UL Listed

DRY TYPE
Secondary Substation Transformers
MGM Transformer Company has established itself as a leading manufacturer of custom dry type transformers. With an exceptionally large and experienced engineering staff, MGM has the ability to design to the varying criteria of differing industries while maintaining short lead times. Core and coil applications for regulators and UPS systems, low loss/high efficiency drives isolation transformers. Special custom size K-factor rated substation transformers for retrofit are but a few of the special transformers MGM has designed and manufactured.

MGM employs three winding styles for Special Design Dry Type transformers, based on kVA, voltage and BIL requirements. The ability to select a specific winding style assures the highest degree of mechanical strength under short circuit stress conditions and suitability for different voltage classes.

Most transformer companies offer standard engineered products only, and ask the users to make it fit their applications. MGM can engineer the product both electrically and mechanically to fit virtually any application.
**PRODUCT RANGE**

**Three Phase**

<table>
<thead>
<tr>
<th>Voltage Class</th>
<th>KVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 V thru 1.2 kV</td>
<td>9 thru 2,000</td>
</tr>
<tr>
<td>2.4 kV thru 5 kV</td>
<td>15 thru 10,000</td>
</tr>
<tr>
<td>8.7 kV thru 15 kV</td>
<td>45 thru 10,000</td>
</tr>
<tr>
<td>25 kV</td>
<td>225 thru 10,000</td>
</tr>
<tr>
<td>34.5 kV</td>
<td>500 thru 10,000</td>
</tr>
</tbody>
</table>

**Single Phase**

<table>
<thead>
<tr>
<th>Voltage Class</th>
<th>KVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 V thru 1.2 kV</td>
<td>10 thru 833</td>
</tr>
<tr>
<td>2.4 kV thru 5 kV</td>
<td>15 thru 1,667</td>
</tr>
<tr>
<td>8.7 kV thru 15 kV</td>
<td>30 thru 3,333</td>
</tr>
<tr>
<td>25 kV</td>
<td>150 thru 6,667</td>
</tr>
<tr>
<td>34.5 kV</td>
<td>333 thru 6,667</td>
</tr>
</tbody>
</table>

**SPECIFICATIONS**

- Aluminum/Copper
- 150°C / 115°C / 80°C or Special Request
- 220°C insulation
- NEMA standard/special sound levels
- ANSI standard/special BIL levels
- VPI
- UL K-factor ratings
- UL/CUL/CE/CSA listings (check with factory)
- Multi-voltage input/output
- 50/60/400 Hz
- OEM core and coil
- Multiple electrostatic shields
- Design to meet customer impedance and loss criteria

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**Barrel wound**

The rectangular barrel wound style is the most common method in the industry for 600V and 5kV applications. MGM’s standard is the superior oval barrel wound method for 600V class and 5kV class, 45kV BIL maximum.

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**Section wound**

The section wound style is rarely used in the industry due to higher cost vs. barrel or random wound. May be used for special applications up to 125 kV BIL.

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**Disk wound**

The continuous disk or pancake wound style is very costly and not widely used. Due to its superior design criteria, MGM uses this method on most 15kV class to 125kV BIL.
Dry Type Substation 1800 kVA
Primary 6.3 kV ∆ Secondary 400Y/231V 50Hz;
150°C Rise; Copper Wound; Digital Temperature
Monitor; NEMA 3R Louvers; Low Voltage
Transition Section with Flex Leads

For over two decades, MGM Transformer Company has been a reliable source for quality secondary unit substation transformers. Our standard designs cover the full range of requirements from 5 kV to 34.5 kV, 500 kVA to 10,000 kVA, in both liquid and dry type.

As an engineering oriented transformer company, we maintain a large engineering staff. Our experience in working with various switchgear manufacturers enables us to design the high voltage/low voltage switchgear interface, assuring the proper match in the field. Flex connectors can be supplied.

Non-standard substation designs are also available for special situations such as failed unit retrofitting or PCB replacement.

All manufacturing processes are done on the premises. This advantage, along with a large inventory of electrical steel and wire, assures our customers of the industry’s shortest standard lead times, regardless of the interface requirements.

RANGE

15 kVA - 10,000 kVA, 2.4/5 kV
45 kVA - 10,000 kVA, 15 kV
500 kVA - 10,000 kVA, 34.5 kV

SPECIFICATIONS

Aluminum/Copper
150°C / 115°C / 80°C
220°C insulation
Indoor/outdoor
ANSI standard/special BIL levels
VPI
UL K-factor ratings
UL/CUL/CSA listings (check with factory)
Safe, Convenient and Environmentally Sound

Installations of ventilated dry-type transformers do not require a liquid confinement area, automatic fire extinguishing system or fire vault. Dry-type transformers use no insulating liquids, virtually eliminating the risk of local environment contamination and simplifying routine maintenance by eliminating the need to check, replace or clean liquid. Dry-type units are relatively lightweight and can be conveniently installed on upper floors, balconies, roof trusses or roofs. Insurance companies generally offer lower premiums for installations of dry-types than for liquid-filled transformers.

General Construction

Coils are vacuum-pressure-impregnated (VPI) with solventless polyester resin, ensuring complete impregnation of the windings and insulation. The finished VPI coils are incredibly strong, readily dissipate heat and are protected against moisture, dirt and most industrial contaminants. Ventilated dry-type winding designs vary depending on the voltage, basic impulse level (BIL) and current of the individual winding and/or application of the transformer. For all units, the insulation system will be 220°C regardless of the average winding rise.

MGM ventilated dry-type transformers are designed for indoor or outdoor applications in schools, hospitals, industrial plants, commercial buildings and any place requiring safe and dependable power. Ventilated dry-type transformers offer an economical solution and are extremely reliable when properly installed and maintained.

Approximate Enclosure Dimensions and Weights

Based upon 15kV class, 150°C rise. Al windings

<table>
<thead>
<tr>
<th>KVA</th>
<th>Height Inches</th>
<th>Width* Inches</th>
<th>Depth Inches</th>
<th>Weight lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>225</td>
<td>90</td>
<td>56</td>
<td>50</td>
<td>2,400</td>
</tr>
<tr>
<td>300</td>
<td>90</td>
<td>56</td>
<td>50</td>
<td>3,000</td>
</tr>
<tr>
<td>500</td>
<td>90</td>
<td>72</td>
<td>50</td>
<td>3,700</td>
</tr>
<tr>
<td>750</td>
<td>90</td>
<td>80</td>
<td>50</td>
<td>4,900</td>
</tr>
<tr>
<td>1000</td>
<td>90</td>
<td>90</td>
<td>50</td>
<td>6,000</td>
</tr>
<tr>
<td>1500</td>
<td>90</td>
<td>90</td>
<td>50</td>
<td>8,100</td>
</tr>
<tr>
<td>2000</td>
<td>100</td>
<td>100</td>
<td>60</td>
<td>9,700</td>
</tr>
<tr>
<td>2500</td>
<td>108</td>
<td>108</td>
<td>60</td>
<td>11,500</td>
</tr>
<tr>
<td>3000</td>
<td>108</td>
<td>108</td>
<td>60</td>
<td>12,800</td>
</tr>
</tbody>
</table>

*Add 18" to width for each ATC.

NOTES:
1. Coordination to HV/LV Switchgear may require Transition/Throats. Width may increase up to 42".
2. Depth and height dimension may increase for outdoor NEMA 3R enclosures.
3. Dimensions may vary with special requirements.
4. Dimensions and weights are subject to change without notice and should not be used for construction purposes.
**STANDARD FEATURES**

- UL Listing, CSA, & CUL
- Vacuum Pressure Impregnated (VPI) windings
- 80°, 115°, 150°C average winding rise ratings
- 60 Hz operation
- 220°C insulation system
- Aluminum or copper windings
- ANSI ground pads
- Core ground strap
- Indoor ventilated enclosure - NEMA 1
- Enclosure — hinged panels
- Enclosure — knockdown
- Electrostatic Shield
- Space heaters
- Temperature monitor/fan controller
- Thermostat for space heaters
- Bus to End
- Flex Leads
- Low Noise

**ENCLOSURE**

The standard indoor enclosure is NEMA 1, Category C construction. Enclosures are suitable for lifting, jacking, rolling or skidding with provisions for lifting from the transformer base. High voltage and low voltage ANSI ground pads are provided.

The enclosure paint finish is neat, clean and highly resistant to corrosion. Metal surfaces are thoroughly cleaned of scale, oil, grease, rust and other foreign matter before painting. Unless specified otherwise, paint color shall be ANSI 61 (light gray). NEMA 3R outdoor enclosures are available for applications that prohibit indoor installation.

**COILS**

Generally, low voltage (LV) windings less than 2,400 volts are either multi-conductor barrel or sheet conductor types. Multi-conductor windings may be more economical and preferred in smaller kVA low voltage applications in which the current and axial short circuit forces are relatively small. High voltage (HV) windings 2,400 volts or greater may be single-section barrel, multi-section barrel or disk types. Ventilated dry-type coils may be either round or rectangular through about 2,000 kVA. Transformers larger than 2,000 kVA generally are designed with round windings unless there are special considerations, such as limiting dimensions.

**CORE**

The transformer cores are constructed of non-aging, high grade, grain oriented silicon steel laminations with high magnetic permeability. Magnetic flux densities are kept well below the saturation point. Core laminations are free of burrs and stacked without gaps. Mitered construction cores may be provided when specified. The core clamping brackets are designed to provide even distribution of clamping forces to the core yokes and legs. The core is electrically isolated except for the factory-installed core ground strap, which provides a single path from the core to ground.

**FORCED AIR COOLING**

All units rated 750 kVA and higher can have added fans, increasing capacity in all current carrying parts for the fan-cooled rating and capability to add a thermometer relay to control fans. When specified, the transformer shall be provided with fans to give a forced air-cooled rating of 33% above the self-cooled rating. Control wiring (wire markers included), a thermal sensor and a fan controller will be supplied.
**AUDIO SOUND LEVELS**

The transformer shall be designed to meet or exceed ANSI and NEMA sound levels for dry-type transformers. As an option, transformers designed at -3dB below ANSI and NEMA standard sound levels are available.

**Vent-Dry Sound Levels: (dB)**

<table>
<thead>
<tr>
<th>Equivalent Two Winding Base kVA</th>
<th>Self-Cooled dB</th>
<th>Fan-Cooled dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>60</td>
<td>N/A</td>
</tr>
<tr>
<td>750</td>
<td>64</td>
<td>67</td>
</tr>
<tr>
<td>1000</td>
<td>64</td>
<td>68</td>
</tr>
<tr>
<td>1500</td>
<td>65</td>
<td>69</td>
</tr>
<tr>
<td>2000</td>
<td>66</td>
<td>71</td>
</tr>
<tr>
<td>2500</td>
<td>68</td>
<td>71</td>
</tr>
<tr>
<td>3000</td>
<td>68</td>
<td>73</td>
</tr>
</tbody>
</table>

**Product Coordination**

When specified, transformers can be close-coupled to a multitude of High Voltage and Low Voltage Switchgear.

**Testing**

Each transformer shall receive the following standard production tests in accordance with ANSI C57.12.90

- Resistance test
- Polarity & phase relation test
- Turns ration test
- No-load loss & exiting current test
- Impedance and load-loss test
- Applied potential test
- Induced potential test

Test results, when requested, are available by transformer serial number. In addition, the following special tests can be performed on each transformer in accordance with applicable ANSI standards at an additional cost.

- Temperature test
- Impulse test
- Sound test
- Insulation power factor test
- Partial discharge test

**VENT-DRY BASIC IMPULSE RATINGS**

<table>
<thead>
<tr>
<th>Nominal System Voltage kV</th>
<th>Standard BIL kV</th>
<th>Option BIL kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>2.5</td>
<td>30</td>
<td>45</td>
</tr>
<tr>
<td>5.0</td>
<td>30</td>
<td>45,60</td>
</tr>
<tr>
<td>8.7</td>
<td>45</td>
<td>60,95</td>
</tr>
<tr>
<td>15.0</td>
<td>60</td>
<td>95,110</td>
</tr>
<tr>
<td>22.0</td>
<td>110</td>
<td>125</td>
</tr>
</tbody>
</table>

**Special Design or Application**

- Low loss designs
- Rectifier transformer designs
- Special ambient designs
- High overload capacity designs
- Special/low sound level designs
- 50 Hz designs
- Series/parallel windings
- Retrofit to specific dimensions
- K-factor ratings
- Special Paint
- Auto transformers
- PCB replacement

**Single Phase Dry Type**

<table>
<thead>
<tr>
<th>kVA</th>
<th>Low Voltage</th>
<th>Medium Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;60kV BIL</td>
<td>&gt;60kV BIL</td>
</tr>
<tr>
<td>15</td>
<td>97.7</td>
<td>97.6</td>
</tr>
<tr>
<td>25</td>
<td>98.0</td>
<td>97.9</td>
</tr>
<tr>
<td>37.5</td>
<td>98.2</td>
<td>98.1</td>
</tr>
<tr>
<td>50</td>
<td>98.3</td>
<td>98.2</td>
</tr>
<tr>
<td>75</td>
<td>98.5</td>
<td>98.4</td>
</tr>
<tr>
<td>100</td>
<td>98.6</td>
<td>98.5</td>
</tr>
<tr>
<td>167</td>
<td>98.7</td>
<td>98.8</td>
</tr>
<tr>
<td>250</td>
<td>98.8</td>
<td>98.9</td>
</tr>
<tr>
<td>333</td>
<td>98.9</td>
<td>99.0</td>
</tr>
<tr>
<td>500</td>
<td>—</td>
<td>99.1</td>
</tr>
<tr>
<td>667</td>
<td>—</td>
<td>99.2</td>
</tr>
<tr>
<td>833</td>
<td>—</td>
<td>99.2</td>
</tr>
</tbody>
</table>

**Three Phase Dry Type**

<table>
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<tr>
<th>kVA</th>
<th>Low Voltage</th>
<th>Medium Voltage</th>
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<td>10</td>
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<td>30</td>
<td>97.5</td>
<td>97.3</td>
</tr>
<tr>
<td>45</td>
<td>97.7</td>
<td>97.6</td>
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<tr>
<td>75</td>
<td>98.0</td>
<td>97.9</td>
</tr>
<tr>
<td>112.5</td>
<td>98.2</td>
<td>98.1</td>
</tr>
<tr>
<td>150</td>
<td>98.3</td>
<td>98.2</td>
</tr>
<tr>
<td>225</td>
<td>98.5</td>
<td>98.4</td>
</tr>
<tr>
<td>300</td>
<td>98.6</td>
<td>98.5</td>
</tr>
<tr>
<td>500</td>
<td>98.7</td>
<td>98.8</td>
</tr>
<tr>
<td>750</td>
<td>98.8</td>
<td>98.9</td>
</tr>
<tr>
<td>1000</td>
<td>98.9</td>
<td>99.0</td>
</tr>
<tr>
<td>1500</td>
<td>—</td>
<td>99.1</td>
</tr>
<tr>
<td>2000</td>
<td>—</td>
<td>99.2</td>
</tr>
<tr>
<td>2500</td>
<td>—</td>
<td>99.2</td>
</tr>
</tbody>
</table>
MGM Transformer Company is pleased to list a sample of our satisfied customers. For more information, please contact the factory.

**Drives Industry**
- Rockwell Automation
- Rockwell Reliance
- ABB
- Toshiba
- Cegelec
- Lloyd Controls
- Ansaldo-Ross Hill
- Control Techniques

**Industrial & Commercial**
- General Electric
- Siemens
- Westinghouse
- Proctor & Gamble
- Cutler-Hammer
- Motorola
- LTV Steel
- Toyota
- Hewlett-Packard
- AT&T

**Petrochemical**
- Amoco Oil
- Arco
- Chevron
- Mobil Oil
- Shell Oil
- Exxon
- Unocal
- Premcor

**Pulp & Paper**
- Weyerhauser
- Eddy Paper
- Georgia-Pacific

**Municipalities & Utilities**
- Southern California Edison
- Commonwealth Edison
- L.A. Department of Water & Power
- Metropolitan Water District
- Florida Power & Light
- Pacific Bell
- Iowa Power & Light
- Wisconsin Power & Light
- Pacific Gas & Electric
- Edison International

**Architects & Contractors**
- ARAMCO
- Bechtel
- Brown & Root
- Jacobs
- Fluor Daniel
- Ralph M. Parsons Co.
- Black & Veatch

**Universities / Labs**
- UCLA
- UC Berkeley
- UC San Diego
- Fermilab
- University of Michigan
- University of Minnesota
- Lawrence Livermore Labs
- Argon National Lab

**Wind-Turbine Power Generation**
- Palm Springs, California
- Tehachapi Pass, California