

# Certified for best-in-class performance, reliability, and safety

**Trihal** sets a new standard for dry-type cast resin transformers



# Setting a new standard for dry-type cast resin transformers



Trihal's safety and reliability make it a perfect choice for key applications

For high safety and exceptional environmental friendliness, there's no matching a dry-type cast resin transformer.

The epoxy resin insulation used in this kind of transformer means no oil is used, greatly reducing fire hazard and improving recyclability, all without loss of performance compared to other transformer types. This makes a dry-type cast resin transformer ideal for critical applications and high-traffic areas.

Yet even among dry-type cast resin transformers, Trihal from Schneider Electric™ stands out for its outstanding performance and unrivalled certifications.

Trihal is a best-in-class range of dry-type cast resin transformers, rated from 100 kVA up to 15 MVA, with insulation rated up to 40.5 kV. It's perfectly suited to a wide variety of industries, from highly populated buildings and critical infrastructure to heavy industry and renewable energy production.

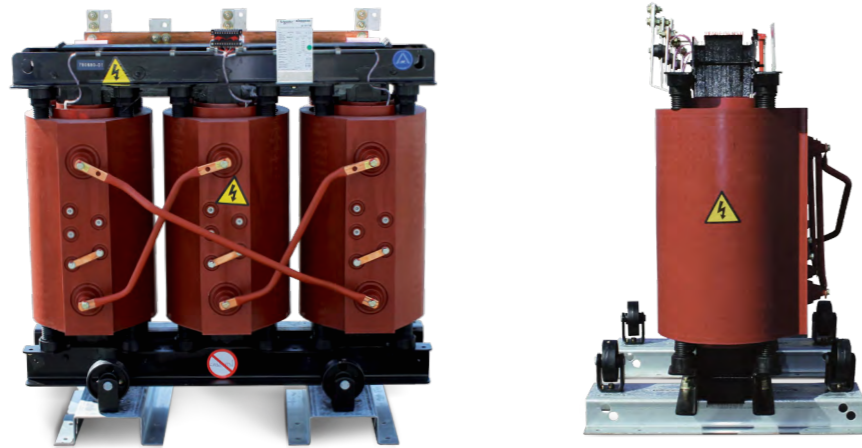
Crucially, Trihal's safety and performance certifications are peerless, and it's compliant with IEC60076-11 and IEC60076-16, as well as ISO 9001 and ISO 14001. That translates to optimum efficiency with very little maintenance, for a long service life.



## Tested and certified for the highest levels of safety and performance - that's Trihal

Over  
**80 000**  
units installed  
world-wide

# Designed to be safe and reliable. Proven to be exceptional.



When it comes to performance and safety, Trihal exceeds expectations. The transformer has not only earned some of the highest certifications set out by IEC standard 60076-11, but in some cases special, extra-rigorous tests have been carried out to prove its capabilities. In addition, Trihal meets the standards for wind applications set by IEC 60076-16.

The result is a versatile, high-quality transformer that performs reliably in a wide range of environments.



Trihal is ideal for high-humidity wind applications

## Dependable in harsh conditions

### **C3\*** climatic certification

Lowest ambient temperatures:

- > Operation -50°C
- > Storage -50°C

Trihal takes climatic testing to a new level. The highest certification described by IEC60076-11, C2, calls for thermal shock testing to a maximum of -25°C. Trihal passes the same tests at -50°C, ensuring optimal performance even in extreme climates.

#### Benefits:

- > Resistance to thermal shock
- > Highest performance under severe ambient conditions
- > Superior behaviour on load changes
- > Extended service life

\* C2 Thermal shock test carried out at -50°C

### **E3** environmental certification

Nearly total condensation or heavy pollution or combination of both.

- > Abnormal level of humidity up to 95%
- > Compliant with IEC 60076-16

Rigorous condensation and humidity penetration tests show that Trihal operates normally even in unusually moist or dirty conditions.

#### Benefits:

- > Highly resistant to condensation or/and heavy pollution
- > Suitable for installation in harsh environments



Trihal brings high quality, remarkable performance, and environmental friendliness to every landscape

## Exceptional quality, with a reduced environmental footprint

Trihal is designed and built in compliance with ISO 9001, ISO 14001 and REACH in order to ensure the highest level of quality and minimize the product's impact on the environment. Also, because it is an oil-free transformer, Trihal can be almost fully recycled.

#### Benefits:

- > Manufactured to ensure high quality
- > Creates no pollutive by-products
- > High level of recyclability

## Enhanced safety and reliability

### **F1** fire certification

Transformers subject to fire hazard:

- > Self-extinguishing capability
- > Restricted flammability required
- > Limited formation of fumes
- > Limited calorific-energy contribution to fire source

Trihal offers the highest level of fire safety recognized by IEC60076-11, significantly reducing the risk of fire. When subjected to an external source of fire, the transformer creates no toxic emissions or opaque smoke.

#### Benefits:

- > Enhanced safety for personnel, equipment, and buildings
- > Suitable for installation in fire-hazard areas

### **≤ 5 pC** partial discharge rating

- > Maximum partial discharge level measured during special test based on IEC 60076-11
- > Tested at 1.3 Un with ≤ 5 pC result

Special testing has confirmed Trihal's partial discharge rate of just ≤ 5 pC. This exceptional level of quality means slower deterioration due to aging insulation and less chance of an electrical breakdown.

#### Benefits:

- > Improved transformer aging
- > Extended service life

# Adaptable to specific needs



Trihal can be specifically adapted to better meet the customer's needs. Special tests are available on request, such as:

- > Temperature rise testing
- > Noise-level determination
- > Lightning impulse and short-circuit testing

In addition, special designs are available on request, including:

- > Reduced losses ranges – Trihal HE (High Efficiency)
- > Improved temperature / altitude range (up to 65°C / 5,000m)
- > Rectifier feeder (6- or 12-pulses) or VSD feeder
- > Extended impedance voltage range (up to 11%)
- > Cast-resin encapsulated LV windings

## A natural fit for the most demanding applications

Trihal is a flexible transformer solution, rated up to 15 MVA and suitable for use in a range of applications, including:



# Technical specifications

	Standard design	Possible adaptations
<b>Manufacturing standards</b>	IEC 60076-11, EN 50541-1	GOST-R, BS, IEEE
<b>Class tests</b>	C3*, E3, F1, ≤ 5 pC	
<b>HV / LV coils</b>	HV encapsulated in cast resin / LV impregnated	HV and LV encapsulated in cast resin
<b>Installation</b>	Indoor use: > IP00 (without enclosure) / IP31 (with enclosure) > C2 Corrosivity class, Medium durability (in compliance with ISO 12944-6)	Outdoor use with proper enclosure: > From IP35 up to IP44 (with enclosure) > Up to C5-Marine, Medium durability (in compliance with ISO 12944-6)
<b>Winding materials</b>	According to manufacturer optimization (AL or CU)	CU/CU
<b>Phases</b>	Three-phase	Single-phase
<b>Cooling system</b>	Standard: > AN (natural air) Option: > Future AF (air forced) or AF (air forced) > 40% performance reserves with radial-flow fans	AFWF (air forced, water forced)
<b>Maximum T°C / altitude</b>	40°C at any time / 1000 m	Up to 65°C / Above 1000 m
<b>Thermal class insulation</b>	According to IEC 60085, Class F	
<b>Temperature rise</b>	100 K	80 K (for 40°C): temperature rise adapted to maximum T°C
<b>Rated frequency</b>	50 Hz or 60 Hz	
<b>Rated power</b>	Up to 3.150 kVA	Up to 15 MVA
<b>Impedance voltage Uk</b>	From 4 to 6%	Lower than 4% Higher than 6%, up to 11%
<b>Vector groups</b>	Dyn (step-up), YNd (step-down)	All others in compliance with IEC
<b>Losses level (120°C)</b>	Standard or reduced (no-load or load losses, or both)	Ultra-reduced
<b>Rated HV insulation</b>	Up to 36 kV (IEC)	Up to 40.5 kV (GOST-R)
<b>HV tapping</b>	Off-circuit tappings links: 3 or 5 positions, +/- 2.5%	Off-circuit tappings links: up to 9 positions, +/- 2.5% or higher
<b>HV terminals</b>	Standard HV connections Top or bottom entry (on request)	HV/MV plug-in or porcelain bushings Side entry through dedicated cable boxes IEC, BS, or NEMA compliant
<b>Rated LV(MV) insulation</b>	1.1 kV	Up to 7.2 kV
<b>LV terminals</b>	Standard LV connections Top or bottom entry (on request)	LV cable ducting interface (Canalis) Side entry through dedicated cable boxes (IEC, BS, or NEMA compliant)
<b>Thermal protection</b>	AN cooling system: 6 PTC sensors (or 3 PT100) + Thermal Relay AF cooling system: 9 PTC sensors (or 3 PT100) + Thermal Relay	
<b>Accessories</b>	Standard: 4 bi-directional flat rollers, 4 lifting holes, 4 haulage holes on the underbase, 2 earthing points, rating plate Most common options: anti-vibration pads, remote communication for thermal relay, mar-shalling box, earthing ball, surge arrestors	Locking device for plug-in bushings, current transformers, automatic voltage regulator panel, special paint color for enclosure
<b>Test certificate</b>	Routine tests in compliance with IEC 60076-11	> Type test in compliance with IEC 60076-11: temperature rises test, lightning impulse test > Special test in compliance with IEC60076-11: noise level measurement, short-circuit test > Others: seismic test resistance, climatic, environmental or fire class test

(\*) C2 Thermal shock test carried out at -50°C

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