NIRVOY - Oil immersed Transformers

MV/LV Distribution Transformers ≤3150 kVA
Ground mounted
Oil immersed transformers
100kVA to 3150kVA
Frequency 50Hz-IEC standards

Standards
These transformers comply with the following standards:
- IEC 60076 and EU regulation No.: 548/2014
Power is our business
we keep you ahead
with innovative ideas
and modern technics
NIRVOY - Normal Distribution Transformers

MV/LV Distribution oil immersed transformers ≤3150 kVA

Description
This range consists of transformers complying with the following specifications:
- Three-phase transformers, for indoor or outdoor use (installation to be specified).
- Step-down type, step-up on request
- Rated frequency: 50Hz
- Maximum ambient temperature: 40°C
- Mineral oil immersed (other dielectric upon request)
- Breathing type hermatically sealed transformers with integral filling
- Cover bolted on tank
- ONAN type natural cooling
- Standard anti-corrosion surface treatment and coating
- Final colour adex beige.

Basic fittings for Breathing type
Each transformer includes
- 1 off-circuit tappings switch with pad locking located on the cover, this switch operates on the highest rated voltage to bring the transformer to the supply voltage/actual value:
  - Oil conservator
  - Oil level gauge
- 3 MV porcelain bushing
- 4 LV flat bars
- Earthing terminals on the cover
- 4 bi-directional rollers
- 2 lifting lugs
- 1 rating plate to be fixed on LV side
- 1 filling plug oil draining device
- Protection index IP 00, IP21S as option.

Routine tests
Routine tests are carried out on transformers during manufacture. Each transformer is issued with an official test certificate:
- Applied voltage dielectric test (50Hz-1mn)
- Measurement of:
  - No load losses and no load current
  - MV & LV winding resistance
  - Impedance voltage and load losses
  - The transformation ratio & vector group.
  - Dielectric strength of oil

Standards
These transformers comply with the following standards.
- IEC 60076 and EU regulation no.: 548/2015

Adex guarantees its transformers from manufacturing defects and all transformers are despatched after full routine tests.

Options
The following fittings may be provided as an option:
- 3 LV fixed plug-in-connectors
- 4 LV porcelain bushings
- LV cable connection box
- Locking device
- Hermetically sealed transformers with integral fillings
- Control & Protection devices
- Buchholz relay or a protection relay DGPT2 Including:
  - 1 gas detector / low level indicator with one contact
  - 2 thermostats for alarm & tripping
  - 1 dial type thermometer indicator

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<th>Insulation (kV)</th>
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<tr>
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<td>kV BIL 1.2/50μs</td>
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NIRVOY - Normal Distribution Transformers

MV/LV Distribution oil immersed transformers ≤3150 kVA

Electrical characteristics: Ecodesign to EU regulation no.: 548/2014

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<tr>
<th>rated power (kVA)</th>
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<th>250</th>
<th>315</th>
<th>400</th>
<th>500</th>
<th>630</th>
<th>800</th>
<th>1000</th>
<th>1250</th>
<th>1600</th>
<th>2000</th>
<th>2500</th>
<th>3150</th>
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<tr>
<td>secondary at no-load</td>
<td>415V between phases, 240V phase to neutral</td>
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<td>rated insulation level</td>
<td>12kV for 11kV</td>
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<td></td>
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<tr>
<td>HV tapping range(off voltage)</td>
<td>± 2.5%, ± 5%</td>
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<td>vector group</td>
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<table>
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<tr>
<th>losses</th>
<th>no - load</th>
<th>210</th>
<th>300</th>
<th>360</th>
<th>430</th>
<th>510</th>
<th>600</th>
<th>650</th>
<th>770</th>
<th>950</th>
<th>1200</th>
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<th>1750</th>
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<tr>
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<td>2350</td>
<td>3250</td>
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<td>18000</td>
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<td>4</td>
<td>4</td>
<td>4</td>
<td>4/6</td>
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<tr>
<td>voltage drop at full load (%)</td>
<td>p.f = 1</td>
<td>1.25</td>
<td>1.14</td>
<td>1.03</td>
<td>0.99</td>
<td>1.06</td>
<td>1.19</td>
<td>0.9</td>
<td>0.93</td>
<td>0.85</td>
<td>0.8</td>
<td>0.78</td>
<td>0.7</td>
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<tr>
<td></td>
<td>p.f = 0.8</td>
<td>3.12</td>
<td>3.21</td>
<td>3.15</td>
<td>3.109</td>
<td>3.8</td>
<td>4.9</td>
<td>4.78</td>
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<tr>
<td></td>
<td>p.f = 1 at 100% load</td>
<td>98.48</td>
<td>98.62</td>
<td>98.8</td>
<td>99.08</td>
<td>98.9</td>
<td>98.64</td>
<td>98.97</td>
<td>98.94</td>
<td>99.01</td>
<td>99.13</td>
<td>99.11</td>
<td>99.16</td>
<td>99.15</td>
</tr>
<tr>
<td>efficiencies (%)</td>
<td>p.f = 0.8 at 100% load</td>
<td>98.11</td>
<td>98.28</td>
<td>98.6</td>
<td>98.85</td>
<td>98.5</td>
<td>98.3</td>
<td>98.72</td>
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<td>98.92</td>
<td>98.89</td>
<td>98.96</td>
<td>98.96</td>
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</table>

Dimensions and weights

Typical dimensions and weights are indicated in the table below for mineral oil immersed transformers. They are provided for 12kV/415 V transformers with electrical characteristics, as described in the previous table.

For other electrical characteristics (voltage, losses, etc...) or other dielectric, dimensions and weights would be different (please consult us).

N.B: The terminal marking is in accordance with IEC standards 616 (1978) see attached diagram.

Approximate dimensions (mm).

<table>
<thead>
<tr>
<th>KVA</th>
<th>100</th>
<th>160</th>
<th>200</th>
<th>250</th>
<th>315</th>
<th>400</th>
<th>500</th>
<th>630</th>
<th>800</th>
<th>1000</th>
<th>1250</th>
<th>1600</th>
<th>2000</th>
<th>2500</th>
<th>3150</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>965</td>
<td>1065</td>
<td>1125</td>
<td>1161</td>
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<td>1285</td>
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<td>1595</td>
<td>1619</td>
<td>1739</td>
<td>1757</td>
<td>1988</td>
<td>2100</td>
<td>2250</td>
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<tr>
<td>B</td>
<td>495</td>
<td>555</td>
<td>574</td>
<td>593</td>
<td>660</td>
<td>556</td>
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<td>683</td>
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<td>846</td>
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<td>1779</td>
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<td>2274</td>
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<td>D</td>
<td>765</td>
<td>846</td>
<td>843</td>
<td>855</td>
<td>876</td>
<td>1086</td>
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<td>1279</td>
<td>1431</td>
<td>1500</td>
<td>1576</td>
<td>1700</td>
<td>1714</td>
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<td>Flat bars weights (kg) total</td>
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<td>881</td>
<td>1003</td>
<td>1074</td>
<td>1340</td>
<td>1620</td>
<td>1977</td>
<td>2423</td>
<td>2900</td>
<td>3083</td>
<td>3920</td>
<td>4585</td>
<td>5668</td>
<td>6032</td>
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<td>mineral oil</td>
<td>181</td>
<td>200</td>
<td>215</td>
<td>235</td>
<td>287</td>
<td>407</td>
<td>455</td>
<td>557</td>
<td>710</td>
<td>712</td>
<td>959</td>
<td>1107</td>
<td>1286</td>
<td>1514</td>
<td>1658</td>
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</tbody>
</table>

Note: Dimension may change depending on the electrical parameter as per final design at the time of order acknowledgement.
NIRVOY - Hermetically Sealed transformer
MV/LV Ecodesign distribution transformers ≤ 3150 kVA

Introduction
Hermetically sealed transformer is an oil immersed transformer suitable in contaminated areas and climate with high humidity. In hermetically sealed transformers, the oil pressure is higher than the atmospheric pressure and unlike the conservator type transformers, the tank of these transformers act as a pressurized vessel. Due to lack of any contact between oil and environment, aging of oil will be deferred and the transformer encounter lower risk in comparison with conservator type transformers.

The tank of hermetically sealed transformers must tolerate high pressure. Due to elimination of conservator, oil temperature variations lead to expansions and contraction of transformer tank and so this affects transformer tank design, behaviour and aging.

Transformer tank are manufactured in corrugated form for efficient heat transfer and oil cooling. In hermetically sealed transformers, the ribs of corrugated tank have the essential role in cooling and tolerating pressure variations.

Characteristics
This range consists of transformers complying with the following specifications:
- Rated power from 100 up to 3150 kVA, operating voltages up to 36 kV
- Three phase transformers, for indoor or outdoor use;
- Step down / Step up type
- Rated frequency 50/60Hz
- Hermetically sealed with integral fittings
- Tapping range on primary voltage: ± 2x2.5% or according to customer request
- Maximum ambient temperature 40°C;
- Maximum temperature rise of winding 65 K, top oil 60 K, natural air cooling (ONAN)
- Maximum installation altitude 1000 m above sea level
- Cover bolted on tank
- 2 loss ranges: normal losses and low-loss Ecodesigned
- Standard anti-corrosion surface treatment and coating
- Completely immersed in mineral oil in accordance with standard IEC 60296.

Advantages
- No aging of the dielectric liquid as there is no contact with the air.
- Minimal maintenance required.
- Compact size (specially suitable for low height areas).
- No expansion tank or air dehydrating needed
- Lighter in weight.
- Less dielectric liquid used than in other types of transformer.
- Minimal risk of leakages
- PCB (Polychlorinated biphenyls) free

Standard equipment
- mineral insulating oil IEC 60296
- Off-circuit regulation tap changer (can only be operated without voltage) IEC 60214
- MV porcelain bushings (plug-in connectors as optional)
- LV porcelain bushings/plug in
- 4 LV flat bars from 250kVA
- 2 Earthing terminals in the tank
- Draining device
- Rating plate EN 50464-1
- 2 Lifting and untanking lugs;
- 4 bidirectional flat rollers from 160kVA;
- filling plug;
- Thermometer pocket ;
- Wheels

Options
- 3 HV plug-in connectors HN 52 S 61 250A/24kV , straight or elbow
- Thermometer: measures the temperature of the top layer of the insulation liquid.
- Available with 2 contacts (alarm and trigger) and upper limit marker
- DMCR 3.0 Protection relay
  - over pressure detection
  - over temperature detection & temperature indication
  - over temperature primary/ alarm
  - over temperature secondary tripping
  - di-electric level monitoring & gas detection

Standards
Our transformers comply with:
- Normal loss according to IEC 60076 standards
- Energy Efficient Ecodesign according to IEC and EU regulation No.: 548/2014

Specific Standards according to country requests etc. can be so be complied with
- standards EN, ANSI, IEEE etc upon request
- other ambient (45°C, 50°C, 55°C etc) upon request.
- other rated frequency (60Hz) upon request.
For customization please consult us.

NIRVOY-05
### Electrical characteristics: Ecodesign to EU regulation no.: 548/2014

<table>
<thead>
<tr>
<th>rated power (kVA)</th>
<th>160</th>
<th>250</th>
<th>315</th>
<th>400</th>
<th>500</th>
<th>630</th>
<th>800</th>
<th>1000</th>
<th>1250</th>
<th>1600</th>
<th>2000</th>
<th>2500</th>
<th>3150</th>
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<tr>
<td>secondary at no-load</td>
<td>415V between phases, 240V phase to neutral</td>
<td></td>
<td></td>
<td></td>
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<tr>
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<tr>
<td>HV tapping range (off voltage)</td>
<td>± 2.5%, ± 5%</td>
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<td></td>
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</tr>
<tr>
<td>vector group</td>
<td>Dyn11</td>
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<table>
<thead>
<tr>
<th>Losses</th>
<th>no-load</th>
<th>210</th>
<th>300</th>
<th>360</th>
<th>430</th>
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<th>600</th>
<th>650</th>
<th>770</th>
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<th>1200</th>
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<table>
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<tr>
<th>Rated impedance voltage (%)</th>
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<tr>
<td>Voltage drop at full load (%)</td>
<td>1.25</td>
<td>1.14</td>
<td>1.03</td>
<td>0.99</td>
<td>1.06</td>
<td>1.19</td>
<td>0.9</td>
<td>0.93</td>
<td>0.85</td>
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<table>
<thead>
<tr>
<th>Efficiencies (%)</th>
<th>p.f = 1 at 100% load</th>
<th>98.48</th>
<th>98.62</th>
<th>98.8</th>
<th>99.08</th>
<th>98.9</th>
<th>98.72</th>
<th>98.67</th>
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<th>99.11</th>
<th>99.16</th>
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<tbody>
<tr>
<td></td>
<td>p.f = 0.8 at 100% load</td>
<td>98.11</td>
<td>98.28</td>
<td>98.6</td>
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<td>98.5</td>
<td>98.3</td>
<td>98.68</td>
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<td>98.89</td>
<td>98.96</td>
<td>98.98</td>
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### Dimensions (mm) - Ecodesign

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<tr>
<th>rated power (kVA)</th>
<th>160</th>
<th>250</th>
<th>315</th>
<th>400</th>
<th>500</th>
<th>630</th>
<th>800</th>
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<th>1600</th>
<th>2000</th>
<th>2500</th>
<th>3150</th>
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<tbody>
<tr>
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<td>1850</td>
<td>1930</td>
<td>1980</td>
<td>2000</td>
<td>2200</td>
<td>2350</td>
<td>2390</td>
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<tr>
<td>B (width)</td>
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<td>875</td>
<td>890</td>
<td>900</td>
<td>910</td>
<td>925</td>
<td>1120</td>
<td>1145</td>
<td>1154</td>
<td>1400</td>
<td>1740</td>
<td>1770</td>
<td>1850</td>
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<tr>
<td>C (height to cover)</td>
<td>845</td>
<td>950</td>
<td>1010</td>
<td>1085</td>
<td>1125</td>
<td>1160</td>
<td>1290</td>
<td>1400</td>
<td>1395</td>
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<td>1630</td>
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<tr>
<td>D (height to HV porcelain bushings)</td>
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<td>1800</td>
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<td>1960</td>
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<td>2080</td>
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<td>E (separation between LV bushing)</td>
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<td>F (separation between HV bushings)</td>
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<td>265</td>
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<td>265</td>
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</tr>
<tr>
<td>porcelain LV(A)</td>
<td>250</td>
<td>630</td>
<td>630</td>
<td>1000</td>
<td>1000</td>
<td>1600</td>
<td>1600</td>
<td>2500</td>
<td>2500</td>
<td>3150</td>
<td>3150</td>
<td>5000</td>
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</tr>
<tr>
<td>G (distance between wheel axis)</td>
<td>670</td>
<td>670</td>
<td>820</td>
<td>820</td>
<td>820</td>
<td>820</td>
<td>820</td>
<td>820</td>
<td>820</td>
<td>820</td>
<td>820</td>
<td>820</td>
<td>1450</td>
</tr>
<tr>
<td>wheel diameter</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>height of wheel</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
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<td>40</td>
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<td>40</td>
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</tr>
<tr>
<td>weights (kg):</td>
<td>mineral oil</td>
<td>200</td>
<td>260</td>
<td>280</td>
<td>330</td>
<td>390</td>
<td>410</td>
<td>510</td>
<td>630</td>
<td>740</td>
<td>1000</td>
<td>1200</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>780</td>
<td>1030</td>
<td>1200</td>
<td>1350</td>
<td>1620</td>
<td>1770</td>
<td>2270</td>
<td>2460</td>
<td>2790</td>
<td>3890</td>
<td>4790</td>
<td>5400</td>
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<tr>
<td></td>
<td></td>
<td>830</td>
<td>1080</td>
<td>1230</td>
<td>1380</td>
<td>1650</td>
<td>1800</td>
<td>2300</td>
<td>2590</td>
<td>3790</td>
<td>4890</td>
<td>5790</td>
<td>6490</td>
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</tbody>
</table>
OUR QUALITY SYSTEM

All AdexTransfo transformers are manufactured in accordance with the quality system as per ISO 9001: 2015.

The quality system is aimed at achieving customer satisfaction in terms of design, quality, service, and adaptation of equipment in line with technology.

The process includes the manufacturing flow chart, internal audit, control non-conforming product, corrective action, quality checking, quality of suppliers and others.
GENERAL

OUR TRANSFORMERS

- Optimised to withstand short circuit forces
  - Concentric windings
  - Insulation between layers
  - Coils are manufactured using the latest techniques and machinery

- Improved heat dissipation in the windings
  - Expertise in coil cooling
  - Careful manufacturing of coils and cooling channels

- Guaranteed insulation
  - Use of high-quality cellulosic materials
  - Optimum handling
  - Storage to preserve insulation properties
  - Connections and Tap Changer

- MV and LV terminals
  - Transformer connection to the outside

- Off-circuit Tap changer
  - Secondary voltage can be adjusted precisely

- Elastic Corrugated tank with cooling fins
  - Increased heat dissipation surface

- Immersed in dielectric liquid
  - Lower noise level
  - Better behaviour in the event of overloads and harmonics

- Surface treatment and paint
  - Protection against corrosion, atmospheric agents, insulation and impacts
GENERAL

TESTING FACILITIES

All of the transformers manufactured are subject to the following routine tests, in accordance with IEC 60076-1.

Our transformers are test certified and we have our own laboratory for testing purpose, equipped with modern, precise measurement devices and systems that are certified and calibrated according to the directives of the ISO 9001: 2015 standard.

Routine tests are carried out on all transformers during manufacture:
- Winding resistance measurement.
- Measurement of the voltage ratio and verification of the vector group.
- Measurement of the short-circuit impedance and load losses.
- Measurement of no-load losses and current.

- Dielectric routine tests:
  - Separate source AC withstand voltage test (also known as Applied over-voltage test or Power frequency test)
  - Dielectric oil tests

Optional tests
- Impulse test
- Partial discharge test
- Temperature rise tests
PRODUCTION FACILITIES

PRODUCTION SITE

Adex transformer production sites are located in Gazipur, Bangladesh with a capacity of producing 750000 kVA transformers per year. The factory has been organised with advance technology and with the consideration of project design stage to the dispatch of finished goods.

Adex Engineering Limited

Production:
- PROTIVA - Ecodesign cast resin transformer ≤ 3150kVA
- NIRVOY - Ecodesign liquid immersed transformer ≤ 3150kVA
- Standard oil immersed transformer (100kVA to 3150kVA, 36kV)
- Hermetically sealed transformer (100kVA to 3150kVA, 36kV)
- Power transformers (upto 35MVA, 132kV)
- Cast resin transformer (upto 5MVA, 316kV)
To ensure manufacturing reliability it is important for design and production department to be linked. We facilitate this by our skilled design team and modern digitilized machines for different sections of production.
PRODUCTION FACILITIES

IRON CORE

The iron core is made of cold rolled grain oriented, low loss and high magnetic conductive silicon steel sheet.

The magnetic cores are precisely cut from very wide sheets of electrical steel using a series of slitters and core cutting machines enabling dust free production field for active parts.

Machines are CNC controlled which gives more accuracy and help us obtaining right properties in the material.

Stacking tables for facilitating the standard technique of step lap stacking to reduce core loss and noise level.
PRODUCTION FACILITIES

WINDING

Winding is the most important and sensitive part of transformer. Their design and construction decide transformer’s parameters demanded by customers.

This section consists series of winding machines for HV, MV and LV coils for all types of conductors, strips and round wires.

Low voltage windings are generally layer, helical or disc type. For high voltage windings, flat enamel conductors are used in layer or disc winding technique depending on the voltage and current.

The technologies used are copper or aluminium windings providing transformer its short-circuit strength in accordance with current standards.
**PRODUCTION FACILITIES**

**DRIYING**
Before being placed in the tank, the active part are dried up using vacuum drying oven for removal of moisture and other impurities. It is crucial requirement in transformer ensuring trouble free operation through the life span of the transformer.

**OIL**
The most commonly used dielectric liquids are of mineral oil type. For purification and filtration, we facilitate oil to be centrifuged by oil centrifuging machine. To control the chemical properties of the insulating material we do testing in our testing laboratory.
PRODUCTION FACILITIES

TANK
For mechanical production, we have advanced technology facilities like plasma cutting, fin forming machines and etc. for making different parts to maintain a high quality.

Higher priority is given to welding and surface treatment.
ADEX guarantees that its TRANSFORMERS are manufactured with all new materials and is totally free from second hand parts polluted with PCB's.