

Arya Transfo in brief

Transformer is one of the main equipment of transmission and distribution systems and in this regards, advances in the material and manufacturing technology as long as vast scientific researches in the past decades have led to the production of more efficient transformers. In response to the local and international demands, Arya Transfo, a newly built and well-equipped manufacturing plant, manufactures high quality power and distribution transformers with higher reliability, longer life time, lower noise level and lower losses. The factory is located in Shahmirzad,



Semnan province, 230 km east of Tehran, Iran. The total workshop area is 70,000 square meters including two independent power transformers and distribution transformers' production lines. This catalog focuses on distribution products and their design and manufacturing technology. The dedicated workshop for production of distribution transformers is 28,000 square meters comprises of metal shop for tanks, core slitting/cutting shop, winding shop and assembly shop with a modern test laboratory.

Arya Transfo with its cutting edge design technology and software, state of the art machines and test laboratory combined with the experience of its skillful engineers can offer reliable and efficient transformers which are competitive in terms of price and quality with large well-known manufacturers in the world.

Products



Transformer with conservator and corrugated walls (Arya Transfo ARCONS™ type)
10 – 4000 kVA
Up to 36 kV



Hermetically sealed transformers with corrugated walls (Arya Transfo ARSEAL™ type)
10 – 4000 kVA
Up to 36 kV



Transformers with conservator and cooling radiators
500 – 4000 kVA
Up to 36 kV



Dry type Cast resin transformers
100 – 10000 kVA
Up to 36 kV



Special transformers
Up to:
4000 kVA
36 kV
20 k A
24 pulse
6 phase



Compact substations
Up to 1600 kVA
Up to 36 kV

Design

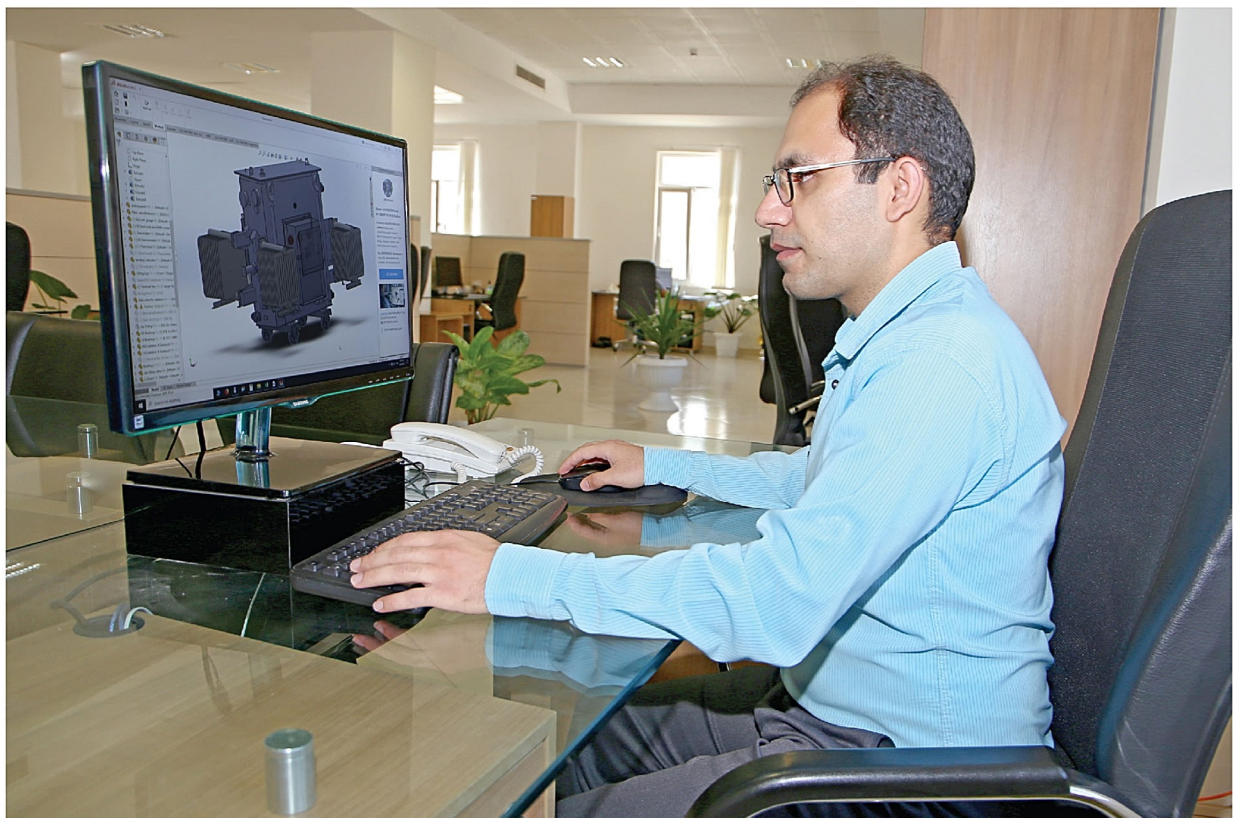
Arya Transfo has an accomplished and experienced design team that utilizes up-to-date professional engineering tools and software for the purpose of:

- Cost optimization over lifetime, considering material cost and loss capitalization as specified by customers.
- Verification of calculated short circuit and impulse withstand strength values
- Calculation of leakage magnetic field and stray

losses

- 3D-CAD modeling of complete transformers which leads to accurate structural design and minimum mismatches.

Besides high quality raw materials and modern machineries, cutting edge design know-how and in-depth software analysis significantly contribute to the transformers with lower losses and lower noise that are highly demanded by the customers.



Core

The electrical quality and mechanical strength of cores have significant impacts on the overall performance of the transformers. The core is manufactured from high grade cold rolled grain oriented silicon steel sheet, or laser treated ones, cut into laminations and stacked in step-lap method to achieve low no-load losses and low noise levels in the core-type transformers. Modern computer-controlled GEORG core cutting /slitting and stacking table in a dedicated, dust and

particle free core cutting workshop increases precision to meet the very small tolerances and improves electrical and mechanical performances of the cores.

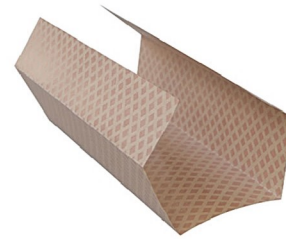


Windings

Transformer windings must withstand high electrical and mechanical stresses during the factory tests, normal operation conditions and also temporary short time abnormal conditions such as electrical faults or lightning. The use of insulating paper partially coated with epoxy resin (Diamond Dotted Paper) in low voltage and high voltage windings bonds the winding into a compact block during the drying process and additionally increases the short-circuit withstand capability.

Low voltage windings are wound with rectangular enameled, paper wrapped wires or sheet conductors (foil) and high voltage windings are layer type, made from round or rectangular enameled or paper wrapped wires depending on the design of each transformer. The winding conductor could be either copper or aluminum as per design or customer requirements.

The winding shop equipped with computer-controlled



Diamond dotted Paper (DDP)

foil and layer winding machines from well-known Swiss manufacturer Tuboly-Astronic AG.

The advantages of foil windings in low voltage are:

- Compensation of any asymmetries in ampere-turns
- Elimination of axial stresses from short-circuit currents
- Reduction of eddy currents resulting reduced load losses
- Even heat distribution throughout the windings
- Optimization of winding dimensions



Tank

As per design that is based mostly on customer requirements, the tank of the transformers can be manufactured with corrugated walls or with radiators.

Corrugated walls can be used in the manufacturing of tanks for either hermetically sealed transformers or with conservator one and the large surface of this kind of walls is responsible for dissipation of heat generated by losses of active part.

In the hermetically sealed transformers with corrugated walls, the large and flexible surface of the walls not only does the heat dissipation but also compensate the changes in the oil volume caused by the variations in ambient temperature and/or transformer loading.

Hermetically sealed transformers with radiators (without corrugated walls) may have an air or gas

cushion above the oil surface in the tank to compensate the oil expansion.

Computer-controlled fin folding machine with robot-welding system produces high quality corrugated walls. After each tank construction, the leakage test is performed through special process before painting. In addition, a final leakage test is routine for all transformers before HV tests.



Surface treatment and painting

All metallic parts are shot-blasted at two stages. First, in the primary stage (raw materials) and second after metal works and welding process in order to obtain a clean surface for maximum adhesion of the paint coating.

There are two painting methods available. The electro-static powder coating and flooding. Depending on the customer request and/or the size of the tanks the best method is applied. In Electro-static powder coating for smaller parts, the minimum thickness of coating is 80 microns and in the flooding coating method, the two-component

water base epoxy-polyurethane coating with the thickness of 160 microns will be applied for larger parts.

Upon the customer request or for the very corrosive environment, the tanks with the hot-dip galvanized coat can be offered.

Arya Transfo preselected color is RAL 7032 (pebble grey). Other colors could also be applied upon request.



Tests

In Arya Transfo factory, medium voltage test laboratory as the most essential station of quality control of final products is comprised of two parallel automated test lines.

Main features of Arya Transfo MV test laboratory are:

- Doubling the test lab outputs by using two parallel and independent test lines
- Fully automated test performance
- Power electronic devices for generation of variable

frequency alternative voltage

- Automatic final test report generation
- Periodic calibration of test devices by the accredited institutes

All routine, type and special tests in accordance with IEC60076 or other internationally recognized standards can be performed as per customer requests. The below table shows the available tests in the MV test laboratory.

Tests	Description of Test	Available Tests
Routine Tests	Check of Signaling and Protective Devices	✓
	Ratio Measurement and Vector Group check	✓
	Winding Resistance Measurement	✓
	Measurement of No-Load losses and No-Load Current	✓
	Measurement of Load losses and Short circuit Impedance	✓
	AC Induced Withstand Voltage test (IWV)	✓
	Test with Applied Voltage	✓
Type Tests	Temperature Rise Measurement (Heat run test)	✓
	Lighting Impulse Withstand test	✓
	Sound Level Measurement	✓
Special Tests	Zero-Sequence impedance Measurement	✓
	Measurement of Insulation Resistance	✓

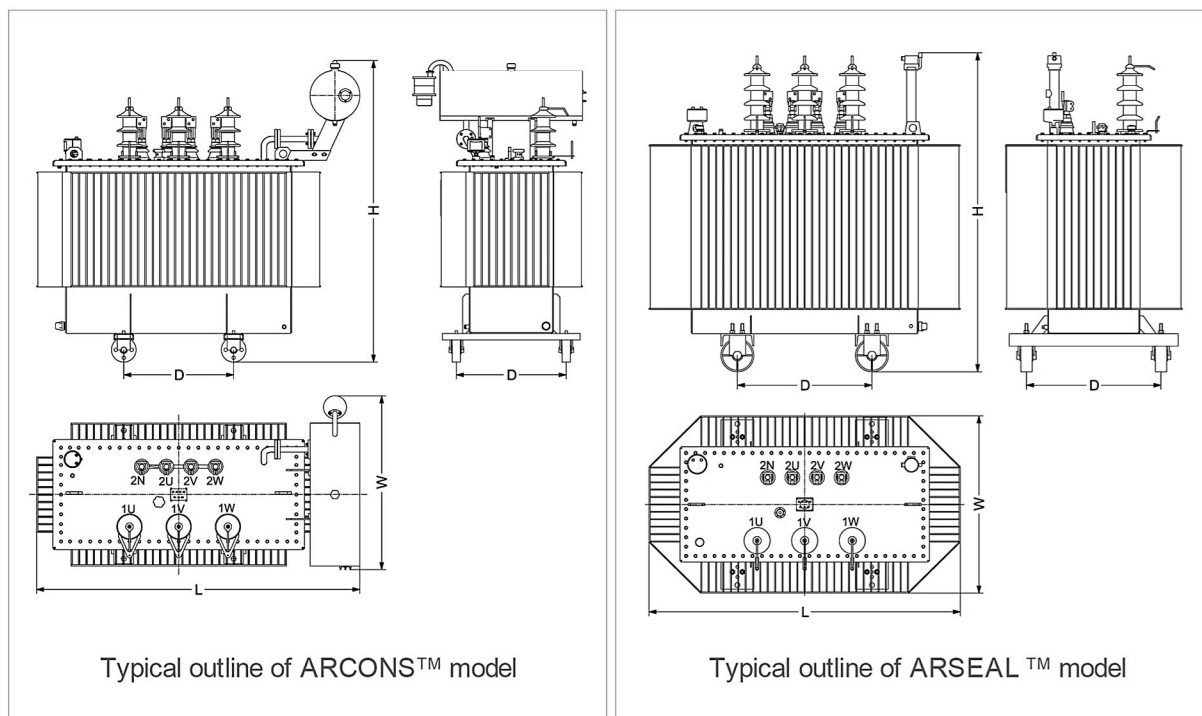


Technical specification

Arya Transfo normal products for domestic market are low loss distribution transformers based on AB' combination according to CENELEC HD 428.1 however, other combination of losses can be designed and manufactured upon request.

The specification of low loss transformers for domestic market:

Standards:	IEC60076, CENELEC HD 428.1
HV/LV voltage:	20/0.4 kV
Rated Frequency:	50 Hz
Ambient Temperature:	40°C
Altitude above sea level:	1000 m
Maximum permissible voltage:	24 kV
Lightning impulse test voltage:	125 kV
Power frequency test voltage:	50 kV
Cooling:	ONAN
Final coating:	RAL 7032



Technical data of 20/0.4 kV Transformers for domestic market

Rated Power KVA	Taps in MV (Off-Circuit) %	Impedance Voltage %	Vector Group%	No-Load Losses W	Load Losses W	Total Weight		Length L		Width W		Height H		Distance Between Rollers mm
						ARCONS	ARSEAL	ARCONS	ARSEAL	ARCONS	ARSEAL	ARCONS	ARSEAL	
						Kg		mm		mm		mm		
25	±1x4	4	Yzn5	110	700	350	450	770	840	730	690	1320	1220	520
50	±1x4	4	Yzn5	145	1100	530	560	885	875	720	740	1355	1220	520
75	±1x4	4	Yzn5	200	1425	605	655	955	900	690	690	1390	1250	520
100	±1x4	4	Yzn5	260	1750	745	790	1010	985	700	725	1395	1250	520
125	±1x4	4	Yzn5	310	2000	770	845	970	975	730	725	1500	1330	520
160	±1x4	4	Yzn5	375	2350	930	1005	1050	1030	740	760	1560	1365	520
200	±1x4	4	Yzn5	445	2760	1230	1265	1230	1190	765	815	1530	1340	520
250	±2x2.5	6	Dyn5	530	3250	1250	1310	1320	1255	775	835	1505	1330	520
315	±2x2.5	6	Dyn5	625	3850	1430	1455	1640	1305	880	850	1575	1340	670
400	±2x2.5	6	Dyn5	750	4600	1605	1650	1635	1340	880	875	1765	1525	670
500	±2x2.5	6	Dyn5	875	5450	1890	1920	1685	1375	930	895	1815	1575	670
630	±2x2.5	6	Dyn5	940	6750	2155	2150	1765	1435	980	925	1860	1620	670
800	±2x2.5	6	Dyn5	1150	8500	2710	2650	1940	1790	1180	945	1870	1620	670
1000	±2x2.5	6	Dyn5	1400	10500	2945	2940	2005	1815	1100	1030	2095	1830	820
1250	±2x2.5	6	Dyn5	1730	13200	3540	3305	2130	1850	1285	1145	2140	1880	820
1600	±2x2.5	6	Dyn5	2200	17000	4155	3975	2240	2100	1320	1180	2100	1905	820
2000	±2x2.5	6	Dyn5	2650	21200	4845	4780	2245	2165	1325	1285	2290	2105	1070

Note1: Transformers are equipped with an oil thermometer from 630 to 2000kVA.

Note1: Transformers are equipped with wheels from 400 to 2000kVA and as an option for below.

Note3: The ARCONS™ models, the conservator is fitted on the long side above LV terminals up to 250 kVA.

Note4: The ARCONS™ transformers are equipped with a Buchholz relay from 1000 to 2000 kVA.

Note5: The ARSEAL™ transformers are equipped with vertical protection relay from 1000 to 2000 kVA.

Arya Transfo offers 33/0.4 kV and 11/0.4 kV distribution transformers as its normal products for local markets and the detailed specification will be available upon request.

Cast resin dry type transformers

Advantage

- Partial discharge free (blow spc)
- Self-extinguishing low fire hazard
- Eco friendly and safe
- low operation cost and maintenance free
- low losses
- High short-circuit and impulse withstand capability
- Zero oil usage
- Crack resistant
- Sustainable

Accessories

- Temperature control system
- cooling fans
- Bi-directional wheels
- Tap changing connectors
- earthing terminal
- transport hook
- Enclosure



Technical Specifications

Standard	IEC 60076-11
capacity (KVA)	50 - 10,000
frequency (HZ)	60 , 50
highest system voltage(hv)	36
Environmental class	E2-C2-F1
Insulation class	F



Special transformers

Arya transfo shargh is ready to design and manufacture all types of special transformers used in industries in accordance with the special requirements of the customers.

In addition to the regular transformers, special

transformers for rectifiers, furnaces and special connection like scott-T and auto-transformers used in motor starting are in the range of products.



Accessories

Arya Transfo supplies high quality accessories from well-known local or foreign manufacturers. Below images show the most common accessories which installed on the distribution transformers.



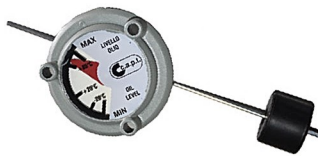
vertical oil level indicator



Multifunctional protective relay



Sudden pressure relay



Magnetic oil level indicator



Off-circuit tap-changer



Dehydrating breather



Oil thermometer



Protective relay for
hermetically sealed transformer



Buchholz relay

Below devices can be installed upon request:

- Pressure relief device
- Oil and winding thermometer
- On-load tap-changer
- Measuring and protection CTs
- Cable box or Bus duct
- Plug-in bushings and elbow connectors
- Sudden pressure relay
- Multi-function relay for hermetically sealed type



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