MGM TRANSFORMERS

BULLETIN 30

DRY TYPE SUBSTATION TRANSFORMERS

ISO 9001 2015 CERTIFIED

U.S. DEPARTMENT OF ENERGY

made in USA

C SA US

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UL

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NAED

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MGM TRANSFORMERS

Special Design

MGM Transformers Manufactures Transformers In Six Major Categories:

Special Design Dry Type Transformers:

9 kVA to 10,000 kVA
Single Phase & Three Phase
600V to 34.5 kV
K-Factor Ratings
Retrofit Applications

Dry Type Substation Transformers:

225 kVA to 10,000 kVA
600 V to 34.5 kV
Indoor and Outdoor

Liquid Filled Substation Transformers:

500 kVA to 10,000 kVA
2.5 kV to 34.5 kV
Indoor and Outdoor

Dry Type Drives Isolation Transformers:

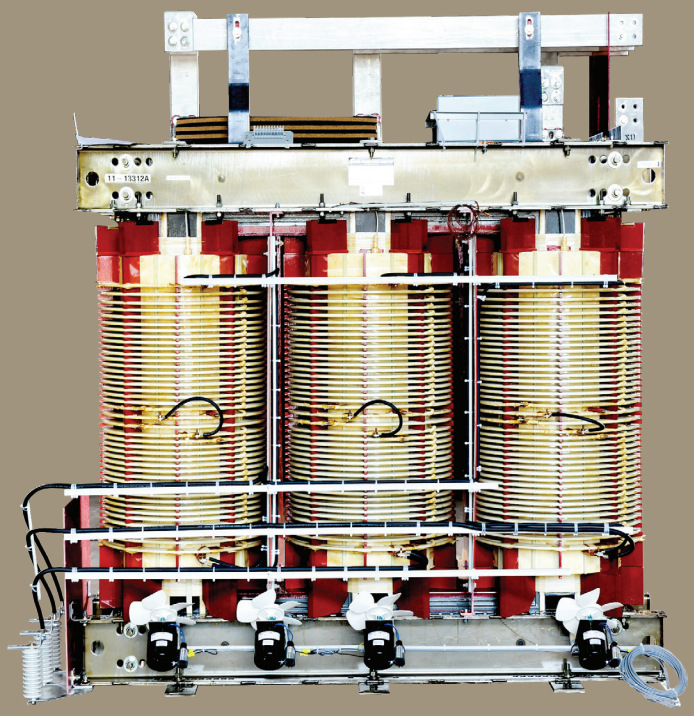
6, 12, 18, 24, 30 and 36-Pulse
15 kVA to 7,500 kVA
600V to 25 kV
Indoor and Outdoor

Liquid Filled Drives Isolation Transformers:

6, 12, 18, 24, 30 and 36-Pulse
200 kVA to 7,500 kVA
2.5 kV to 25 kV
Indoor and Outdoor

600V Class Transformers:

15 kVA to 3,750 kVA, 3-Phase
10 kVA to 833 kVA, 1-Phase



MGM Transformers *has established itself as a leading manufacturer of custom dry type transformers. With an large and experienced engineering team, MGMT has the ability to design to the varying criteria of differing industries while maintaining short lead times. Core and coil applications for voltage regulators and UPS systems, efficiency drives isolation transformers. Special custom size K-factor rated substation transformers for retrofit are but a few of the special transformers MGMT has designed and manufactured.*

MGMT employs three winding types - foil wound, wire disk wound, wire layer wound, wire section wound. Plus a few others. The type is generally chosen for dielectric performance at a given kVA, voltage, and BIL. The short-circuit performance is more determined by winding shape (round, oval, rectangular) than winding type.

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

Dry Type Transformers

PRODUCT RANGE

THREE PHASE

Voltage Class	KVA
600V thru 1.2 kV	9 thru 2,000
2.4 kV thru 5 kV	15 thru 10,000
8.7 kV thru 15 kV	45 thru 10,000
25 kV	225 thru 10,000
34.5 kV	500 thru 10,000

SINGLE PHASE

Voltage Class	KVA
600V thru 1.2 kV	10 thru 833
2.4 kV thru 5 kV	15 thru 1,667
8.7 kV thru 15 kV	30 thru 1,667
25 kV	150 thru 1,667
34.5 kV	333 thru 1 ,667

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)*
- *Mufti-voltage input/output*
- *50/60/400 Hz*
- *OEM core and coil*
- *Multiple electrostatic shields*
- *Design to meet customer impedance and loss criteria*
- *Ultra Efficient Designs*

LAYER WOUND

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

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.

DISK WOUND

Due to its superior design criteria,l MGMT uses this method on most 15kV class to 125kV BIL.

Substation Transforrners

DRY TYPE SUBSTATION 1800 KVA

- *Primary 6.3KVΔ*
- *Secondary 400Y/231V*
- *50Hz*
- *150°C Rise*
- *Copper Wound*
- *Digital Temperature Monitor*
- *NEMA 3R Louvers*
- *Low Voltage Transition Section with Flex Leads*

RANGE

- **225kVA - 3,750kVA,** 600V
- **225kVA - 10,000kVA,** 2.4/5/15kV
- **500kVA - 10,000kVA,** 34.5kV

SPECIFICATIONS

- Aluminum/Copper
- 80°C, 115°C, 150°C
- 220°C insulation system
- Indoor/outdoor
- IEEE standard/special BIL levels
- VPI
- UL K-factor ratings
- UL, CUL, & CSA listings

BULL RUSH PROGRAM

Need it fast? We can deliver. Emergencies happen and we're here to respond. WE WILL WORK 24/7 TILL THE UNIT IS DONE OR YOUR MONEY BACK! Ask about our BULL RUSH program and let us know what you need.

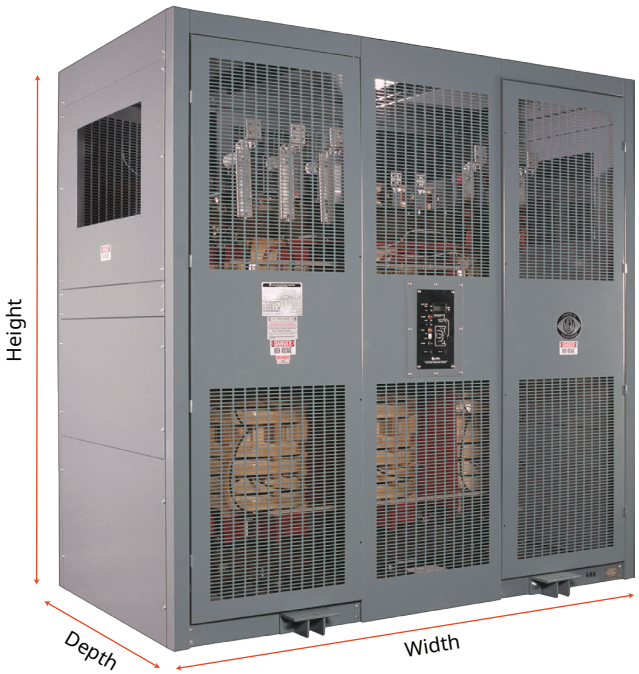
For over two decades, **MGM Transformers** has been a reliable source for quality secondary unit substation transformers. Our standard designs cover the full range of requirements from 5kV to 34.5kV, 500kVA to 10,000kVA, in both liquid and dry type.

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.

Ventilated Dry-Type Transformers



Approximate Enclosure Dimensions & Weights

Based upon 15kV class, 150ºC rise. Al windings

kVA	Height Inches	Width* Inches	Depth Inches	Weight lbs
225	90	56	50	2,400
300	90	56	50	3,000
500	90	72	50	3,700
750	90	80	50	4,900
1000	90	90	50	6,000
1500	90	90	50	8,100
2000	100	100	60	9,700
2500	108	108	60	11 ,500
3000	108	108	60	12,800

*Add 18" to width for each ATC.

NOTES:

- Coordination to HV/LV Switchgear may require Transition/Throats.
- Depth and height dimension may increase for outdoor NEMA 3R enclosures.
- Dimensions may vary with special requirements.
- Dimensions and weights are subject to change without notice and should not be used for construction purposes.
- Compact designs available.
- Retrofit designs available. (with or without enclosures)
- Special, totally enclosed enclosures available. (dimensions will vary)
- MGMT is now offering NEMA 1, NEMA 3R, & NEMA 4 stainless steel enclosures.

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 220ºC regardless of the average winding rise.

MGMT 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.

MGM TRANSFORMERS

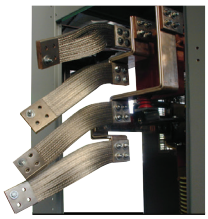
Dry

STANDARD FEATURES

- *UL Listing, CSA, & CUL*
- *Vacuum Pressure Impregnated (VPI) windings*
- *80ºC, 115ºC, 150ºC average winding rise ratings*
- *60 Hz operation*
- *220ºC insulation system*
- *Aluminum or copper windings*
- *IEEE ground pads*
- *Core ground strap*
- *Indoor ventilated enclosure - NEMA 1*
- *Paint — ANSI 61 finish*
- *Provisions tor lifting*
- *Removable front and rear panels*
- *Vibration isolating pads*
- *(2) 2 1/2 % full capacity taps above and below nominal*
- *Conform to IEEE standards for Dry Type Transformers*
- *Seismic rated including OSHPD certified*

ACCESSORIES OR OPTIONS

- *Fans for 133% FA kVA rating*
- *Future fan wiring and control*
- *Ground bus - full length copper*
- *Impact indicator - Mechanical*
- *Outdoor enclosure NEMA 3R*
- *Paint — polyurethane overcoat*
- *Temperature monitor/fan controller*
- *Thermostat for space heaters*
- *Customer specified bus configurations*
- *Flex Leads*
- *Low Noise*
- *Screened ventilation openings*
- *Enclosure — hinged panels*
- *Removeable enclosure*
- *Electrostatic Shield*
- *Space heaters*



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. Two ground pads standard 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 and NEMA 4 outdoor enclosures are available for applications that prohibit indoor installation.

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 step-lap 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.

COILS

Generally, low voltage (LV) windings less than 2,400 volts are either multi-conductor layer 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 layer, multi-section layer or disk types. Ventilated dry-type coils may be either round, oval or rectangular through about 2,000 kVA. Transformers larger than 2,000 kVA generally are designed with round windings in cross-section for improved short-circuit performance unless there are special considerations, such as limiting dimensions.

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 thermostat to control fans. When specified, the transformer shall be provided with fans to give a forced air-cooled rating of 133% above the self-cooled rating. Control wiring (wire markers included), a thermal sensor and a fan controller will be supplied.

AUDIO SOUND LEVELS

Transformers are designed to meet or exceed ANSI and NEMA sound levels for dry-type transformers. As an option, transformers designed at -3dB to -10dB below ANSI and NEMA standard sound levels are available.

VENT-DRY SOUND LEVELS: (dB)

Equivalent Two Winding Base kVA	Self-Cooled dB	Fan-Cooled dB
500	60	N/A
750	64	67
1000	64	68
1500	65	69
2000	66	71
2500	68	71
3000	68	73

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 ratio test at all tap positions*
- *No-load loss & exciting 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*
- *Partial dicharge test*

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*
- *Grounding transformers*
- *Zig-zag transformers*
- *Scott-T transformers*
- *6, 12, 18, 24 and 36-pulse transformers*
- *Drives isolation transformers*

VENT-DRY BASIC IMPULSE RATINGS

Nominal System Voltage kV	Standard BIL kV	Option BIL kV
1.2	10	30
2.5	30	45
5.0	30	45,60
8.7	45	60,95
15.0	60	95,110
22.0	110	125

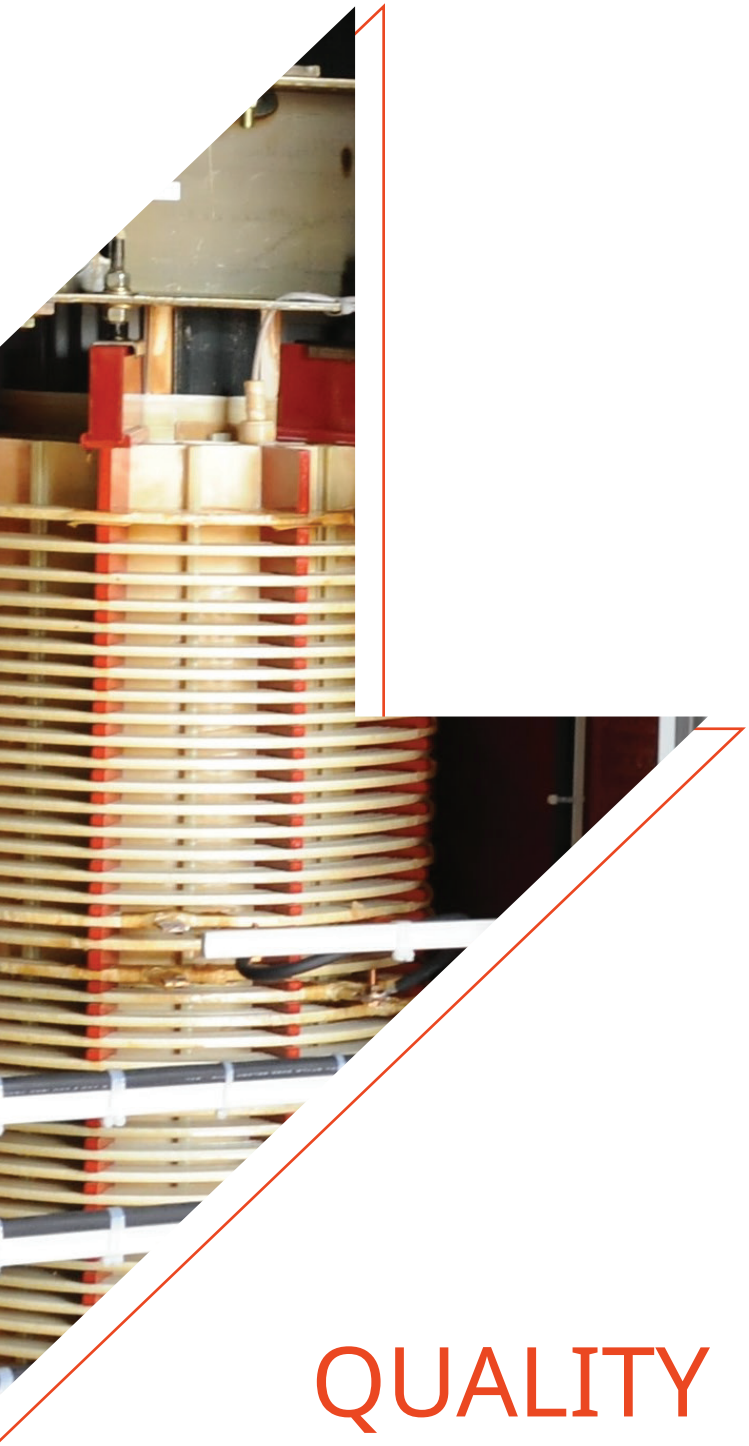
DOE 2016 ENERGY EFFICIENCY

SINGLE PHASE

kVA	BIL		
	20-45 kV	*46-95 kV*	*>= 96 kV*
	Efficiency (%)	Efficiency (%)	Efficiency (%)
15	98.10	97.86	NA
25	98.33	98.12	NA
37.5	98.49	98.30	NA
50	98.60	98.42	NA
75	98.73	98.57	98.53
100	98.82	98.67	98.63
167	98.96	98.83	98.80
250	99.07	98.95	98.91
333	99.14	99.03	98.99
500	99.22	99.12	99.09
667	99.27	99.18	99.15
833	99.31	99.23	99.20

THREE PHASE

kVA	BIL		
	20-45 kV	*46-95 kV*	*>= 96 kV*
	Efficiency (%)	Efficiency (%)	Efficiency (%)
15	97.50	97.18	NA
30	97.90	97.63	NA
45	98.10	97.86	NA
75	98.33	98.13	NA
112.5	98.52	98.36	NA
150	98.65	98.51	NA
225	98.82	98.69	98.57
300	98.93	98.81	98.69
500	99.09	98.99	98.89
750	99.21	99.12	99.02
1000	99.28	99.20	99.11
1500	99.37	99.30	99.21
2000	99.43	99.36	99.28
2500	99.47	99.41	99.33



QUALITY YOU CAN SEE

MGM Transformers 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

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Weyerhauser
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