12kV~36kV

L - SERIES CAST RESIN TRANSFORMER

EPE Transformer Sdn. Bhd
(600084-V)
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EPE began as Electrical Power Engineering Sdn. Bhd. in 1972, and has been an iconic name for switchgear and power distribution products in Malaysia and its surrounding regions. EPE has, over the years supplied its customers’ superior power transmission & distribution, including power solutions.

Being one of the major power suppliers to Malaysian Power Utilities for the last four decades, EPE has also supplied to other utilities overseas such as Zimbabwe Electrical Supply Authority (ZESA), Yemen Public Electricity Co., Dhaka Electrical Supply Co. (DESCO), Fiji Electricity Authority, North Cyprus Electric Authority, FEWA UAE, Al-Sunut Power Plant UAE, DAL Group Atbara Sudan, Safah Power Plant Oman, Al Waab City Qatar, Sheikh Khalifa Sports City Bahrain, and many more.

The following milestones are part of EPE’s major events in its history:

- **1970s**
  EPE first acquired the technology & technical know-how from Sprecher & Schuh, Switzerland for medium voltage oil circuit breaker & panel.
  EPE became one of the major suppliers to the Malaysian Power Utility Company, then known as the National Electricity Board of Malaysia.
  EPE brand became a well known name in Malaysia.

- **1980s**
  EPE expanded its range of products by acquiring the technology & technical know-how from Reyrolle UK/NZ for oil ring main units and Midensha Japan for vacuum circuit breakers.

- **1990s**
  EPE ventured into the overseas market.
  EPE developed electrical busway system for power distribution.
  EPE was awarded contracts for supply of the utility facilities in Zimbabwe, Yemen, The Philippines, Cyprus & Bangladesh, and supplied to industrial plants in Vietnam, China, Australia & New Zealand.
  EPE also participated in commercial sectors such as hotels, residential, and complexes.
  EPE expanded its switchgear range and technology by acquiring Gas Insulated Switchgear (GIS) technology from Japan AE Corporation.

- **2000s**
  EPE continued to expand its business overseas into UAE, Oman, South Africa, Hong Kong, Qatar, Turkey, Bahrain, Sudan, Sri Lanka & Singapore.
  EPE acquired the technology & technical know-how from Lucy Switchgear for its RMU range.

- **2010s**
  EPE continues to develop better quality & achievement through its research and development.
  With an existing plant in a 6 acres land area, EPE has the potential to achieve a minimum of USD50 million sales annually on electrical switchgear & power distribution products.
Advanced Managing System, Intelligence System & Automatization System

EPE cast-resin transformers manufacturing operation is under the organization and management of an experienced team of dedicated professionals with vast experience in process control, quality assurance and system management.

Operational reliability and efficiency is assured using automated flexible manufacturing systems such as robotic welders, CNC turret punch and other sheet-metal working technology.

The latest testing methods are applied in the quality control process using advanced and precise test equipments, to ensure the end-product meets even the most stringent of quality standards.
EPE Transformer Technology Brief

EPE transformers have the following advantages

**Lower partial discharge**

Although most cast-resin or dry-type transformer manufacturers are using vacuum resin casting technology, minor air bubbles tend to remain within the coil, as even state of the art technology cannot generate an absolute vacuum chamber within the earth’s atmosphere. Therefore EPE applies sophisticated processes to reduce the presence of air within the coil and insulation material. In order to minimize air bubbles, casting is done at an optimized level of vacuum and casting temperature, using an optimised casting technology. This successfully proven process was derived after long research and results in a product whereby a 20-35kV transformers can achieve less than 10pC of partial discharge. This level of partial discharge is lower than the requirements of IEC 60076-11, with the outcome being the product possesses a longer operational life time and higher reliability.

**Lower noise level & Lower power losses**

EPE constantly improves its existing transformer designs. Using the latest softwares, EPE is able to simulate, analyze and identify causes of undesirable transformer electro-magnetic field and magnetic flux density, reduces power loss and noise resonance. This allows EPE to build a quieter and more efficient power transformer ideally suited for urban applications.
Product Introduction

Based on the most efficient and reliable cast-resin transformer technology of the last 3 decades, the L-Series of dry-type transformer is available at the voltage ratings of 0.4kV, 12kV, 24kV, 36kV.

The HV (High Voltage) coil

The transformer’s high voltage coil consists of premium enamel insulated copper wires which are wound with high precision winding equipment. The coil is casted into epoxy resin via a vacuum casting process which produces epoxy resin insulation with a high degree of reliability. The design methodology for EPE’s transformer is based on a sophisticated mathematical calculation in which the different rates of thermal expansion for both the epoxy resin and the coil are taken into account and due allowances are made to ensure the functional integrity of the transformer through a broad temperature range. With this, EPE’s transformers can reliably operate from -25 degC to +155 degC.

The LV (Low Voltage) coil

As the 0.4kV (LV) coil is expected to carry an excess load of 500A, EPE’s transformers uses copper or aluminium (upon request) foil for its LV coil construction. The LV coil can be made either of vacuum casted or prepeg. This application allows the coil to bear higher currents and also avoids the vertical stresses which are existent in spirally winded wire coils. Therefore EPE transformers have a massive short circuit withstand capability.
Product Designation

EPE L - □ - XXXX / XX
- Primary rated voltage
- Rated capacity
- Generation designation
- 3 phase cast-resin structure

Applicable Standards

- IEC 60076-11
- DIN 42523

Side view of LV L-Series cast resin transformer

L-Series cast resin transformer with enclosure
The following HV terminal sizes apply for transformers with capacity Sn<2000kVA, Md=10; and for transformers with capacity Sn>2000kVA, Md=16.

The LV terminals 0, a, b, c for full-type transformers are asymmetrically located, whereby the phase center distances are K2 and K3 respectively, while the LV terminals 0, a, b, c for wire-wound type transformers are symmetrically located, whereby the phase center distances are all K1.

The air forced cooling system with cooling fans are compact and its dimensions do not exceed the basic transformer dimensions (a x b).

When Sn<80kVA, N=4; when Sn>80kVA, N=8.
When 80kVA<Sn<630kVA, C=80; when Sn>630kVA, C=100.

Drawings for LV terminal
12kV, 500-2500kVA Distribution Transformer

Rated HV Voltage: 12 (6, 6.3, 6.6, 10, 10.5) kV
Rated LV Voltage: 0.42kV
Vector Group: Dyn11 or Yyn0
Insulation Level: LI/AC 75/35kV / LI/AC 0/3kV

<table>
<thead>
<tr>
<th>Type</th>
<th>Pk (W)</th>
<th>Pk (75°C)</th>
<th>Pk (120°C)</th>
<th>Uk %</th>
<th>I0 %</th>
<th>dp</th>
<th>kg</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>a</td>
</tr>
<tr>
<td>EPE L-500/12</td>
<td>1140</td>
<td>4180</td>
<td>5500</td>
<td>4</td>
<td>1</td>
<td>50</td>
<td>2040</td>
<td>1450</td>
</tr>
<tr>
<td>EPE L-1000/12</td>
<td>1730</td>
<td>6680</td>
<td>8800</td>
<td>6</td>
<td>0.6</td>
<td>50</td>
<td>3130</td>
<td>1650</td>
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<tr>
<td>EPE L-1250/12</td>
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<td>8390</td>
<td>10100</td>
<td>6</td>
<td>0.6</td>
<td>52</td>
<td>3550</td>
<td>1650</td>
</tr>
<tr>
<td>EPE L-1600/12</td>
<td>2400</td>
<td>10040</td>
<td>12500</td>
<td>6</td>
<td>0.6</td>
<td>52</td>
<td>4730</td>
<td>1770</td>
</tr>
<tr>
<td>EPE L-2000/12</td>
<td>3000</td>
<td>12370</td>
<td>16000</td>
<td>6</td>
<td>0.4</td>
<td>52</td>
<td>5690</td>
<td>1950</td>
</tr>
<tr>
<td>EPE L-2500/12</td>
<td>3430</td>
<td>14700</td>
<td>18500</td>
<td>6</td>
<td>0.4</td>
<td>52</td>
<td>6530</td>
<td>2090</td>
</tr>
</tbody>
</table>

We recommend using double bus bars of the same sizes on the LV connection for ratings of 630kVA and higher. This category applies for standard transformers, a separate datasheet will be attached for special products.

12kV Distribution Transformer with Enclosure

Users may choose between an aluminum or steel enclosure for protecting the transformer for indoor applications. The degrees of protection available are: IP20, IP21, IP23, IP30, IP31 and IP33.

An IP20 rated enclosure will shield the transformer from intrusion by objects larger than 12mm.

An IP 23 rated enclosure will also shield the transformer from intrusion by objects larger than 12mm, and at the same time it will shield the transformer from water droplets descending vertically onto the enclosure as well as water spray directed at the enclosure at a downwards 60 degree angle.

Remarks: When using IP23 enclosures, transformer capacity has to be derated by 5-10% due to lower heat dissipation/ventilation conditions of the enclosure. Special requirement enclosures for outdoor applications are available on request.

The cable supporters illustrated in the drawings are only supplied for applications where cable entry is from the base of the enclosure.
Drawings for 12kV Transformer with Enclosure

Drawings for line in / line out
### 36kV, 500~2500kVA Distribution Transformer

- **Rated HV Voltage**: 36 (33, 35, 38.5) kV
- **Rated LV Voltage**: 0.42 kV
- **Vector Group**: Dyn11 or Yyn0
- **Insulation Level**: LI/AC 170/70kV / LI/AC 0/3kV

<table>
<thead>
<tr>
<th>Type</th>
<th>Pn (kW)</th>
<th>Pk (70°C)</th>
<th>Uk %</th>
<th>Io %</th>
<th>Lp (dB) (A)</th>
<th>Gt (kg)</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
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<tbody>
<tr>
<td>EPE L-600/33</td>
<td>1620</td>
<td>5810</td>
<td>6</td>
<td>1</td>
<td>50</td>
<td>2560</td>
<td>1860</td>
<td>850</td>
<td>1960</td>
<td>690</td>
</tr>
<tr>
<td>EPE L-1000/33</td>
<td>2430</td>
<td>9120</td>
<td>6</td>
<td>0.6</td>
<td>52</td>
<td>4320</td>
<td>2210</td>
<td>1070</td>
<td>2110</td>
<td>820</td>
</tr>
<tr>
<td>EPE L-1250/33</td>
<td>2830</td>
<td>11110</td>
<td>6</td>
<td>0.6</td>
<td>52</td>
<td>4835</td>
<td>2300</td>
<td>1070</td>
<td>2070</td>
<td>820</td>
</tr>
<tr>
<td>EPE L-1600/33</td>
<td>3240</td>
<td>13520</td>
<td>6</td>
<td>0.6</td>
<td>52</td>
<td>5580</td>
<td>2470</td>
<td>1070</td>
<td>2170</td>
<td>820</td>
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<td>EPE L-2000/33</td>
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<td>15920</td>
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<td>0.4</td>
<td>52</td>
<td>6800</td>
<td>2980</td>
<td>1070</td>
<td>2440</td>
<td>820</td>
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<tr>
<td>EPE L-2500/33</td>
<td>4450</td>
<td>19070</td>
<td>6</td>
<td>0.4</td>
<td>52</td>
<td>8690</td>
<td>2780</td>
<td>1370</td>
<td>2275</td>
<td>1070</td>
</tr>
</tbody>
</table>

We recommend using double bus bars of the same size on the LV connection for 630kVA and higher transformers. This category applies for standard transformers, a separate datasheet will be attached for special products.
LD Range of Temperature Controllers for Transformer

High grade platinum resistors with high thermal-resistance linearity (pt100) are used in the temperature monitoring and control system for greater reliability.

Comprehensive use of SCM microprocessor technology to process incoming signals from different sensors and evaluate fault occurrence events, ensuring the elimination of error reporting of its status and the occurrence of faults when a transformer is operational.

An internal database stores thermal readings of the transformer and in the event of a power failure in the thermal monitoring and control system a data saving and recovery function ensures data will not be lost.

LCD and LED display technology is used for ease of monitoring.

The monitoring system is available with RS485 communications protocol.

4 channels circuit indication, CH-A, CH-B, CH-C for A, B, C windings, and CH-D for core temperature measurement.

Temperature alarm & over heat tripping is pre-settable, and the control and indication system for the cooling fans may be set at manual or automatic.

Remote protocol of fans statute, digital compensate for each channel.

Measured data is saved when the system power is off. Power loss alarm and air-intake (fan) break-down alarm are present in the system.

Automatic start and stop timing for the fans is settable. Relay status monitoring is also present in the system.
Air Forced Cooling System

There are two methods of cooling for cast resin/dry type transformers: Air Natural Cooling (AN), and Air Forced Cooling (AF).

During AN cooling under normal operating conditions, the transformer is capable of continuous output at 100% rated capacity.

During AF cooling under normal operating conditions, the transformer is capable of output at 150% rated capacity for a short period of time. Since power loss & impedance will increase sharply during an overload, we do not recommend prolonged overload operations.

The transformer chamber should be well ventilated for both AN and AF transformer types. If the transformer is installed in a basement or other badly ventilated environment, extra ventilation should be installed, the ventilation level should be 2~4m3/min for each 1kW of net power loss.

Cooling fans quality, power & voltage listed below:

<table>
<thead>
<tr>
<th>Transformer capacity (kVA)</th>
<th>250~500</th>
<th>630~1000</th>
<th>1250~1600</th>
<th>2000~2500</th>
<th>≥3150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fans quantity x fan power</td>
<td>4x40</td>
<td>6x40</td>
<td>6x80</td>
<td>6x90</td>
<td>10~12x90</td>
</tr>
<tr>
<td>Fans voltage</td>
<td>~220V</td>
<td>~220V</td>
<td>~220V</td>
<td>~220V</td>
<td>~220V</td>
</tr>
</tbody>
</table>

The AF system is automatically controlled by a temperature control system which starts or stops the fans when required.

The dimension of AF system will not exceed overall transformer dimension.
Amorphous alloy core transformer

Amorphous alloy has the characteristics such as high resistivity and low loss. As compared with the traditional silicon steel core transformer, the amorphous alloy transformer has the advantage of low no-load loss, thus it is reduced by 70–80%.

Dry type amorphous alloy core transformer

Dual ratio amorphous alloy core transformer

No-Load Losses (W)

75%
EPE Transformer Sdn. Bhd
(900584-V)

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