				485	350		
200	6,3-10,5	300	1050	1450	1275	780	1525	1050	520			310	265	178	150
	15,8	300	1050	1450	1275	780	1600	1050				385	265		
	33	270	730	1130	1250	830	1645	990				485	350		
250	6,3-10,5	325	1140	1580	1355	700	1625	1105	520			310	265	178	150
	15,8	325	1140	1580	1355	700	1700	1105				385	265		
	33	295	815	1250	1550	700	1710	1015				485	350		
315	6,3-10,5	390	1405	1975	1500	720	1690	1170	670	150	50	310	330	178	150
	15,8	390	1405	1975	1500	720	1765	1170				385	330		
	33	360	995	1555	1590	765	1805	1105				485	350		
400	6,3-10,5	465	1700	2390	1660	740	1820	1250	670	150	50	310	330	178	150
	15,8	465	1700	2390	1660	740	1895	1250				385	330		
	33	440	1190	1875	1640	840	1950	1220				485	350		
500	6,3-10,5	510	1955	2750	1680	915	1835	1300	670	150	50	310	330	263	200
	15,8	510	1955	2750	1680	915	1910	1300				385	330		
	33	520	1440	2250	1700	895	2020	1270				485	350		
630	6,3-10,5	570	2235	3115	1700	1100	1875	1360	670	150	50	310	330	263	200
	15,8	570	2235	3115	1700	1100	1950	1360				385	330		
	33	605	1720	2650	1700	970	1950	1320				485	350		
800	6,3-10,5	630	2360	3245	1800	950	1980	1375	820	150	50	310	400	263	220
	15,8	630	2360	3245	1800	950	2055	1375				385			
	33	730	1980	3100	1840	1050	2155	1370				485			
1000	6,3-10,5	755	2890	4120	1950	980	2155	1545	820	200	70	310	400	340	230
	15,8	755	2890	4120	1950	980	2230	1545				385			
	33	770	2275	3525	2005	1035	2210	1425				485			
1250	6,3-10,5	810	3425	4700	1900	1100	2190	1580	820	200	70	310	400	340	240
	15,8	810	3425	4700	1900	1100	2265	1580				385			
	33	885	2440	3880	2000	1170	2255	1470				485			
1600	6,3-10,5	900	3395	4845	1900	1140	2215	1605	820	200	70	310	400	372	240
	15,8	900	3395	4845	1900	1140	2290	1605				385			
	33	1000	2825	4645	2070	1330	2410	1580				485			
2000	6,3-10,5	1100	4065	6030	2205	1300	2285	1625	1000	200	70	310	400	372	250
	15,8	1100	4065	6030	2205	1300	2360	1625				385			
	33	1085	3100	5240	2100	1385	2465	1630				485			
2500	6,3-10,5	1335	4765	7145	2150	1400	2315	1655	1000	200	70	310	400	450	260
	15,8	1335	4765	7145	2150	1400	2390	1655				385			
	33	1330	3915	6720	2270	1575	2485	1650				485			

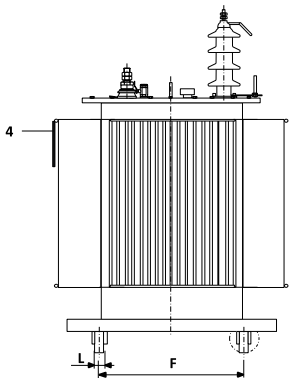
6

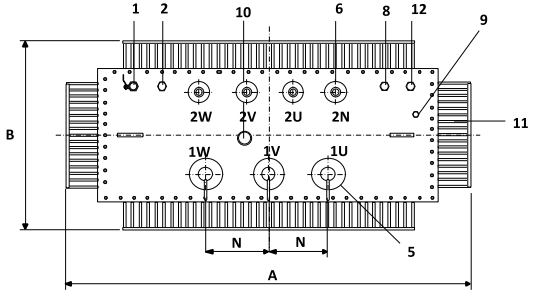
WITH CONSERVATOR
25-2500 kVA
STANDARD
TRANSFORMERS
OVERALL DIMENSIONS

Three Phase, Hermetically Sealed Type, 25 - 2500 kVA Transformers Technical drawings

25 - 400 kVA

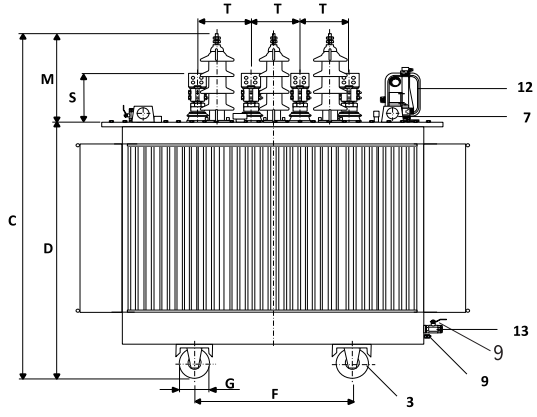






1 - Oil filling valve
2 - Pressure relief device
3 - Wheels
4 - Rating plate
5 - H.V.Bushings
6 - L.V.Bushings
7 - Lifting lugs
8 - Thermometer pocket
9 - Earthing screws
10- Off load tap changer
11- Corrugated walls
12- Oil level indicator
13- Oil filter and drain valve

500 - 2500 kVA



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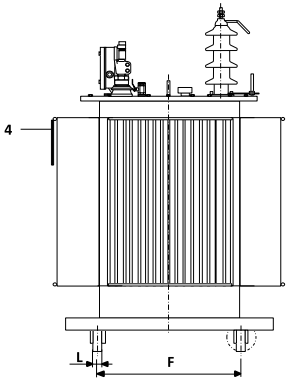
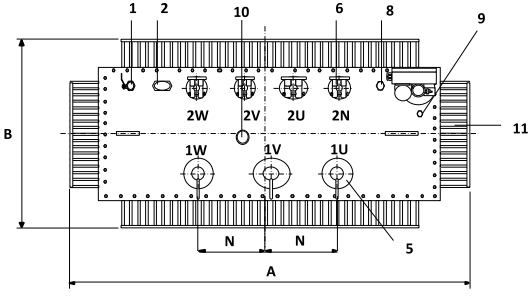


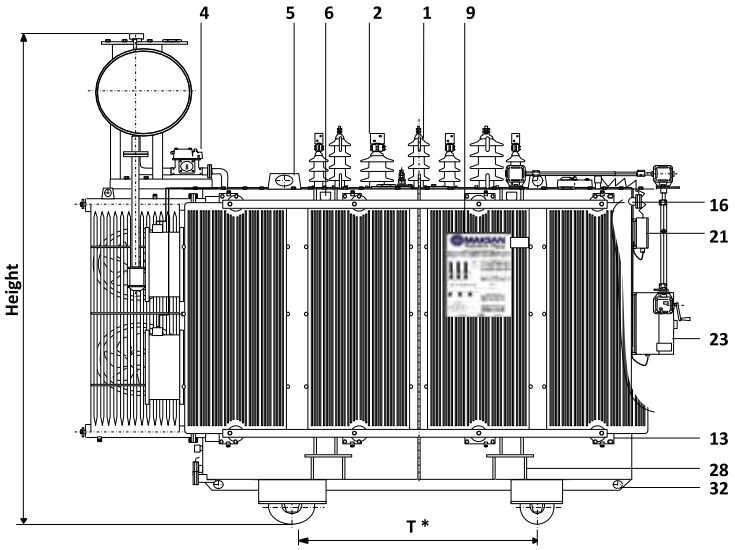


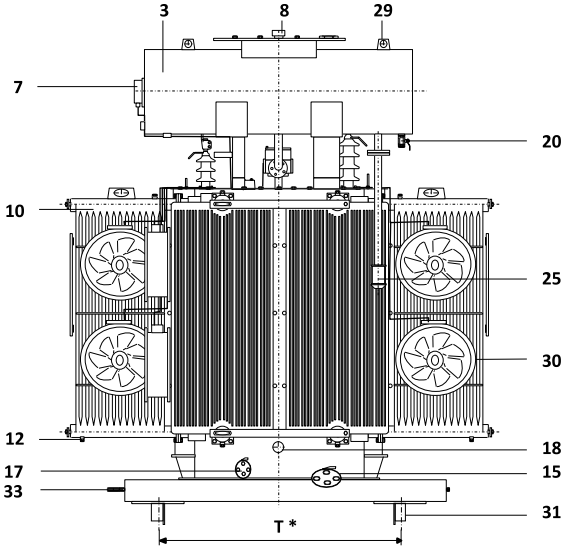
1 - Oil filling valve
2 - Pressure relief device
3 - Wheels
4 - Rating plate
5 - H.V.Bushings
6 - L.V.Bushings
7 - Lifting lugs
8 - Thermometer pocket
9 - Earthing screws
10- Off load tap changer
11- Corrugated walls
12- Multifunctioning protection device
13- Oil filter and drain valve

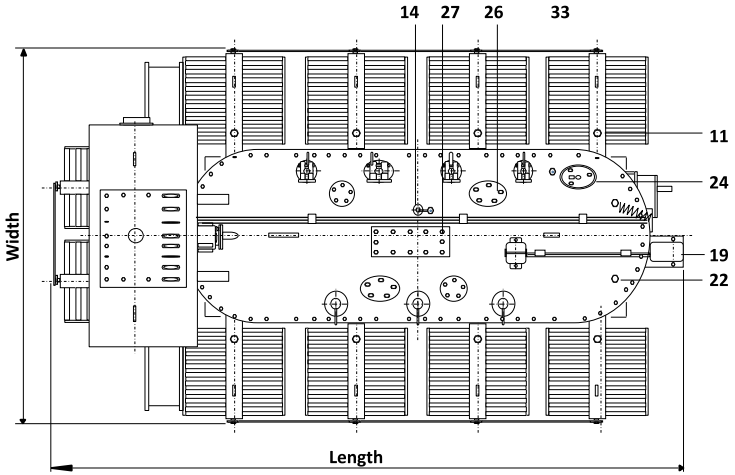
Power	Rated Voltage	Oil Weight	Active Part Weight	Total Weight	Length A	Width B	Heigth C	D	F	ØG	L	M	N	S	T
kVA	kV	kg	kg	kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
25	6,3-10,5	130	295	530	900	670	1010	700	520			310	210	138	150
	15,8	130	295	530	900	670	1085	700				385	220		
	33	120	225	410	840	660	1205	720				485	290		
40	6,3-10,5	155	395	650	980	670	1070	760	520			310	265	138	150
	15,8	155	395	650	980	670	1145	760				385	265		
	33	145	310	545	895	680	1290	805				485	330		
50	6,3-10,5	175	435	705	995	690	1080	770	520			310	265	138	150
	15,8	175	435	705	995	690	1155	770				385	265		
	33	155	335	580	910	670	1310	825				485	330		
63	6,3-10,5	190	495	790	1020	695	1120	810	520			310	265	138	150
	15,8	190	495	790	1020	695	1195	810				385	265		
	33	165	375	635	925	675	1330	845				485	330		
80	6,3-10,5	215	565	880	1050	700	1160	850	520			310	265	138	150
	15,8	215	565	880	1050	700	1235	850				385	265		
	33	180	415	700	950	680	1350	865				485	330		
100	6,3-10,5	240	665	1030	1100	705	1220	910	520			310	265	138	150
	15,8	240	665	1030	1100	705	1295	910				385	265		
	33	195	480	780	975	690	1380	895				485	350		
125	6,3-10,5	255	810	1210	1145	715	1260	950	520			310	265	138	150
	15,8	255	810	1210	1145	715	1335	950				385	265		
	33	210	555	885	1015	700	1415	930				485	350		
160	6,3-10,5	275	975	1405	1200	725	1310	1000	520			310	265	138	150
	15,8	275	975	1405	1200	725	1385	1000				385	265		
	33	235	645	1010	1060	720	1455	970				485	350		
200	6,3-10,5	290	1055	1505	1210	730	1360	1050	520			310	265	178	150
	15,8	290	1055	1505	1210	730	1435	1050				385	265		
	33	255	720	1135	1090	760	1475	990				485	350		
250	6,3-10,5	310	1150	1635	1180	735	1415	1105	520			310	265	178	150
	15,8	310	1150	1635	1180	735	1490	1105				385	265		
	33	285	810	1275	1135	810	1500	1015				485	350		
315	6,3-10,5	385	1390	1995	1275	790	1480	1170	670	150	50	310	330	178	150
	15,8	385	1390	1995	1275	790	1555	1170				385	330		
	33	350	990	1570	1200	855	1590	1105				485	350		
400	6,3-10,5	465	1675	2390	1400	865	1560	1250	670	150	50	310	330	178	150
	15,8	465	1675	2390	1400	865	1635	1250				385	330		
	33	425	1190	1880	1280	915	1705	1220				485	350		
500	6,3-10,5	510	1920	2700	1425	930	1610	1300	670	150	50	310	330	263	200
	15,8	510	1920	2700	1425	930	1685	1300				385	330		
	33	495	1395	2200	1370	940	1755	1270				485	350		
630	6,3-10,5	560	2200	3045	1455	1005	1670	1360	670	150	50	310	330	263	200
	15,8	560	2200	3045	1455	1005	1745	1360				385	330		
	33	580	1710	2660	1445	1010	1805	1320				485	350		
800	6,3-10,5	615	2355	3300	1560	1020	1685	1375	820	150	50	310	400	263	220
	15,8	615	2355	3300	1560	1020	1760	1375				385			
	33	715	1980	3120	1570	1100	1860	1370				485			
1000	6,3-10,5	750	2875	4120	1600	1060	1855	1545	820	200	70	310	400	340	230
	15,8	750	2875	4120	1600	1060	1930	1545				385			
	33	750	2245	3550	1685	1095	1910	1425				485			
1250	6,3-10,5	790	3420	4700	1690	1090	1890	1580	820	200	70	310	400	340	240
	15,8	790	3420	4700	1690	1090	1965	1580				385			
	33	870	2465	4020	1760	1210	1955	1470				485			
1600	6,3-10,5	875	3390	4840	1790	1160	1915	1605	820	200	70	310	400	372	240
	15,8	875	3390	4840	1790	1160	1990	1605				385			
	33	970	2765	4570	1810	1330	2065	1580				485			
2000	6,3-10,5	1080	4060	6035	1880	1340	1935	1625	1000	200	70	310	400	372	250
	15,8	1080	4060	6035	1880	1340	2010	1625				385			
	33	1095	3100	5415	1860	1465	2120	1630				485			
2500	6,3-10,5	1305	4755	7165	2080	1440	1965	1655	1000	200	70	310	400	450	260
	15,8	1305	4755	7165	2080	1440	2040	1655				385			
	33	1335	3850	6805	2060	1715	2140	1650				485			

6

HERMETICALLY SEALED TYPE 25-2500 kVA STANDARD TRANSFORMERS OVERALL DIMENSIONS







* (T) Distance between wheel center of power rate 8 MVA and lower transformers is 1490 mm. Above from this power rates is 1505 mm.

1 - H.V.Bushings
2 - L.V.Bushings
3 - Oil conservator
4 - Buchholz relay
5 - Cover lifting lugs (for active past)
6 - Cover lifting lugs (complete tank)
7 - Oil level indicator
8 - Oil filling pipe
9 - Rating plate
10- Radiators
11- Radiators air relase plug
12- Radiators oil drain plug
13- Flange
14- Earthing screw bushings
15- Oil filter valve
16- Oil filter valve (Top)
17- Oil filter valve (Bottom)
18- Oil sampling valve
19- Chest level, the control mechanism
20- Oil drain valve of conservator
21- Double contact thermometer
22- Double contact thermometer pocket(Free)
23- Control panel
24- Pressure relief device
25- Silicagel for dehydrating breather
26- Inspection holes
27- Observation hole
28- Jacking lugs
29- Oil conservator lifting lugs
30- Cooling fans
31- Wheels
32- Eyebolt to pull transformer
33- Earthing screws

Rated Power	Voltage	Vektor Group	Impedance	Losses		No Load Current	Noise Level	Length	Width	Heigth	Oil Weight	Active Part Weight	Total Weight	Efficiency
MVA ONAN(ONAF)	kV/kV		% Uk	No Load kW	Load kW	Io %	dB	mm	mm	mm	kg	kg	kg	Full Load
3,15	33/15,8	Dyn5	6	4,5	28	1	75	2650	2250	2750	1700	4600	8250	98,97
4	33/15,8	Dyn5	6	5,5	33	1	77	2950	2600	2900	2050	5400	10100	99,04
4(5)	33/15,8	Dyn5	7	6,5	38	0,9	78	3050	2500	3050	2200	6000	10400	99,11
5	33/15,8	Dyn5	7	6,5	38	0,9	78	3050	2650	3050	2400	6000	11050	99,11
5(6,25)	33/15,8	Dyn5	7	7,7	45	0,9	80	3200	2650	3100	2650	8150	13700	99,16
8	33/15,8	Dyn5	7	9,5	54	0,9	82	3300	2650	3250	2850	9100	14650	99,21
8(10)	33/15,8	Dyn5	7	11	63	0,8	84	3350	2650	3400	3000	9700	15500	99,26
10	33/15,8	Dyn5	7	11	63	0,8	84	3350	2850	3400	3300	9700	16800	99,26
10(12,5)	33/15,8	Dyn5	10	10	65	0,5	79	3650	2650	3650	3850	13050	20400	99,40
16	33/15,8	Dyn5	10	12	80	0,5	80	3900	3100	3850	4650	15700	25750	99,43
16(20)	33/15,8	Dyn5	10	14	95	0,5	83	3900	3000	4000	5050	16750	26800	99,46
20	33/15,8	Dyn5	10	14	95	0,4	83	3900	3500	4000	5500	16750	29000	99,46
20(25)	33/15,8	Dyn5	10	16	110	0,4	85	4100	3600	4600	8250	22500	38500	99,46
25	33/15,8	Dyn5	10	16	110	0,4	85	4250	4150	4600	9000	22500	42000	99,46
31,5	33/15,8	Dyn5	10	25	150	0,4	90	4400	4250	4900	9500	26000	44000	99,44

6

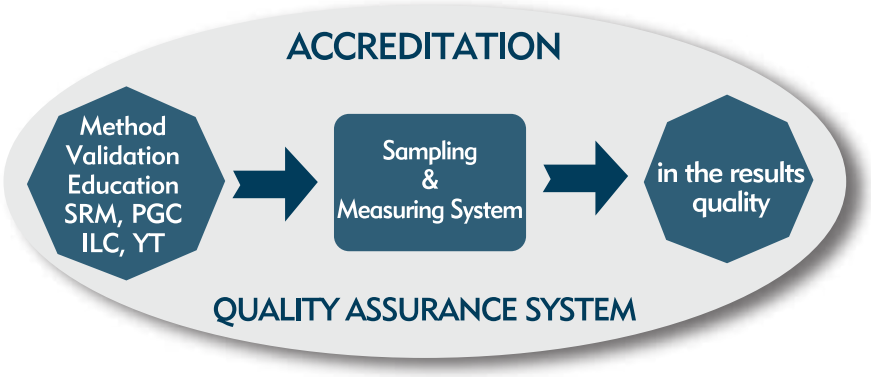
TECHNICAL DATA AND OVERALL DIMENSIONS OF POWER TRANSFORMERS

7

TEST

MAKSAN Testing Laboratory is an accredited laboratory in accordance with TS EN ISO/IEC 17025 standard, which is conducted by TURKAK.

Routine and type tests specified in IEC and TS EN 60076-1 standards, can be assessed in our test laboratories with the exception of short-circuit mechanical withstand ability type tests and special chemical transformer oil tests. Short circuits mechanical withstand ability type tests for all product groups have been conducted out at the accredited international laboratories and results have been positive.



Routine Tests

Routine tests has been applied to every transformer which is produced in line with TS EN 60076-1 and IEC standards

1. Measurement of voltage ratio and check of phase displacement
2. Measurement of winding resistance
3. Measurement of short circuit impedance and load losses
4. Measurement of no-load losses and no-load current
5. Applied voltage withstand ability test (Body test)
6. Induced voltage withstand ability test
7. Measurement of insulation resistance (Megger test)
8. Leak testing with pressure for liquid-immersed transformers
9. Test on on-load tap changers, where appropriate

Type Tests

Type tests are applied upon customer request.

1. Temperature rise test
2. Impulse test
3. Measurement of no load losses and current at 90 % and 110 % of rated voltage
4. Determination of sound level
5. Measurement of power consumption of liquid pump and fans

Special Tests

Special tests are applied upon customer request

1. Measurement of zero sequence impedance
2. Measurement of oil dielectric withstand and breakdown voltage level
3. Measurement power factor of transformer oil and solid insulation materials
4. Paint thickness measurement
5. Function test of alarm and protective equipment
6. Measurement of dissipation factor of the insulation system capacitances

7

TEST

The test reports of all delivered transformers are recorded, and through our advanced archiving system, the reports of each transformer delivered in the last 25 years are available upon request. Statistics related to test is recorded and kept up to date as well.

8

QUALITY ASSURANCE

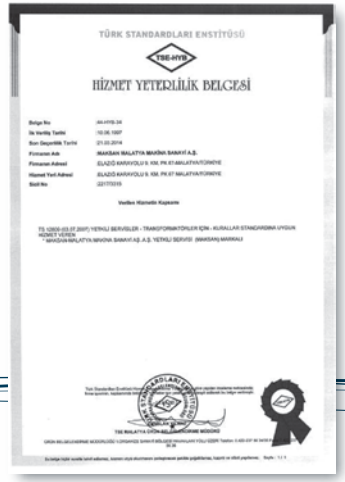
MAKSAN has been manufacturing power and distribution transformers by using the state of the art technology, thus exceeding the demands and expectations of its customers as its mission statement. MAKSAN is the first company that has been granted TS 267 and TS 1055 certificates in Turkey which is not being enforced anymore. Nevertheless, those subjected production standards, form the documentation essentials of quality control systems.

"Production Quality" is the guiding principle that has been in use since its establishment that enabled MAKSAN to receive numerous Quality Assurance Certificates and Quality Awards. MAKSAN granted ISO 9001 Quality Assurance Certificate in 1995, ISO 9001-2000 issued by the TSE (Turkish Standard Institute) in 2003, ISO 14001 Environment Management Certificate from TUV and URS in the same year. The last but not the least MAKSAN received the 50th Anniversary of Quality Award granted by TSE in 2004.

Short circuit mechanical withstands ability tests that determine the product quality are conducted at international laboratories. We have received proof of certificates for each product groups.

MAKSAN continuously conducts quality control regime for each and every employee at every stage of the production line to apply QC and QA. Each employee accepts the next production stage as his customer and transfers the product to the next production stage after performing the quality check. Quality control department inspects control documents and applies additional inspection at strategic points during production. This process enables the production to be more efficient. When necessary, additional inspection and modifications are made.

Since its establishment, MAKSAN and its employees have believed that customer satisfaction precepts are the fundamental principle of the company to provide and secure their futures.



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