TRANSFORMER FAILURE AND REPLACEMENT

Distribution transformers rarely catch the attention of the Operation and Maintenance department. They do not have any moving parts; they cannot jerk or misfire. They do what they have to, day after day, year after year, with a remarkably high level of energy efficiency and reliability. Transformers provide an almost constant quality of service. Their decrease in energy efficiency and reliability is at a very slow rate and generally remains unnoticed. Until, that is, they fail and have to be replaced.

If reliability is the only criteria, replacement of the transformer is the best option. This is especially the case for relatively old transformers (>25 years) for which maintenance measurements have shown that risk of failure has risen substantially above the average.

REASONS FOR A REPLACEMENT TRANSFORMER

◆ To improve energy efficiency
◆ To improve the reliability of supply
◆ Because of a change in load profile
◆ To comply with environmental and fire safety regulations
◆ Regulation
◆ Reduction of maintenance cost

WE WILL MEET YOUR REQUIREMENTS

◆ We can meet any possible dimension requirement
◆ Our engineers will come to your site to take measurements so you get the exact unit you need
◆ VTC will even match HV and LV termination so you don’t have to spend extra to change termination dimensions
◆ VTC makes replacement easy and worry-free
◆ Replacement transformer will fit existing pad

OUR CAPABILITIES

<table>
<thead>
<tr>
<th>Facility</th>
<th>MVA/Yr</th>
<th>Max MVA</th>
<th>Max kV</th>
<th>Max BIL</th>
<th>People</th>
<th>Other/Special</th>
<th>Full Scope Field Serv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rincon, GA</td>
<td>24,000</td>
<td>14,000 Shell 400 Core</td>
<td>500 Shell 345 Core</td>
<td>1175 kV Shell 1675 Core</td>
<td>150</td>
<td>Autotransformer, HV or LV LTCs, Re-connectables, shunt reactors, Phase shifters, High current furnace</td>
<td>Yes</td>
</tr>
<tr>
<td>Pocatello, ID</td>
<td>10,000</td>
<td>100</td>
<td>230</td>
<td>1050</td>
<td>230</td>
<td>Tertiary windings, High current furnace, rectifier, HV or LV LTCs Reulators, zig-zag grounding, Air core Reactor, Single Phase, phase change, Autotransf, HV or LV LTCs</td>
<td>Yes</td>
</tr>
<tr>
<td>Roanoke, VA</td>
<td>9,000</td>
<td>30</td>
<td>138</td>
<td>550</td>
<td>360</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Chihuahua, MX liquid</td>
<td>4,000</td>
<td>10</td>
<td>69</td>
<td>350</td>
<td>350</td>
<td>Renewable padmount, ABS, PowerCon sw, RI-9 Circ 25, 26, 31 rectifier transformers, Re-connection (integer multiple)</td>
<td>Yes</td>
</tr>
<tr>
<td>Chihuahua, MX Dry</td>
<td>4,000</td>
<td>7.5</td>
<td>34.5</td>
<td>150</td>
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<td></td>
<td>Yes</td>
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<tr>
<td>VT and GT assoc</td>
<td>47,000</td>
<td>14,000 Shell 400 Core</td>
<td>500 Shell 345 Core</td>
<td>1175 kV Shell 1675 Core</td>
<td>1090</td>
<td>See above</td>
<td>Yes</td>
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</tbody>
</table>
## TYPICAL DIMENSIONS FOR LIQUID FILLED TRANSFORMERS

Dimensions and weights are typical and should not be used for design purposes. For exact dimensions and weights, contact factory. Smaller or matching dimensions may be possible.

### TYPICAL DIMENSIONS

<table>
<thead>
<tr>
<th>15 and 35 kV Classes, Two-winding, Copper</th>
<th>46 and 69 kV Classes, Two-winding, Copper, Circular</th>
<th>115 kV Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>KVA</td>
<td>H&quot;</td>
<td>W&quot;</td>
</tr>
<tr>
<td>57</td>
<td>43</td>
<td>55</td>
</tr>
<tr>
<td>59</td>
<td>46</td>
<td>62</td>
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<td>49</td>
<td>64</td>
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<tr>
<td>73</td>
<td>53</td>
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<tr>
<td>76</td>
<td>53</td>
<td>80</td>
</tr>
<tr>
<td>79</td>
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<td>108</td>
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<td>118</td>
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<tr>
<td>124</td>
<td>103</td>
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</table>

### 138 kV Class

<table>
<thead>
<tr>
<th>KVA</th>
<th>H&quot;</th>
<th>W&quot;</th>
<th>D&quot;</th>
<th>Wt. Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7500</td>
<td>195</td>
<td>155</td>
<td>140</td>
<td>70,000</td>
</tr>
<tr>
<td>10000</td>
<td>202</td>
<td>160</td>
<td>150</td>
<td>80,000</td>
</tr>
<tr>
<td>12000</td>
<td>209</td>
<td>165</td>
<td>160</td>
<td>875,000</td>
</tr>
<tr>
<td>15000</td>
<td>213</td>
<td>170</td>
<td>180</td>
<td>100,000</td>
</tr>
<tr>
<td>20000</td>
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<td>190</td>
<td>120,000</td>
</tr>
<tr>
<td>25000</td>
<td>220</td>
<td>200</td>
<td>200</td>
<td>135,000</td>
</tr>
<tr>
<td>36000</td>
<td>225</td>
<td>220</td>
<td>205</td>
<td>165,000</td>
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<tr>
<td>50000</td>
<td>248</td>
<td>270</td>
<td>225</td>
<td>215000</td>
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</table>

### 161 kV Class

<table>
<thead>
<tr>
<th>KVA</th>
<th>H&quot;</th>
<th>W&quot;</th>
<th>D&quot;</th>
<th>Wt. Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15000</td>
<td>250</td>
<td>240</td>
<td>180</td>
<td>123,000</td>
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<td>20000</td>
<td>250</td>
<td>280</td>
<td>195</td>
<td>175,000</td>
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<tr>
<td>25000</td>
<td>290</td>
<td>290</td>
<td>200</td>
<td>220,000</td>
</tr>
<tr>
<td>36000</td>
<td>298</td>
<td>303</td>
<td>240</td>
<td>235,000</td>
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<tr>
<td>50000</td>
<td>298</td>
<td>303</td>
<td>230</td>
<td>250,000</td>
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</table>

### 230 kV Class

<table>
<thead>
<tr>
<th>KVA</th>
<th>H&quot;</th>
<th>W&quot;</th>
<th>D&quot;</th>
<th>Wt. Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15000</td>
<td>290</td>
<td>303</td>
<td>240</td>
<td>235,000</td>
</tr>
<tr>
<td>25000</td>
<td>298</td>
<td>303</td>
<td>240</td>
<td>250,000</td>
</tr>
</tbody>
</table>

### Applicable Standards

- **ANSI** – American National Standards Institute
- **IEC** – International Electrical Commission
- **IEEE** – Institute of Electrical and Electronic Engineers
- **CSA** – Canadian Standards Association
- **CS7.12.00** – Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers
- **CS7.93** – Guide for installation of Liquid-Immersed Power Transformers
- **CS7.98** – Guide for Transformer Impulse Tests
- **CS7.100** – Standard Test Procedure for Thermal Evaluation of Oil-Immersed Distribution Transformers

### TRANSFORMER FEATURES

**Range** – 1 to 100 MVA, 15 kV to 230 kV voltage class

**Loading** – Designed to deliver rated current and MVA in all tap positions

**Service** – Outdoor

**Basic Impulse Level (BIL)** – Per ANSI standard

**Impedance** – ANSI standard

**Coils** – Aluminum or copper conductor, circular construction, continuous or helical disc, or barrel wound

**Cooling Fluid** – Type II mineral oil, R-Temp or Silicone oil available up to 15 MVA

**Fluid Preservation System** – Sealed tank or conservator

**Cooling Radiators** – Plate type

**Gauges and Accessories** –
- Liquid temperature indicator
- Liquid level gauge
- Vacuum pressure gauge
- Drain valves
- Filter press connections (top and bottom)
- Automatic pressure relief device
- Control wiring in flexible conduit
- Other accessories available

**Paint** – ANSI 61 enamel on sandblasted surface, other colors available

**Nameplate** – Stainless steel, engraved

**Bushings** – Cover or side mounted

**Other** – Welded top cover, 19-in manhole covers, provisions on base for skidding, transformer lifting lugs, stainless steel ground pads

**Class I, Div II Group C & D Available**

### CUSTOM FEATURES

- Reconnectable windings
- Non-standard impedance
- Epoxy paint in your choice of color
- Demountable radiators with isolation valves
- Galvanized radiators
- Terminal throats and chambers
- Sloping roof
- Multi-stage fan cooling for increased MVA
- Other gauges and accessories
- Shock indicator
- Customer-specific controls and relays
### Products / Applications / Services

#### Liquid Type Transformers
- **Ratings**
  - 300 kVA to 500 MVA
  - Up to 500 kV Class
- **LTC**
  - Up to 500 MVA
  - Up to 230 kV Class
- **Cooling Fluids**
  - Mineral Oil, Beta, Silicone, Envirotex (FR3), Luminol
- **Fluid Preservation**
  - Sealed Tank (Standard)
  - Automatic Nitrogen System
  - Conservator
- **Three Phase Regulators**
  - Up to 69 kV

#### Dry Type Transformers
- **VPI** (Vacuum Pressure Impregnated)
  - 300 kVA to 15 MVA
  - Up to 35 kV Class
  - 220°C Class Insulation
- **UNIClad® Encapsulated Coils**
  - 300 kVA to 15 MVA
  - Up to 35 kV Class
  - 220°C Class Insulation
- **Totally Enclosed Non-Ventilated (TENV)**
  - Up to 5000 kVA
  - Up to 35 kV Class

#### Industrial
- Rectifier Duty
- Paper & Cement Mills
- Steel Mills
- Motor Start
- Fan, Pump & Compressor Operation
- Hoists
- Mining
- Drive Isolation - AC, DC
- Chemical Plants / Ethanol
- Oil & Gas - Refineries, Pipelines, Storage, etc.
- Zig-Zag Transformer
- Cycloconverter Application
- Dynamic Voltage Restorer
- Unit Substation
- Special Fluid Transformers - Silicone, Envirotex (FR3), Beta Fluid
- Chemical / Hazardous Environment-Class I, Division II, Group C & D
- Coastal Environment / Offshore

#### Switchgear Match-up for
- General Electric
- Cutler Hammer
- Siemens
- Square D
- Others
- Special Fluid Transformers - Silicone, Envirotex (FR3), Beta Fluid
- Chemical / Hazardous Environment-Class I, Division II, Group C & D
- Coastal Environment / Offshore

#### Field Service Options
- Field Installation
- Assembly On Site
- Hot Oil Vacuum Processing
- Crane Services/Off-loading
- Field Testing
- On Site Training

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**Virginia Transformer Corp**
- 220 Glade View Drive
  - Roanoke, VA 24012
  - Phone: 540.345.9892
  - www.vatransformer.com
- 3770 Poleline Road
  - Pocatello, ID 83201
  - Phone: 208.238.0720

**Georgia Transformer**
- Complejo Industrial Chihuahua.
  - Ave. Homero #3307, Chihuahua, MX
  - Phone: 52.614.483.0000
- 2789 Highway 21 South
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  - Phone: 912.754.5300
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