



FABRYKA TRANSFORMATORÓW w Żychlinie

Spółka z ograniczoną odpowiedzialnością

ISO 9001:2008

ISO 14001:2004

PN-N-18001:2004

Certificate of compliance issued by the PCA-accredited body

Certificate of usability in Polish power industry

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CAST RESIN TRANSFORMERS TYPE TZE

40-10000 kVA

1-37.5 kV





Applications

The cast resin transformers must meet severe requirements concerning reliability, lifetime and environment protection. The cast resin transformer may work whenever other type of transformers may not be used due to safety reasons and harsh operating conditions. The big advantage of cast-resin transformers is easy and simple installation. Cast resin transformers are not harmful for natural environment, and their insulating systems are made of slow-burning and self-extinguishing materials. At the same time, the materials used for manufacture of cast-resin transformers emit no toxic gases in high temperatures.

Operating conditions

The transformers in standard version are designed for operation in the conditions of moderate climate.

Maximum installation height for the transformer: 1000 m a.s.l.

Operating place: Open space or the room with sufficient ventilation; atmosphere free of dust and chemically active or explosive gases.

Ambient temperature range: -25°C up to +40°C (248°K up to 313°K), average annual temperature not exceeding +20°C (293°K).

Rated frequency: 50 Hz

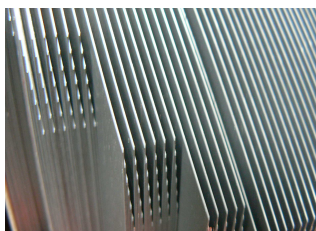
Environmental class: C2/E2/F1

NOTE:

Transformer in special version complying with other requirements is available on request.

Design

Transformer cores:



Three-legged cores made of cold-rolled, low power loss transformer plates covered with inorganic insulating material. Stepped cross-section of the core leg is near-circular with optimal structure designed with the aid of computer software, taking into account the cross-section filling factor and suitable flux density. Both leg and yoke sheets made in the form of strips with chamfered ends are precisely assembled in packets, with great attention paid for magnetic properties of sheets. In the splicing area several sheets are mutually offset by several millimetres and form so called Step-Lep cycles

Transformer windings:



Lower side windings are wound from copper strip or several parallel shaped wires, in H-class paper insulation. The strips are insulated with the layer of special insulating composite material which bonds the adjacent turns of windings together. This type of winding is characterised by high resistance to short-circuit forces, full tightness of winding that prevents



infiltration of moisture and chemical vapours, and also by high dielectric strength.

Upper side windings are wound from round or shaped wires in H-class varnish insulation. The individual layers of windings are separated by insulation made of glass roving soaked with epoxy resin. The completed winding forms a compact, monolithic element featuring with high mechanical and electrical strength. The winding is equipped with taps allowing for voltage regulation. Upon completion of winding and curing operations, the coils are mounted on core legs and connected to form the suitable vector group. *The windings are made of materials that meet the requirements of V-0 flammability rating according to the UL-94 standard.*

Regulation:

Voltage regulation is effected by changing the connection of strands on winding taps. The wiring diagram is shown of transformer's rating plate.

Undercarriages and enclosures: The transformers are mounted on adjustable undercarriage.



On Customer request, the transformers can be enclosed in enclosures featuring with specified degree of protection. Standard protection degrees of enclosures are as follows: P20, IP21, IP23, IP43, and IP54. In standard version the transformers are delivered with no enclosures - degree of protection is IP 00.

Thermal protections:



Transformers are equipped with temperature control system with contacts (alarm, shut-off) and a full set of PTC sensors installed on each phase. On request, the transformer can be equipped with PT-100 sensors with local and remote temperature reading through RS-232 or RS-485 digital output or 4-20mA analog output.

Tolerances:

- no-load losses +15%-
- load losses +15%
- total losses +10%
- no-load current +30%
- short-circuit voltage $\pm 10\%$
- partial discharge level $< 10\text{pC}$

International standards and requirements:

- PN-EN 60076-11 - Power transformers - Part 11. Dry-type transformers
- PN-EN 60076-1 - Power transformers. General requirements
- PN-EN 60529 - Degrees of protection provided by enclosures (IP code)
- PN-EN 61378 - Converter transformers. Transformers for industrial use



The Fabryka Transformatorów w Żychlinie Sp. z o.o. is operating its own testing station equipped with test stands and devices that allows performing of the following tests and examinations:

- Product tests according to the PN-EN 60076-11 standard;
- Transformers' heating tests according to the PN-EN 60076-2 standard (type tests);
- Taking of infrared mapping pictures during heating (special test);
- Impulse withstand tests according to the PN-EN 60076-3 standard (type tests);
- Noise test according to the PN-EN 60076-10 standard (special test).

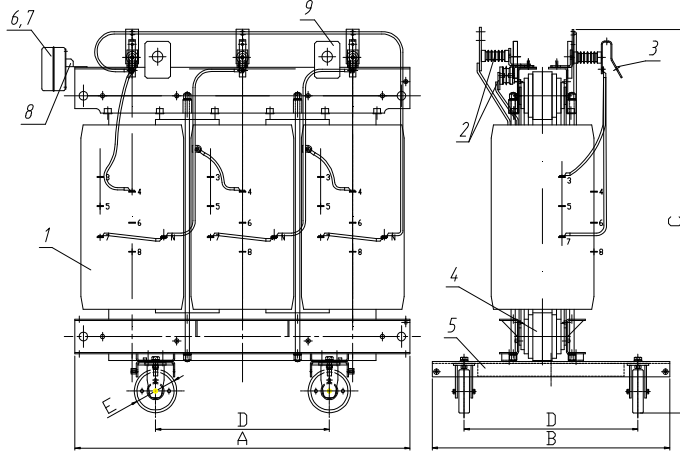


Exemplary specifications:

Item	Type	Power	High Voltage	Low Voltage	Regulation	Short-circuit voltage	Vector group	Degree of protection	No-load losses	Load losses	Total mass
		kVA	V	V	%	%	-	-	W	W	kg
1.	TZE 40/6,3	40	6300	400	±2x2,5	4,5	Yzn5	IP00	220÷350	800÷1000	400
2.	TZE 63/6,3	63	6300	400	±2x2,5	4,5	Yzn5	IP00	250÷400	1400÷1600	450
3.	TZE 100/6,3	100	6300	400	±2x2,5	4,5	Yzn5	IP00	260÷440	1800÷2000	500
4.	TZE 160/6,3	160	6300	400	±2x2,5	4,5	Yzn5	IP00	350÷610	2500÷2700	785
5.	TZE 250/6,3	250	6300	400	±2x2,5	4,5	Dyn5	IP00	500÷820	3200÷3500	970
6.	TZE 400/6,3	400	6300	400	±2x2,5	6	Dyn5	IP00	700÷1150	4500÷4900	1600
7.	TZE 630/6,3	630	6300	400	±2x2,5	6	Dyn5	IP00	1000÷1500	7100÷7300	1900
8.	TZE 800/6,3	800	6300	400	±2x2,5	6	Dyn5	IP00	1100÷1800	8000÷9000	2300
9.	TZE 1000/6,3	1000	6300	400	±2x2,5	6	Dyn5	IP00	1300÷2100	9000÷10000	2725
10.	TZE 1250/6,3	1250	6300	400	±2x2,5	6	Dyn5	IP00	1500÷2500	11000÷12000	3200
11.	TZE 1600/6,3	1600	6300	400	±2x2,5	6	Dyn5	IP00	1800÷2800	13000÷14500	3730
12.	TZE 2000/6,3	2000	6300	400	±2x2,5	6	Dyn5	IP00	2200÷3600	15500÷18000	4500
13.	TZE 2500/6,3	2500	6300	400	±2x2,5	6	Dyn5	IP00	2600÷4300	18500÷26000	5300
14.	TZE 40/10,5	40	10500	400	±2x2,5	4,5	Yzn5	IP00	230÷380	850÷1050	450
15.	TZE 63/10,5	63	10500	400	±2x2,5	4,5	Yzn5	IP00	270÷420	1450÷1650	500
16.	TZE 100/10,5	100	10500	400	±2x2,5	4,5	Yzn5	IP00	260÷440	1800÷2000	550
17.	TZE 160/10,5	160	10500	400	±2x2,5	4,5	Yzn5	IP00	350÷610	2500÷2700	800
18.	TZE 250/10,5	250	10500	400	±2x2,5	4,5	Dyn5	IP00	500÷820	3200÷3500	1250
19.	TZE 400/10,5	400	10500	400	±2x2,5	6	Dyn5	IP00	700÷1150	4500÷4900	1500
20.	TZE 630/10,5	630	10500	400	±2x2,5	6	Dyn5	IP00	1000÷1500	7100÷7300	2100
21.	TZE 800/10,5	800	10500	400	±2x2,5	6	Dyn5	IP00	1100÷1800	8000÷9000	2280
22.	TZE 1000/10,5	1000	10500	400	±2x2,5	6	Dyn5	IP00	1300÷2100	9000÷10000	2825
23.	TZE 1250/10,5	1250	10500	400	±2x2,5	6	Dyn5	IP00	1500÷2500	11000÷12000	3180
24.	TZE 1600/10,5	1600	10500	400	±2x2,5	6	Dyn5	IP00	1800÷2800	13000÷14500	3850
25.	TZE 2000/10,5	2000	10500	400	±2x2,5	6	Dyn5	IP00	2200÷3600	15500÷18000	4550
26.	TZE 2500/10,5	2500	10500	400	±2x2,5	6	Dyn5	IP00	2600÷4300	18500÷26000	5500
27.	TZE 40/15,75	40	15750	400	±2x2,5	4,5	Yzn5	IP00	280÷400	900÷1100	500
28.	TZE 63/15,75	63	15750	400	±2x2,5	4,5	Yzn5	IP00	300÷550	1400÷1600	550
29.	TZE 100/15,75	100	15750	400	±2x2,5	4,5	Yzn5	IP00	330÷600	1350÷1750	725
30.	TZE 160/15,75	160	15750	400	±2x2,5	4,5	Yzn5	IP00	450÷870	1800÷2500	900
31.	TZE 250/15,75	250	15750	400	±2x2,5	6	Dyn5	IP00	520÷880	3400÷3800	1100
32.	TZE 400/15,75	400	15750	400	±2x2,5	6	Dyn5	IP00	750÷1200	4500÷5500	2150
33.	TZE 630/15,75	630	15750	400	±2x2,5	6	Dyn5	IP00	1100÷1650	7100÷7600	2300
34.	TZE 800/15,75	800	15750	400	±2x2,5	6	Dyn5	IP00	1300÷2000	8000÷9400	2500
35.	TZE 1000/15,75	1000	15750	400	±2x2,5	6	Dyn5	IP00	1550÷2300	9000÷11000	2900
36.	TZE 1250/15,75	1250	15750	400	±2x2,5	6	Dyn5	IP00	1800÷2800	11000÷13000	3300
37.	TZE 1600/15,75	1600	15750	400	±2x2,5	6	Dyn5	IP00	2200÷3100	13000÷16000	4500
38.	TZE 2000/15,75	2000	15750	400	±2x2,5	6	Dyn5	IP00	2600÷4000	16000÷18000	5400
39.	TZE 2500/15,75	2500	15750	400	±2x2,5	6	Dyn5	IP00	3100÷5000	19000÷23000	6200
40.	TZE 40/21	40	21000	400	±2x2,5	4,5	Yzn5	IP00	280÷400	900÷1100	500
41.	TZE 63/21	63	21000	400	±2x2,5	4,5	Yzn5	IP00	300÷550	1400÷1600	700
42.	TZE 100/21	100	21000	400	±2x2,5	4,5	Yzn5	IP00	330÷600	1350÷1750	750
43.	TZE 160/21	160	21000	400	±2x2,5	4,5	Yzn5	IP00	450÷870	1800÷2500	960
44.	TZE 250/21	250	21000	400	±2x2,5	6	Dyn5	IP00	520÷880	3400÷3800	1200
45.	TZE 400/21	400	21000	400	±2x2,5	6	Dyn5	IP00	750÷1200	4500÷5500	2200
46.	TZE 630/21	630	21000	400	±2x2,5	6	Dyn5	IP00	1100÷1650	7100÷7600	2400
47.	TZE 800/21	800	21000	400	±2x2,5	6	Dyn5	IP00	1300÷2000	8000÷9400	2550
48.	TZE 1000/21	1000	21000	400	±2x2,5	6	Dyn5	IP00	1550÷2300	9000÷11000	2980
49.	TZE 1250/21	1250	21000	400	±2x2,5	6	Dyn5	IP00	1800÷2800	11000÷13000	3730
50.	TZE 1600/21	1600	21000	400	±2x2,5	6	Dyn5	IP00	2200÷3100	13000÷16000	4750
51.	TZE 2000/21	2000	21000	400	±2x2,5	6	Dyn5	IP00	2600÷4000	16000÷18000	5600
52.	TZE 2500/21	2500	21000	400	±2x2,5	6	Dyn5	IP00	3100÷5000	19000÷23000	6400

NOTE: It is also possible to build the transformer with other, previously agreed parameters and additional equipment. The masses of units are given for the highest losses.

Dimensional drawing :



- Marking of elements and equipment:
1. Winding (upper - outside, lower - inside)
 2. Upper side winding lead-out
 3. Lower side winding lead-out
 4. Core
 5. Undercarriage with wheels
 6. Protection and control system terminal box
 7. Rating plate
 8. Rating plate and protection device holder
 9. Lifting lugs

Exemplary dimensions of transformers:

Item	Type	A	B	C	D
		mm	mm	mm	mm
1.	TZE 40/6,3	850	520	910	420
2.	TZE 63/6,3	875	520	925	420
3.	TZE 100/6,3	875	520	925	420
4.	TZE 160/6,3	1050	700	1035	520
5.	TZE 250/6,3	1150	700	1268	520
6.	TZE 400/6,3	1430	810	1375	670
7.	TZE 630/6,3	1470	810	1340	670
8.	TZE 800/6,3	1500	810	1540	670
9.	TZE 1000/6,3	1600	1050	1690	820
10.	TZE 1250/6,3	1620	1050	1995	820
11.	TZE 1600/6,3	1680	1050	1890	820
12.	TZE 2000/6,3	1750	1050	2000	820
13.	TZE 2500/6,3	2000	1350	2330	1070
14.	TZE 40/10,5	890	520	900	420
15.	TZE 63/10,5	900	520	900	420
16.	TZE 100/10,5	900	520	960	420
17.	TZE 160/10,5	1070	700	1075	520
18.	TZE 250/10,5	1200	700	1090	520
19.	TZE 400/10,5	1440	810	1400	670
20.	TZE 630/10,5	1600	810	1515	670
21.	TZE 800/10,5	1600	810	1590	670
22.	TZE 1000/10,5	1680	1050	1750	820
23.	TZE 1250/10,5	1700	1050	1785	820
24.	TZE 1600/10,5	1720	1050	1830	820
25.	TZE 2000/10,5	1800	1050	2080	820
26.	TZE 2500/10,5	2050	1350	2350	1070
27.	TZE 40/15,75	890	700	998	520
28.	TZE 63/15,75	920	700	1250	520
29.	TZE 100/15,75	930	700	1250	520
30.	TZE 160/15,75	1100	700	1300	520
31.	TZE 250/15,75	1200	700	1330	520
32.	TZE 400/15,75	1780	810	1534	670
33.	TZE 630/15,75	1800	810	1600	670
34.	TZE 800/15,75	1800	810	1650	670
35.	TZE 1000/15,75	1820	1050	1710	820
36.	TZE 1250/15,75	1820	1050	1810	820
37.	TZE 1600/15,75	1830	1050	2060	820
38.	TZE 2000/15,75	2010	1050	2150	820
39.	TZE 2500/15,75	2250	1350	2350	1070
40.	TZE 40/21	1000	700	1060	520
41.	TZE 63/21	1100	700	1156	520
42.	TZE 100/21	1100	700	1320	520
43.	TZE 160/21	1140	700	1360	520
44.	TZE 250/21	1250	700	1400	520
45.	TZE 400/21	1530	810	1530	670
46.	TZE 630/21	1580	810	1560	670

NOTE:

1. The manufacturer reserves the right to change specifications presented in the catalogue and resulting from product modernisation.

2. The dimensions of units are given for the highest



47.	TZE 800/21	1610	810	1660	670
48.	TZE 1000/21	1850	1050	1780	820
49.	TZE 1250/21	1850	1050	2125	820
50.	TZE 1600/21	1880	1050	2140	820
51.	TZE 2000/21	2060	1050	2250	820
52.	TZE 2500/21	2290	1350	2380	1070

Dry-type cast resin special transformers and reactors

Transformers available for special order:

- with primary side insulation class up to 40.5 kV;
- with insulation temperature classes F (155°C) and H (180°C);
- high-power transformers (up to 10 MVA);
- transformers for feeding the converter circuits (AC/DC) - 6÷24-pulse;
- transformers for feeding the induction and resistance furnaces;
- for underground use in flame-proof enclosures (mines);
- for underground use in IP54 enclosures (mines where no methane occurs);
- dry-type or resin-insulated arc suppressing coils and shunt reactors;
- for traction systems (6÷24-pulse ones);
- for wind power plants;
- for excitation of generators;
- starting autotransformers for induction motors.

Application examples:



8000kVA transformers with 20/6kV ratio;



630kVA transformer with 15/0.4kV ratio and AF cooling system;



Compact design starting autotransformer for 6kV, 1,300kW induction motor;



Single-phase transformer for excitation of 1,350 kVA, 22 kV generator;

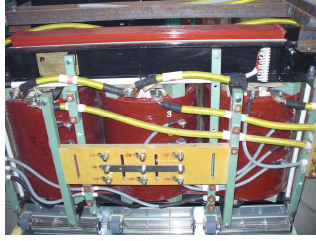


24-pulse transformer for feeding of frequency converter 50/60Hz with power of 1,600 kVA and system voltage of 15kV;



15kV, 1,200kVA, compact design transformer with rectifier, for power supply of tramway traction system;.





6kV, 400kVA transformer with internal air circulation designed for installation in IP54 enclosure for the voltage of 6kV;



6/3kV, 2,600 kVA transformer for flame-proof station used in coal mines;



Transformers in IP20 enclosures, with lower side buses mounted on transformer top, for use in busbar bridges..