

# REPLACEMENT TRANSFORMER SOLUTIONS



**VIRGINIA TRANSFORMER CORP**

*The Commitment Company*

## 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
- **SYNCRUDEOIL / 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

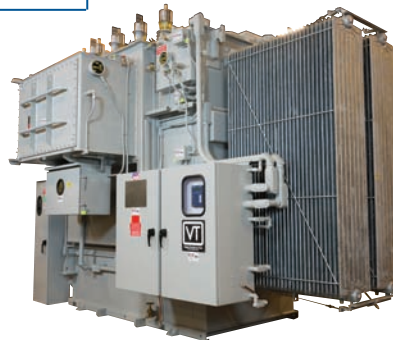
Dimensions and weights are typical and should not be used for design purposes. For exact dimensions and weights, contact factory. Smaller or matching dimensions may be possible.

TYPICAL DIMENSIONS													
15 and 35 kV Classes, Two-winding, Copper				46 and 69 kV Classes, Two-winding, Copper, Circular					115 kV Class				
H"	W"	D"	Wt. Lbs.	KVA	H"	W"	D"	Wt. Lbs.	KVA	H"	W"	D"	Wt. Lbs.
57	43	55	7,600	1500	120	84	78	15,600	5000	80	145	124	53,000
59	46	62	9,500	2000	125	88	84	19,000	7000	185	147	138	65,000
64	49	64	10,700	2500	125	90	88	22,200	10000	189	160	141	72,000
73	53	64	14,000	3750	130	96	94	28,500	12000	190	170	150	80,000
76	53	80	16,000	5000	130	100	98	34,200	15000	195	170	160	85,000
79	55	108	19,000	7500	135	106	106	44,200	20000	196	180	165	107,000
82	61	110	24,100	10000	135	112	112	54,000	25000	210	195	180	130,000
89	78	109	32,300	12000	140	115	115	60,500	36000	210	220	200	160,000
93	86	114	39,300	15000	140	120	122	70,000	50000	240	260	220	200,000
110	94	117	46,100	20000	165	140	160	90,000	-	-	-	-	-
118	97	118	54,200	25000	180	160	180	105,000	-	-	-	-	-
124	103	124	63,000	33000	192	220	190	140,000	-	-	-	-	-

TYPICAL DIMENSIONS													
138 kV Class				161 kV Class					230 kV Class				
H"	W"	D"	Wt. Lbs.	KVA	H"	W"	D"	Wt. Lbs.	KVA	H"	W"	D"	Wt. Lbs.
195	155	140	70,000	10000	215	156	175	100,000	15000	250	240	180	123,000
202	160	150	80,000	-	-	-	-	-	20000	-	-	-	-
209	165	160	875,000	15000	230	180	175	119,000	25000	250	280	195	175,000
213	170	180	100,000	25000	240	210	200	160,000	37500	290	290	200	220,000
220	180	190	120,000	-	-	-	-	-	40000	302	310	240	235,000
220	200	200	135,000	36000	256	230	220	175000	50000	298	300	230	250,000
225	220	205	165,000	50000	260	280	235	225000					
248	270	225	215000										

## 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
- C57.12.90 – Standard Test Code for Liquid-Immersed Distribution, Power and Regulating Transformers and Guide for Short Circuit Testing of Distribution and Power 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

### 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, Envirotemp (FR3), Luminol

### Three Phase Regulators

- Up to 69 kV

### Fluid Preservation

- Sealed Tank (Standard)
- Automatic Nitrogen System
- Conservator



## DRY TYPE TRANSFORMERS *Indoor & Outdoor*

### VPI (Vacuum Pressure Impregnated)

- 300 kVA to 15 MVA
- Up to 35kV 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, 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



## 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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