Liquid Filled Transformers
Load Tap Changing Transformers
Three-Phase Voltage Regulators

VIRGINIA TRANSFORMER CORP
Virginia Transformer is a leader in custom power transformers engineered precisely for your application and optimized for performance and long life.
Liquid Filled Transformers for Precisely Your Application

Full Range of Liquid Filled Transformers
Virginia Transformer manufactures a full range of liquid filled transformers from 300 kVA to 300 MVA up to 230 kV Class, 900 BIL.

Automatic Load Tap Changing (LTC) Transformers
Tap Changer Types: Virginia Transformer offers resistive-type LTC or reactive vacuum type systems. We will custom engineer your transformer with the LTC switch connected on the low voltage winding (U.S) or on the high voltage winding (Europe, Asia, Canada).

Three Phase Voltage Regulators
Virginia Transformer voltage regulators – are used in distribution applications throughout North America to maintain voltage over transmission lines.
Virginia Transformer Liquid Filled Transformers: Utility Operations Throughout North America

Engineered and Custom Built to Your Precise Requirements

Our expert sales team helps you specify your individual transformer requirements. Our engineering and manufacturing staff transforms your requirements into a unique, top quality, efficient, long-life solution for your application. Virginia Transformer will customize units for special requirements. Common options and accessories are available for system protection, reliability and hassle-free maintenance.

Virginia Transformer brings more than 40 years of transformer engineering experience to each new assignment. We have amassed an archive of more than 12,000 designs and test data, serving as an exclusive resource for the development of new solutions... perhaps yours.

Virginia Transformer Liquid Filled Transformers are integral to industrial, commercial and utility operations, but don’t let that limit your thinking. We build custom units for specialty segments such as mining, transit, oil & gas, marine, government, data centers, storage facilities and export markets to name a few. Think about your precise requirements. We do.
Circular Coil Windings for Better Stability

Virginia Transformer uses disc and/or helical winding types for both HV or LV windings, using either copper or aluminum conductors, as specified. Windings are made in temperature and pressure controlled environments. We typically provide circular coils which are more stable than rectangular coils and offer greater short circuit withstand strength.

Circular coils are more stable than rectangular coils. Rectangular coils, under strong short circuit conditions tend to become circular, the natural shape to withstand maximal radial forces, a possible source of internal damage.

Core Stacking Configurations to Optimize Cost, Losses and Sound Levels

Virginia Transformer engineers select from a variety of core lamination materials made from high grade, grain oriented silicon steel to optimize cost, losses and sound levels.

Virginia Transformer uses mitered-joint and/or step-lap core construction with an appropriate grade of cold-rolled, grain oriented silicon steel laminations for optimum efficiency and minimized sound levels.

Choice of Oil Preservation Systems

Virginia Transformer offers three types of oil preservation systems for liquid filled transformers. One of these systems will fit your needs best...Sealed Tanks, Conservators and Automatic (nitrogen) positive-pressure systems.

Conservator Tanks are custom designed primarily for environments with extreme variations in ambient temperatures, most often in severe cold winter climates.

VCM (Virginia Control Module) Transforms Control & Management

Monitor your transformer’s performance remotely with wired or wireless connection available VCM from Virginia Transformer. VCM is a PLC based monitoring and diagnostic module to track and record Top Oil Temperature, WTI (Winding Temp. Indicator), Gas Pressure, Rate of Rise Pressure, Liquid Level. The device sends real time solid state contact outputs and data to supervisory controls. VCM analyzes and detects abnormal conditions and provides data for trend analysis and historical review.

VCM Transformer Monitoring and Diagnostic Module connects through the internet remotely for a real time view of transformer conditions. Modbuss, DNP3, Fiber

www.vatransformer.com
**Virginia Transformer**

**Standard Features**

**Range** – 300 kVA to 300 MVA up to 230 kV Class, 900 BIL

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

**Service** – Outdoor or indoor

**Basic Impulse Level (BIL)** – Per ANSI standard / CSA standard - or per spec

**Impedance** – ANSI standard / CSA standard - or per spec

**Coils** – Aluminum or copper conductor, circular construction, utilizing helical or continuous disc design

**Cooling Fluid** – Type II mineral oil or less flammable oils including biodegradable fluids

**Fluid Preservation System** – Sealed tank, conservator with bladder. Nitrogen Preservation

**Cooling Radiators** – Plate type, Galvanized standard

**Gauges and Accessories** – Liquid temperature gauge, liquid level gauge, vacuum pressure gauge, drain valves, filter press connections (top and bottom), automatic pressure relief device, control wiring indoor/outdoor

**Paint** – ANSI 61/70 epoxy, polyurethane, high performance paint on sandblasted surface. Special colors available

**Nameplate** – Stainless steel, engraved

**Bushings** – Cover or side mounted in air chambers

**Welded top cover**

**Removable Manhole covers**

**Provisions on base for skidding**

**Transformer lifting lugs**

**Stainless steel ground pads**

**Custom Options**

- Nitrogen supply for oil preservation
- Re-connectible windings
- Non-standard impedance
- High performance paint in your choice of color
- Demountable radiators with isolation valves
- Stainless steel radiators
- Air Terminal throats and chambers
- Explosion proof control box
- Sloping roof
- Multi-stage fan cooling for increased MVA
- Thermally upgraded insulation system 120º
- Customer-specific controls and relays
- Stainless junction box
- Less flammable fluids – FR3, Silicon, Beta
- Low temperature oils – Luminol
- Control wiring – rigid, or flexible conduits

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**Fluid Choices**
Virginia Transformer uses Type II mineral oil as our standard transformer fluid. Other choices are available. Beta Fluid may be the perfect choice to lower the risk of fire or explosion in equipment located indoors or near buildings or hazards. FR3 is a less flammable transformer fluid that provides an even greater flash/fire point and is also biodegradable to lessen the impact on the environment.
Custom engineering is our calling card at Virginia Transformer. We provide more than a dozen transformer types for industrial, commercial and utility operations plus variations for mining, cement, marine, export, transit, oil & gas, government facilities and data center specialities. Our engineering strength extends to every discipline of transformer design including electrical, mechanical, thermal and materials engineering.

The design and engineering process at Virginia Transformer is ISO-9001-2008 Certified and delivers quality assured transformers for customer applications demanding performance, efficiency and long-life at the lowest possible cost.

Controlled Manufacturing Environments

Virginia Transformer is in the forefront of transformer manufacturing processes and technology. We produce the world’s finest liquid filled transformers in controlled environments at our three plants in North America.

Test Proof

Virginia Transformer performs complete, in-house production testing per ANSI C57.12.90 and customer specifications as applicable, including:

- Ratio
- Polarity & Phase Relation
- Resistance Measurement
- Excitation Current & No-Load Loss
- Impedance & Load Loss
- Applied Potential
- Induced Potential
- Applied Potential

Other testing procedures are available including

- Power Factor*
- Partial Discharge*
- Lightning Impulse Test*
- Front of Wave
- Switching Surge
- Temperature Rise Test
- Sweep Frequency Response Analysis (SFRA)
- Short Circuit Test (Outside lab)
- Sound Level Measurement
- Thermal Imaging during Temperature Rise Test

* Becomes routine test for Class II Power Transformers

Sophisticated AutoCAD® design systems drive down costs and optimize performance.

www.vatransformer.com
Shorter Order Time to Delivery

Linked design, engineering and manufacturing systems help us produce and deliver custom-built transformers with the industry’s shortest turnaround times for both drawing submittals and production.

Field Service for Installation and Maintenance

Virginia Transformer offers complete installation and maintenance support for transformers manufactured in our facilities including: assembly, oil filling, pre-commisioning testing, repair services, replacement parts, oil handling, hot oil processing and oil testing services, periodic inspection and technical support. Call 540.345.9892 for around-the-clock emergency response.

Commitment to Customer Satisfaction

Each transformer is produced under the watchful eye of our Customer Service Center. They will know the status of your transformer project at every stage of production from start to finish. You will have your own single point of contact for contracts and logistics. You will be kept informed and up to date. Your total satisfaction is both our goal and commitment.
Individualized Solutions For Precisely the Transformer You Need.

Virginia Transformer designs LTC transformers for your specific application. Resistive-type or reactive vacuum type systems are available. You can configure your transformer with the LTC switch connected on the low voltage winding, as is common in the United States or on the high voltage winding, which is common in Canada, Europe and Asia.

A tap range +/- 10% in 5/8% increments is typical but increased adjustment ranges and incremental steps are available, as directed by your requirements.

Control System Alternatives to Fit Your Operations

Virginia Transformer offers local or remote, automatic or manual control systems for single or multiple (parallel) applications. Line monitoring, time delays, supervisory control and interfaces are available as required.

You may also request remote indication of tap position via selsyn, current-loop analog output, digital position indication on multi-contact position indicator.

Long Life and Reliability Means You Keep the Power On

Virginia Transformer optimizes core and coil designs by selecting the most appropriate type of construction for your needs. Winding dielectric systems are designed for maximum protection against voltage spikes.

Transformer coils are dried under highly controlled conditions including vacuum and vapor phase technology to remove moisture and complete the insulation bonding process. Winding connections are solidly brazed or welded. Leads from the coils to the tap changer and bushings are tied and supported.

On the operations side, the LTC switch is housed in a separate compartment with its own oil supply, for both resistive and reactive type LTC system, thus easing maintenance. Our reactive-type system uses a preventive autotransformer, housed in the main transformer tank.
Transform Your LTC into an Intelligent Transformer

With the available VLCM, your LTC transformer will talk to you. VLCM provides alarm contacts for the 16L, 16R, Nominal and Off Tap positions and operational counter information on its PLC screen and on your PC screen via remote or direct access. Electronic contacts replace mechanical design switches common in other devices for greater reliability and lower cost.

Voltage Regulators

Three-phase voltage regulators are used in distribution and transmission applications to maintain steady voltages. The voltage ratio of a regulator is nearly one to one as its basic design differs from that of an LTC transformer, in that it is wound as an autotransformer.

Many critical applications require a more controlled voltage delivered at the terminals of the load. Three-phase Voltage Regulators can perform this duty by employing a load tap changer, which is operated by sensing the load voltage. Normally, about +/-10% voltage is required to be corrected and therefore employing an autotransformer configuration would result in ten times the throughput power for the same size transformer.

www.vatransformer.com
## Transformer Facts

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>KVA</th>
<th>H”</th>
<th>W”</th>
<th>D”</th>
<th>Wt. Lbs.</th>
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<td>15000</td>
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### TYPICAL DIMENSIONS

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<thead>
<tr>
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<th>H”</th>
<th>W”</th>
<th>D”</th>
<th>Wt. Lbs.</th>
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<tbody>
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<td>15000</td>
<td>103</td>
<td>124</td>
<td>124</td>
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### AUDIBLE SOUND LEVELS

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<tr>
<th>KVA</th>
<th>Sound Level (dBA)</th>
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<td>57</td>
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### BIL AND PERCENT IMPEDANCE VOLTAGES AT SELF-COOLED (ONAN) RATING

<table>
<thead>
<tr>
<th>High Voltage BIL (kV)</th>
<th>Without LTC</th>
<th>With LTC</th>
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<td>≤110</td>
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<tr>
<td>750</td>
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Above 15000 kVA consult factory. Data are based on OA rating for oil-immersed power transformers are per NEMA TR-1 standard.

www.vatransformer.com
## DIELECTRIC INSULATION LEVELS FOR CLASS II POWER TRANSFORMERS

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Nominal System Voltage (kV)</th>
<th>Dielectric Strength (kV)</th>
<th>Dielectric Constant</th>
<th>Flash Point ºC</th>
<th>Fire Point ºC</th>
<th>Pour Point ºC</th>
<th>Total Acid Number (mgKOH/gram)</th>
<th>Neutralization (mgKOH)</th>
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<tbody>
<tr>
<td>Silicone</td>
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### LOW FREQUENCY TEST LEVELS

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<tr>
<th>Application</th>
<th>Basic lightning impulse insulation level (BIL) (kV crest)</th>
<th>Chopped wave level (kV crest)</th>
<th>Induced-voltage test (phase to ground)</th>
<th>Switching impulse level (BIL) (kV crest)</th>
<th>One hour level (kV rms)</th>
<th>Enhancement level (kV rms)</th>
<th>Applied voltage test level (kV rms)</th>
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<td>Switching impulse level (BIL) (kV crest)</td>
<td>One hour level (kV rms)</td>
<td>Enhancement level (kV rms)</td>
<td>Applied voltage test level (kV rms)</td>
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### Applicable Standards

- ANSI – American National Standards Institute
- IEC – International Electrical Commission
- IEEE – Institute of Electrical and Electronic Engineers
- CSA – Canadian Standards Association
- C57.12.00-2006 – 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
# Ever Expanding Markets and Applications

### Utility
- Substations
- Voltage Regulator
- Auto Transformer
- Grounding Transformer
- Sub Transmission

### Power Generation
- Generator Step Up (GSU)
- Unit Auxiliary Transformer (UAT)
- Station Service Transformer (SST)
- Excitation
- Generator Start Up
- Reserve Auxiliary Transformer
- Solar & Wind Power
- Geo Thermal
- Bio-Mass

Virginia Transformer maintains professional relationships with engineering consulting firms and keeps a large archive of engineering solutions complete with Utility customer profiles to facilitate your specification and purchasing process.

### Industrial Segments
- 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 Transformers
- Special Fluid Transformers
- – Envirotex Temp (FR3)
- – Beta Fluid, Silicone
- – Chemical/Hazardous Environment
- – Class I, Division II, Group C & D
- Coastal Environment/Offshore

### Commercial/Institutional
- Hospitals, Universities, Hotels, Offices, Airports, Unit Substation

### Transit & Large Drive
- Extra Heavy Duty Traction (RI9)
- ANSI Circuit 25, 26, 25 & 26, 31, 41
- Up to 5000 kW Rectifier
- Up to 20,000 HP, AC, DC
- Liquid Filled - 55°C or 65°C Rise
- Dry Type 0 80°C, 115°C, 150°C Rise

### Switch Gear Match Up for
- General Electric
- Cutler Hammer
- Siemens
- Square D
- Others

### Qualifications
- UL Listed Dry Type up to 2500 kVA, 15kV Class 220°C Insulation System, NEMA 1 or 3R.
- UL Liquid Filled up to 100 MVA, 69 kV Class
- ANSI, CSA, IEC
Virginia Transformer is a leader in custom power transformers engineered precisely for your application and optimized for performance and long life.

Corporate Office  
220 Glade View Drive  
Roanoke, VA 24012  
540.345.9892  
Fax 540.342.7694

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3770 Poleline Rd.  
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Pocatello, ID 83201  
208.238.0720  
Fax 208.238.1678

VTC-W  
Complejo Industrial Chihuahua  
Ave. Homero #3307  
Chihuahua, Mexico  
52.614.483.0000  
Fax 52.614.481.4900

VTC-I  
Engineering Procurement Facility  
Delhi, India

Field Service – Installation | Maintenance | Spare Parts  
(Available optionally after delivery)  
1-800-882-3944  
24/7/365

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