AET Electric Pte Ltd

Dry Type Transformers

K-Factor(K13)

“ A Manufacturer

of High Quality Transformers in Singapore ”

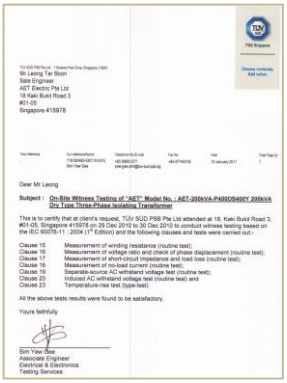
Manufacture and sale of transformers, mainly dry type, with a wide and diverse areas ranging from electronic manufacturing, data centers, marine, petrol chemical industries and offshore applications.

We have been manufacturing transformers since 1980. Through the years of dedication to this highly specialized field, our company had acquired knowledge and experiences in this field.

We work with a variety of clients including engineers, architects, facilities personnel, and end-users. Industries we serve include financial, education, manufacturing, utility, communications, broadcasting, government and even retail.

Our Quality

We adopt strict quality assurance and control measures in our manufacturing process to ensure consistency and reliability in our products and services to meet the needs and requirements of our customers. We had also been awarded the ISO9001 Certification in design, manufacture and repair of transformers.



TUV-PSB Cert (IEC 60076-11)

We had achieved approvals from recognized international bodies from ABS(American Bureau of Shipping), LR(Lloyd's Registrar), DNV, BV(Bureau Veritas) , NKK(Nippon Kaiji Kyokai), RINA, GL(German Lloyd), RMRS and PSB

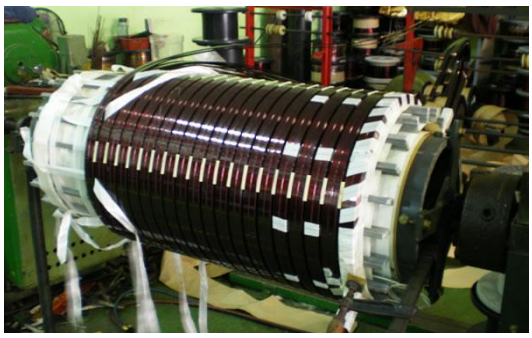
With our complete setup and quality assurance, we are flexible and capable to meet your special requirements.

Why Choose AET transformers?

Our competitive advantage lies on

- Our vast experience in designing our transformer
- Employ various winding techiques to enhance reliability and improve heat dissipation
- Use of highest quality materials
- Full manufacturing facilites from core cutting, coil winding and vaccumm impregnantion
- Full quaility control in our transformer
- Stringent testing procedure
- Short leadtime
- ISO certified and manufactured in Singapore
- After sales service

Manufacturing Facilities



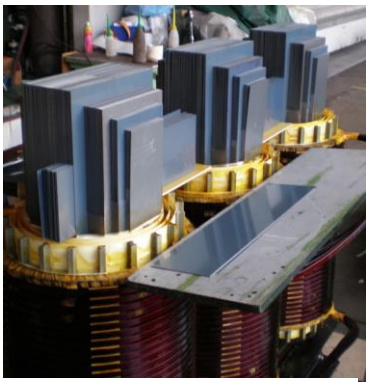
Coil Winding

Vacuum Impregnation

Varnish Curing

Iron Core Stamping

Core Stacking



Core Insertion

Enclosure Manufacturing

Termination

Testing

Our Materials

To ensure our transformer reliability and performance, our company uses the high grade materials. This allow the transformer to have a life expectancy more than 25years within its operating limits

High Grade Iron Core

- High Grade Steel sheet with low specific losses, insulated on both sides by thin organic coating.

High Grade Copper Windings

- Copper Strips with enameled coating. The copper conductors are fully sized, transposed and shaped to minimize Eddy current losses.

Insulation Materials

- Class H(NOMEX from Dupont) Insulation material is used between overlapping layers.
- Axial channels are used between layers of primary and secondary winding to provide air gap for uniform cooling.
- High temperature tolerant fiberglass boards are used as bobbins to separate the core and windings.
- Fully impregnated with class H varnish and oven dried.

Terminals

- Tinned Copper Busbar (For 100KVA and above)

Protection Devices(Optional)

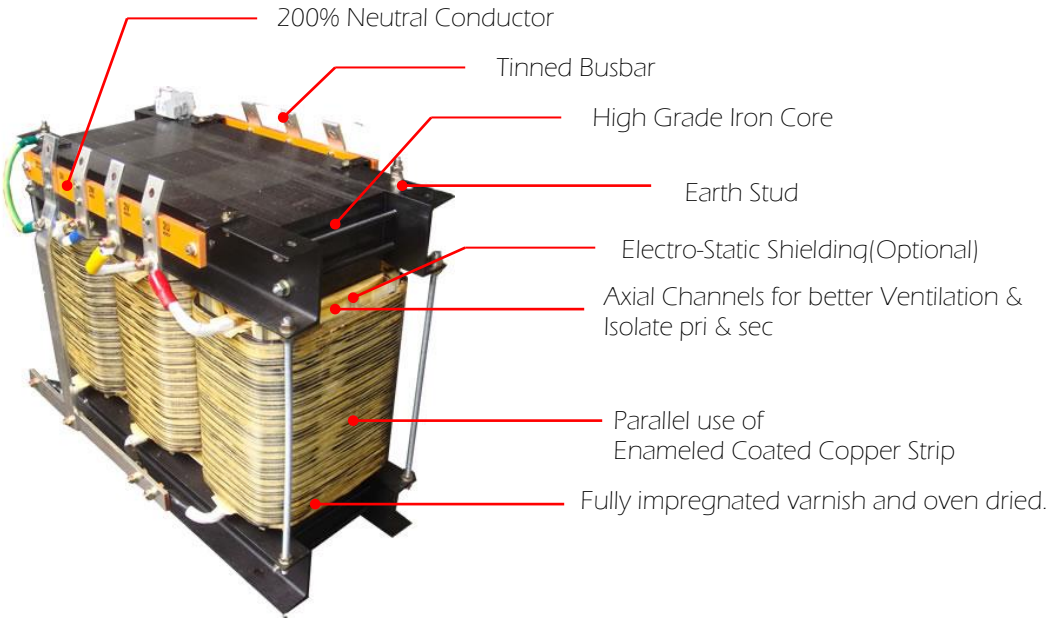
- Thermal protection devices
- Thermister (Normally Closed, activated at 160°C)
- Digital Temperature Controller with 2 x Voltage Free contacts
- Inrush Current Limiter (Available in Auto or Semi-Auto Type)

Temperature Controller,FOX-2PF

Testing Facilities

- Insulation Test at 1000Vdc and
- Hi-potential test at 3KV
- Induced AC Withstand Voltage Test
- Winding Resistance Test
- Open circuit Test (No-load Test)
- Short circuit Test
- Temperature Rise Test
- Inrush Current Test
- Noise Level Test
- Partial Discharge Test(Um>3.6kV)

Our Transformer Construction



Why use K-Factor transformers?

Harmonics are generated by the use of computers, servers and non-linear devices. These harmonics will cause excessive heating and degrade the insulation materials in the transformer which eventually lead to transformer failure.

Determine K-Factor

Defination(From UL1561)

A rating applied to a transformer indicating its suitability for the use of non sinsodial loads. In other words,

$$K - Factor = \sum_{h=1}^{\infty} {I_{h(PU)}}^2 h^2$$

Where
$I_{h(PU)}$ is the rms current(in per unit) at harmonic,h
h is the harmonic order

Harmonics Effects on Transformer

The presence of harmonics will cause the increase in losses and heating. They will incease both the load loss(impedance loss) and no-load loss(excitation).

a) Load Loss

Load Loss includes skin effect, inceased winding eddy current(P_{EC}), I^2R(P_{DC}) and stray losses(P_{OSL})

From IEEE C57-110, total load loss consist mainly winding eddy current loss, and I^2R loss. Stray losses can be neglected in dry type transformer

b) No Load Loss

No load loss is increased due increasing of hysterisis loss . The presence of harmonics increase the flux density and the rate of change of core magnetization which result in increased of hyterisis loss.

In Our Design

In order to reduce the effects of harmonics, our K-Type Transformers ,DTKF™ series are specially designed

For Load Loss

- Parallel individual insulated copper conductors are used to reduce skin effect and eddy current losses
- Larger conductors are used to reduce I^2R losses
- Static Shield between the PRI & SEC winding to reduce electrostatic noise caused by the harmonics
- Well ventilated by using axial channels and internally gapped per turn winding
- 200% neutral conductor to handle zero sequence currents flow

For No Load Loss

- To reduce hysterisis loss, our transformer is deisgned at a lower flux density and use of high grade iron core.

For Low Inrush Current

- Deisgned at a lower flux density and use of high grade iron core with hgh core saturation point.
- Primary winding is wound externally to increase the primary impedance path

Specifications – K13

Rated Power (Kva)		30	60	70	80	100	125	150	200	250	300
Rated Primary Voltage		400Vac									
Secondary Voltage (At No Load)		400Vac(230Vac-N) Neutral Conductor Size 200% bond to ground									
Voltage Regulation		< 3.5%									
Input Voltage Tolerance		+10% ie (0V to 440V)									
Rated Current		43	87	101	115	144	180	216	289	360	433
Frequency		45-65Hz									
Vector Group		Dyn11 or Dzn0									
Insulation Type		H									
Test Voltage		3kVac, 1 min									
Efficiency		97~98%									
Max Ambient Temperature(^{O}c)		40									
Max Allowable Temperature Rise(^{O}c)		120									
Approx Impedance Voltage (%)		3~6									
Standard in accordance		IEC 60076-11 ; IEEE C57-110 ; UL1561									
Approx Losses (W)	No-load Iron losses	200	350	400	450	700	800	900	900	1000	1300
	On-Load Copper losses	500	900	1100	1300	1500	1600	2500	3000	4000	5800

Specifications – K13

Rated Power (Kva)		375	500	600	700	800	900	1000	1200	1500	2000
Rated Primary Voltage		400Vac									
Secondary Voltage (At No Load)		400Vac(230Vac-N) Neutral Conductor Size 200% bond to ground									
Voltage Regulation		< 3.5%									
Input Voltage Tolerance		+10% ie (0V to 440V)									
Rated Current		542	721	866	1010	1154	1300	1443	1732	2165	2886
Frequency		45-65Hz									
Vector Group		Dzn0(Zero phase Shift)									
Insulation Type		H									
Test Voltage		3kVac, 1 min									
Efficiency		>98%									
Max Ambient Temperature(^{O}c)		40									
Max Allowable Temperature Rise(^{O}c)		120									
Approx Impedance Voltage (%)		3~6									
Standard in accordance		IEC 60076-11 ; IEEE C57-110 ; UL1561									
Approx Losses (W)	No-load Iron losses	1300	1500	1700	1850	1950	2050	2200	2500	3000	5000
	On-Load Copper losses	5700	6800	7500	8500	11000	15000	18000	22000	28000	35000