REPLACEMENT TRANSFORMER SOLUTIONS
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

VTC HISTORY

• 1971 – VTC established
• 1982 – Current president assumes management
• 1989 – Manufactures first LTC transformer
• 1995 – Opened 2nd manufacturing facility in Chihuahua, Mexico
• 1997 – Achieves ISO 9001 certification
• 2003 – Acquired medium power transformer facility, Pocatello, Idaho
• 2005 – Testing facilities upgraded, enabling “Front of Wave” and “Switching Surge” testing
• 2009 – Added Vapor Phase Drying (VPD) – Pocatello, ID
• 2011 – VTC’s 40th Anniversary
• 2012 – Introduction of VCM (Virginia Control Module) – VTC enters Wind and Solar GSU Pad mount market
• 2013 – Expanded Roanoke to Troutville with a new Metal Fab facility
• 2014 – Added Vapor Phase Drying VPD to Roanoke facility

VTC 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

VTC REPLACEMENT CLIENTS

• Fluor / Tesoro Wilmington Refinery
  (2) 5 MVA, 13.8 kV transformers
  (2) 2 MVA, 13.8 kV transformers

• Powell / Chevron Tahiti Project
  (2) 2000 kVA, 6.9 kV transformers
  (2) 4000 kVA, 6.9 kV transformers

• Syncrude Oil / Tar Sands Pipeline
  (4) 5000 KVA, 34.5 kV transformers

• Atlas Pipeline - Buffalo Plant
  (4) 15 MVA, 34.5 kV transformers

• Marathon Oil - Agility Project
  (3) 3750 KVA, 15 KV transformers
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</th>
<th>46 and 69 kV Classes</th>
<th>115 kV Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H&quot; W&quot; D&quot; Wt. Lbs.</td>
<td>KVA H&quot; W&quot; D&quot; Wt. Lbs.</td>
<td>KVA H&quot; W&quot; D&quot; Wt. Lbs.</td>
</tr>
<tr>
<td>57 43 55 7,600</td>
<td>1500 120 84 78 15,600</td>
<td>5000 80 145 124 53,000</td>
</tr>
<tr>
<td>59 46 62 9,500</td>
<td>2000 125 88 84 19,000</td>
<td>7000 185 147 138 65,000</td>
</tr>
<tr>
<td>64 49 64 10,700</td>
<td>2500 125 90 88 22,200</td>
<td>10000 189 160 141 72,000</td>
</tr>
<tr>
<td>73 53 64 14,000</td>
<td>3750 130 96 94 28,500</td>
<td>12000 190 170 150 80,000</td>
</tr>
<tr>
<td>76 53 80 16,000</td>
<td>5000 130 100 98 34,200</td>
<td>15000 195 170 160 85,000</td>
</tr>
<tr>
<td>79 55 108 19,000</td>
<td>7500 135 106 106 44,200</td>
<td>20000 196 180 165 107,000</td>
</tr>
<tr>
<td>82 61 110 24,100</td>
<td>10000 135 112 112 54,000</td>
<td>25000 210 195 180 130,000</td>
</tr>
<tr>
<td>89 78 109 32,300</td>
<td>12000 140 115 115 60,500</td>
<td>36000 210 220 200 160,000</td>
</tr>
<tr>
<td>93 86 114 39,300</td>
<td>15000 140 120 122 70,000</td>
<td>50000 240 260 220 200,000</td>
</tr>
<tr>
<td>110 94 117 46,100</td>
<td>20000 165 140 160 90,000</td>
<td>– – – – –</td>
</tr>
<tr>
<td>118 97 118 54,200</td>
<td>25000 180 160 180 105,000</td>
<td>– – – – –</td>
</tr>
<tr>
<td>124 103 124 63,000</td>
<td>33000 192 220 190 140,000</td>
<td>– – – – –</td>
</tr>
</tbody>
</table>

### 138 kV Class | 161 kV Class | 230 kV Class
<table>
<thead>
<tr>
<th>H&quot; W&quot; D&quot; Wt. Lbs.</th>
<th>KVA H&quot; W&quot; D&quot; Wt. Lbs.</th>
<th>KVA H&quot; W&quot; D&quot; Wt. Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>195 155 140 80,000</td>
<td>10000 215 156 175 100,000</td>
<td>15000 250 240 180 123,000</td>
</tr>
<tr>
<td>202 160 150 80,000</td>
<td>– – – – –</td>
<td>20000 – – – – –</td>
</tr>
<tr>
<td>209 165 160 875,000</td>
<td>15000 230 180 175 119,000</td>
<td>25000 250 280 195 175,000</td>
</tr>
<tr>
<td>213 170 180 100,000</td>
<td>25000 240 210 200 160,000</td>
<td>37500 290 290 200 220,000</td>
</tr>
<tr>
<td>220 180 190 120,000</td>
<td>– – – – –</td>
<td>40000 302 310 240 235,000</td>
</tr>
<tr>
<td>220 200 200 135,000</td>
<td>36000 256 230 220 175000</td>
<td>50000 298 300 230 250,000</td>
</tr>
<tr>
<td>225 220 205 165,000</td>
<td>50000 260 280 235 225000</td>
<td>– – – – –</td>
</tr>
<tr>
<td>248 270 225 215000</td>
<td></td>
<td></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
- C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers
- C57.93 – Guide for installation of Liquid-Immersed Power Transformers
- C57.98 – Guide for Transformer Impulse Tests
- C57.100 – Standard Test Procedure for Thermal Evaluation of Oil-Immersed Distribution Transformers

**Transformer Features**

- Range – 1 to 100 MVA, 15kV to 230kV 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

<table>
<thead>
<tr>
<th>Ratings</th>
<th>Cooling Fluids</th>
<th>Fluid Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 300 kVA to 500 MVA</td>
<td>- Mineral Oil, Beta, Silicone, Envirotemp (FR3), Luminol</td>
<td>- Sealed Tank (Standard)</td>
</tr>
<tr>
<td>- Up to 500 kV Class</td>
<td>- 300 kVA to 15 MVA</td>
<td>- Automatic Nitrogen System</td>
</tr>
<tr>
<td><strong>LTC</strong></td>
<td>- 300 kVA to 15 MVA</td>
<td>- Conservator</td>
</tr>
<tr>
<td>- Up to 500 MVA</td>
<td>- Up to 35 kV Class</td>
<td></td>
</tr>
<tr>
<td>- Up to 230 kV Class</td>
<td>- 220ºC Class Insulation</td>
<td></td>
</tr>
</tbody>
</table>

### DRY TYPE TRANSFORMERS

<table>
<thead>
<tr>
<th>VPI (Vacuum Pressure Impregnated)</th>
<th>UNIClad® Encapsulated Coils</th>
<th>Totally Enclosed Non-Ventilated (TENV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 300 kVA to 15 MVA</td>
<td>- 300 kVA to 15 MVA</td>
<td>- Up to 5000 kVA</td>
</tr>
<tr>
<td>- Up to 35kV Class</td>
<td>- Up to 35 kV Class</td>
<td>- Up to 35 kV Class</td>
</tr>
<tr>
<td>- 220ºC Class Insulation</td>
<td>- 220ºC Class Insulation</td>
<td></td>
</tr>
</tbody>
</table>

### INDUSTRIAL

- Rectifier Duty
- Paper & Cement Mills
- Steel Mills
- Motor Start
- Fan, Pump & Compressor
- 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, Envirotemp (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, Envirotemp (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

---

**Corporate Office & Roanoke Facility**
220 Glade View Drive
Roanoke, VA 24012
- 540.345.9892
- 540.342.7694

**VTC Troutville, VA**
100 Transformer Way
Troutville, VA 24175

**VTC Pocatello, ID**
3770 Poleline Rd.
Bldg. #37
Pocatello, ID 83201
- 208.238.0720
- 208.238.1678

**VTC Chihuahua, MX**
Complejo Industrial Chihuahua,
Ave. Homero #3307
Chihuahua, Mexico
- 52.614.483.0000
- 52.614.481.4900

**VTC Delhi, India Office**
Engineering Procurement

© REPLACETRANS-12-2014