



آریا ترانسفو قدرت
ARYA TRANSFO-GHODRAT

Power Transformers



Certificates



KEMA type test certificate for large power transformers (160 MVA, 230/63/20 kV)

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Arya Transfo in brief

Arya Transfo is a newly built manufacturing plant that manufactures high quality oil-immersed power and distribution transformers, cast resin dry type transformers and compact substations. With utilizing of high quality raw material, modern technology and cutting edge machineries, Arya Transfo's products will be delivered with high reliability, long life time, low noise level and low losses.

Total workshop area is 70,000 square meters including two independent power transformers and distribution transformers' production lines. The range of the products in terms of voltage and power rating for distribution transformers

are up to 36 kV and 4000 kVA and for power transformers are up to 420 kV and 550 MVA. The manufacturing plants located in Shahmirzad, Semnan province, 230 km east of Tehran, Iran.

This catalogue focuses on power transformer products, the know-how and production technology. The dedicated workshop for production of power transformers is 42,000 square meters comprises of metal shop for tanks, core slitting/cutting shop, winding shop, insulators carpentry shop and two separate assembly shops for medium and large power transformers with a modern HV test field.



Products



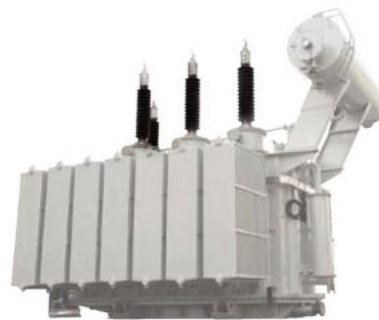
Large Power Transformers
up to 550 MVA, 420 kV



Medium Power Transformers
up to 100 MVA, 145 kV



Special Transformers
up to 420 kV, 100 kA



Series/Shunt Reactors
up to 100 MVA_r, 420 kV

Know-how

From designing to the construction stages of manufacturing large power transformer, there is a close technical business cooperation between Arya Transfo and the well-known Dutch company, Royal SMIT Transformers B.V. The company Royal SMIT Transformers B.V. is the manufacturer of large power transformers between 100 MVA to 1300 MVA and voltage ratio up to 800 kV, from 1913 and has developed its know-how and experience within the high quality demanding markets of Europe and North America. For this cooperation, there is a license contract and a long term co-manufacturing agreement

between Royal SMIT Transformers B.V. and Arya Transfo that covers design, manufacturing, quality control and tests of power transformers. Arya Transfo is proud and confident that through this cooperation, it shall receive support from a company with more than a century experience and the opportunity to receive access to the sophisticated technology and know-how for the design and up to date manufacturing methods of different types of power transformers, such as Generator Step Up Transformers, Autotransformers, Phase Shifters and series/shunt reactors.



Under License of
 **ROYAL SMIT**

Design

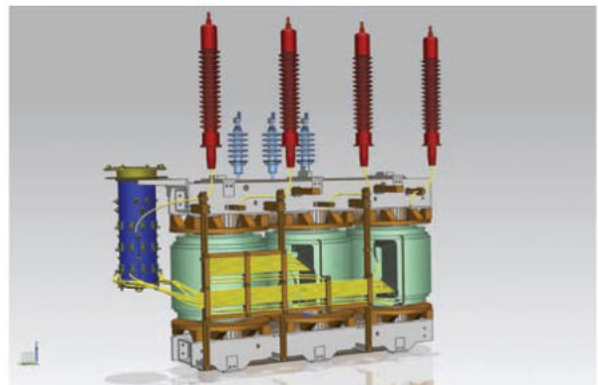
Arya Transfo has an accomplished and experienced design team that utilizes up-to-date professional engineering tools and software for the purpose of:

- 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 electric field in different areas and evaluation of the insulation design.

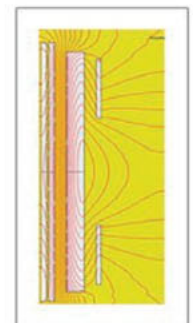
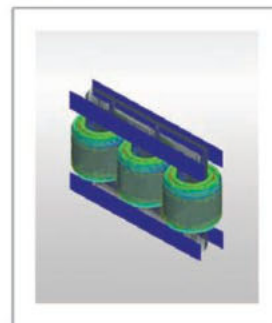
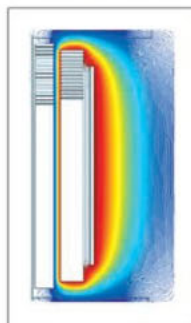
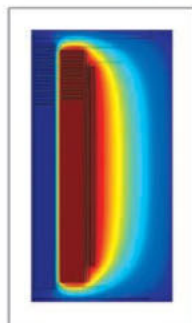
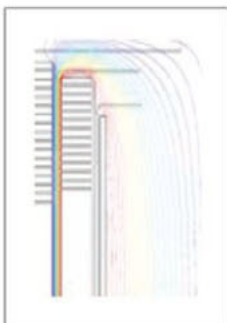
- Calculation of leakage magnetic field and stray losses.
- 3D-CAD modelling of complete transformers which leads to accurate structural design and minimum mismatches.

Besides high quality raw materials and modern machineries, modern 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.

3D Design



Magnetic and electrical field analysis



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 short-circuit and transient over voltages. Therefore, the most recommended HV windings of power transformers are disc type and for the LV coils are layer or helical type. Thanks to the SMIT technologies such as SMIT

windings (SMIT Disc) method and SMIT winding individual clamping which increase the strength and performance of windings.

The dust free winding shop has been equipped with computer controlled vertical and horizontal winding machines with adjustable mandrels supplied from Swiss manufacturer Tuboly Astronic AG.



Tank

Power transformer's tanks are designed and constructed in the form of conventional or bell type from mild carbon steel.

The surface treatment of raw materials in initial stage as well as semi-completed tanks are carried out by shot blasting process.

The inner surfaces of tanks also coated with special oil and heat resistant varnish with the thickness of 80 microns and the outer surface coating is water base three layers polyurethane performed through airless spray with the total thickness of 240 microns.



Active part

All windings and the related clamping components are assembled in a short-circuit proof manner, thanks to SMIT individual clamping technology.

The drying of the active part is done according to the vapor phase procedure. After that the

active part is installed in the tank and filled with high-grade insulating oil under vacuum.

Drying and oil filling under vacuum is critical for a well impregnated cellulose insulation system and satisfactory PD level during HV tests.



Tests

Our new test field has modern equipment from globally well-known manufacturers.

The test field has voltage and power sources enabling us to perform tests on large power transformers up to 550 MVA and 420 kV in accordance with international standards. Among the other, important items of equipment are:

- The static frequency converter 4000 kVA frequency range 40-200 Hz is used instead of the conventional motor-generator system
- Impulse generator, 12 levels with voltage range setting of 2400 kV/360 kJ
- 198 MVar Capacitors bank
- The reactor test transformer 120 MVA, 30-60/264-443 kV with test voltage up to 767 kV
- HIGHVOLT Control desk and power measurement system
- RAYTECH Transformer Test System
- Sound level measurement system from Bruel & Kjeaar.

Available Routine, type and special tests in the Arya Transfo test field are:

Tests	Description of Test	Available Tests
Routine Tests	Winding Resistance Measurement	✓
	Ratio Measurement and Vector Group check	✓
	Measurement of Load losses and Short circuit Impedance	✓
	Measurement of No-Load losses and No-Load Current	✓
	Functional test of the Tap changer	✓
	Check of ratio and Polarity of CTs	✓
	Check of core and frame insulation	✓
	Measurement of dissolved gasses in dielectric liquid (Um>72.5 kV)	✓
	Dielectric Routine Tests	✓
Leakage test and pressure tests of tank	✓	
Type Tests	Temperature Rise test	✓
	Measurement of Power Consumption of the Cooling Plant	✓
	Determination of sound level	✓
	Dielectric Type Tests	✓
Special Tests	Measurement of zero-sequence impedance	✓
	Determination of capacitances	✓
	Measurement of dissipation factor (tan δ)	✓
	Dielectric Special Tests	✓
	Measurement of d.c. insulation resistance	✓
	Frequency Response Analysis Test	✓
	Short-circuit withstand test	Third Party
Other Tests	Flux Balance Check	✓
	Winding thermometer Setting and Test	✓
	Partial Discharge Localization	✓

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 power transformers.



Bushing



Buchholz Relay



Pressure Relay



Tap changer



Control panel



Cooling Fan



Dehydrating breather



Magnetic oil level indicator



Oil and winding Thermometer



Current transformers

In addition, other accessories such as devices listed below can be added to transformer depending on customer's request.

- Oil pumps
- Online gases in oil monitoring device (OLGM)
- Automatic voltage regulator (AVR)
- Oil/Air and Oil/Water Heat exchanger

Research & Development

Arya Transfo has a strong and experienced engineering team focuses on research and development in transformer related projects which requested by customers or defined by in-house requirements.

The R&D engineers are working to develop and optimize designing software, manufacturing and quality control procedures in order to keep the whole designing and manufacturing processes up to date.



After Sales Services

We work hard to offer our customers peace of mind by offering comprehensive after sales services including commissioning, supervision during installation, diagnostic and repair of power transformers at customer sites to ensure that your transformers are operating at optimum performance. The warranty period for our power transformers is 24 months from factory test or

18 months from delivery.

We offer to our clients:

- Supervision during installation
- Commissioning
- Diagnosis and performance assessment
- Refurbishment and enhancement
- On site repairing
- Life time spare part supply





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