MGM TRANSFORMER COMPANY

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Medium Voltage Dry Type Substation Transformers

Sales Guide

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Company Profile

For over four decades, MGM Transformer Company has been a reliable source for quality substation transformers. Our abilities cover the full range of requirements from 600v to 34.5kV, 500kVA to 10,000kVA. As an engineering-oriented transformer company, we maintain a large in-house engineering staff at both our factories. 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 also be supplied. Non-standard substation designs are also available for special situations such as failed unit retrofitting or PCB replacements. All manufacturing processes are done on the premises. This advantage, along with a large inventory of electrical steel and wire, assures our customers the industry's shortest standard lead times, regardless of the interface requirements.

General Construction

Coils are vacuum pressure impregnated (VPI) with sol ventless 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.

Bull Rush Program

Need it fast? We can deliver. Emergencies happen and we can expedite the manufacturing of your units to meet your delivery requirements. Ask about our **Bull Rush program** when you place your order and we can manufacture and ship your unit in as fast as 5 working days!

How do I sell Medium Voltage (MV) Transformers?

You start with a Fast/Accurate MV Transformer Quote

WHEN YOU GET AN INVITATION TO QUOTE ON MEDIUM VOLTAGE DRY TRANSFORMER, WHAT DO YOU DO?

1. Send the inquiry immediately to your assigned MGM SAE for a quotation that you can present back to your customer?
2. Give thought about what will be required for you to book the order?
3. What will be your course of action?

    a. *Get* a "feel" for pricing and delivery needed. (Don't rely on standard lead times)
    b. *Be sure* that MGM is approved.
    c. *Why* is the customer asking for a quote? Budgetary, Bid, or Buy?
    d. *Get* information on your competition:

        - Is Liquid Filled in the picture?
        - Will the customer consider a "Used" or "Repaired" transformer?
        - Will a switchgear manufacturer try to "package" you out?
        - Does the customer know all the MGM Transformer advantages?

    e. Get a complete understanding of all the ratings, features, and other associated equipment that will be purchased along with the purchase of the transformer. Will the customer need to buy a PLI (aka primary load interrupter)

    f. Know who will really make the final buying decision and what criteria will be used in making this decision. How do you propose to influence this decision maker to buy our equipment?

**Included as part of this newsletter is the Specification Guide and the Transformer Specification Checklist. The Specification Guide will be available in Word for engineers to use to specify MGM transformers.

Accompanying the *Specification Guide* is the *Transformer Specification Checklist*, which contains the basic information needed to offer an accurate and successful proposal. In this checklist you will see places to indicate the winding material, winding temperature rise, BIL, indoor or outdoor, the method of connecting the transformer to other equipment, and the "ship to" destination. All the items in this checklist are important for us to know so we can offer the best proposal for success.

Vacuum Pressure Impregnated (VPI)

Dry-Type Substation Transformer

Specification Guide

This specification provides technical requirements for the design, manufacture, and testing of substation transformers.

This specification covers only the general requirements of the transformer. The specific requirements will be given in detail on the attached Transformer Data Sheet.

Transformer Technical Requirements

Description

Dry type vacuum pressure impregnated construction, mounted in a suitably ventilated enclosure.

Primary and secondary voltages shall be as indicated on the data sheet

Core Characteristics

The transformer core shall be constructed of high grade non-aging silicon steel laminations with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point. A step lap mitered core joint shall be used to minimize losses, exciting currents and sound levels. The core laminations shall be clamped together with heavy steel members.

Temperature Rise

The average temperature rise of the transformer windings shall be rated at (*80°C, 115°C, 150°C*) and shall be built utilizing Class 220°C insulations, regardless of the temperature rise specified. The transformer shall not exceed the specified temperature rise when the unit is operated continuously at full nameplate rating. The transformer shall be capable of carrying 100% of the nameplate rating in a 40°C maximum, 30°C 24 hour period average ambient.

Coil Characteristics

The high voltage and low voltage windings shall be constructed using copper or aluminum conductors as indicated on the data sheet. The conductors shall be insulated with a 220°C insulation. .

The high voltage winding shall be wound over the low voltage winding with sufficient mechanical bracing to prevent movement during fault conditions and sufficient solid Class 220°C insulation to isolate the high voltage winding dielectric potential from the low voltage windings.

Taps

Transformer primary winding shall have adjustable taps as indicated on the data sheet. Taps shall be for de-energized operation only.

Vacuum Pressure Impregnation Process

The coils shall be dried at atmospheric pressure in an oven through which hot air is continuously circulated. The totally dried coils shall be vacuum pressure impregnated in polyester resin varnish.
The VPI process shall apply a one (1) cycle polyester protective shield of varnish to the coils. The VPI process shall effectively impregnate the coil assemblies, thus resulting in a unit which is virtually impermeable to moisture, dust, dirt, salt air, and other industrial contaminants. The VPI processed coils shall be permanently assembled on the core, and then dipped in polyester resin varnish. The varnish shall be cured on the core and coil assembly following an established temperature vs. time baking cycle in a hot air circulating oven.

Core and Coil Assembly

After installation of windings on core and stacking of the top yoke core steel, core and coil assembly is to be secured with a rigid frame. Primary and secondary coordination bus assemblies, as required for connection to associated switchgear are to be of welded or bolted construction.

Dielectric Threshold

The impulse rating of the transformer must equal or exceed the basic impulse level specified by ANSI for the applicable voltage class. The basic impulse level shall be inherent to the winding design and is to be obtained without the use of supplemental surge arrestors.

Vibration Isolation

The transformer shall have vibration isolation pads installed between core and coil assembly and enclosure base structures to prevent the transmission of structure borne vibration. The pads shall be neoprene-cork-neoprene sandwich type.

Enclosure

The enclosure shall be constructed of heavy gauge sheet steel and shall be finished in ANSI 61 paint color applied using either a powder coat paint system. All ventilating openings shall be in accordance with NEMA and NEC standards for ventilated enclosures. The base of the enclosure shall be furnished with ground pads located on opposite diagonal corners. The base shall have jacking pads and shall be constructed of heavy steel members to permit skidding or rolling in any direction.

Optional – Transformer case anchoring provisions shall be certified to meet California Building Code (CBC) Zone 4 seismic requirements with seismic table validation.

Optional - OSHPD certification is also available.

Optional – Enclosures can be constructed to provide NEMA 3R protection against rain, sleet and external ice construction.

Nameplate

Transformer shall be furnished with a non-corrosive diagrammatic nameplate per ANSI C57.12.01, permanently attached with non-corrosive hardware. The diagrammatic nameplate shall include the name of the manufacturer of the transformer as well as the location where the transformer was manufactured and tested

Forced Air Cooling

Forced air cooling, when required, shall increase the continuous self cooled rating of the transformer by 33 1/3% for units rated 3750 kVA and below and 25% for units 3751 kVA and larger. The FA rating increase shall be possible with forced cooling without exceeding the specified maximum temperature rise. The forced air cooling shall be regulated automatically by sensors placed in the low voltage winding's air ducts. Forced air cooling shall include: three phase electronic digital temperature monitor, fans, control wiring, control panel with test switch, indicating lights, alarm and alarm silencing switch.

Optional Overload Capabilities

When 80°C and 115°C winding temperature rise are specified, they can be designed with inherent overload capabilities. An 80°C rise unit would be capable of continuous operation at 33% above nameplate rating and a 115°C rise unit would be capable of continuous operation at 15% above nameplate rating. This overload capability would be achieved on the AA and FA rating and is accomplished by allowing the transformers' maximum rise to be 150°C. Customer specification must define the high capacity overloads.

Test

After completion, each transformer shall undergo the following routine production tests per ANSI C57.12.01 and ANSI C57.12.91. Testing shall be accomplished using calibrated test equipment, which have recorded accuracy traceable to National Institute of Standards Technologies (NIST).

Accessories

Standard transformer accessories shall include:

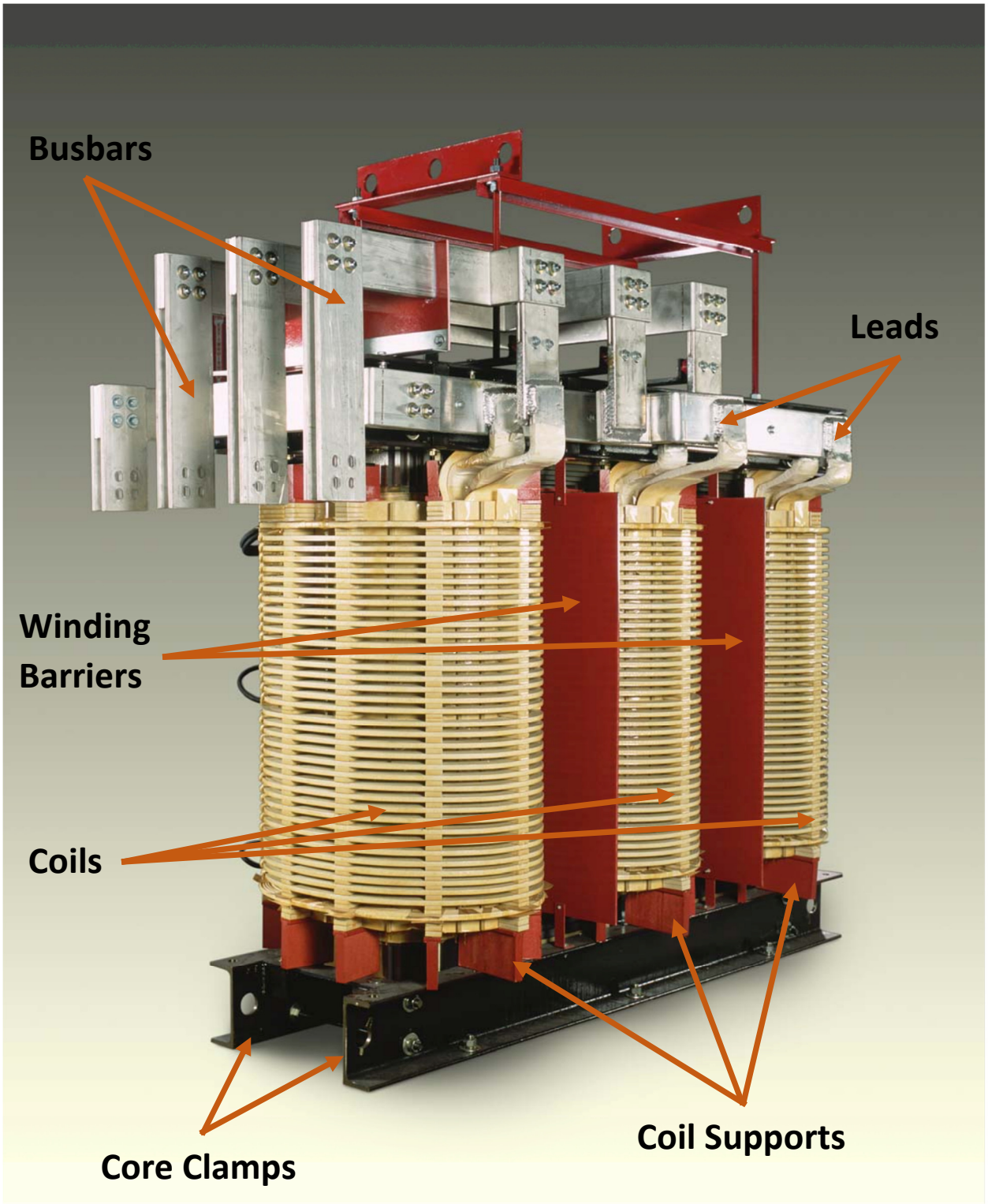
- Diagrammatic instruction nameplate
- Provisions for lifting and jacking
- Removable case panel for access to HV taps
- Stainless steel ground pads
- Line voltage adjustment taps

Documentation

When requested, manufacturer shall provide copies of following documents to buyer for review

- A certified test report containing minimum information per IEEE C57.12.91
- Installation, maintenance, and operating instructions
- Outline Drawing
- Connection Diagram
- Nameplate Drawings
- Spare parts list
- Applicable wiring diagrams

Medium Voltage Transformer Parts



Glossary of terms

Air Cooled: A transformer which uses air as the cooling medium. This may be natural draft cooling by convection or forced air with the use of fans aka dry type transformer

FA: An air-cooled transformer with additional fans for increased air flow

FFA: The transformer has provisions so that fans may be added later.

BIL: Basic Insulation Level is a measure of the ability of the insulation system to withstand surges

Core Loss: Losses caused by a magnetization of the core and its resistance to magnetic flux.

Delta: A standard three-phase connection in which each phase winding is connected in series to form a closed loop.

Delta-Wye: The term used when indicating a method of connection for both primary and secondary windings of a three-phase transformer bank.

Dielectric Tests: A series of tests conducted at much higher than rated nameplate voltage to determine the effectiveness of insulating materials and electrical clearances.

Distribution Transformer: Any transformer rated between 3 and 500 KVA, inclusive with a primary voltage of 601 volts or greater.

Electrostatic Shield: A grounded conductor sheet placed between the primary and secondary winding to greatly reduce or eliminate line to line or line to ground noise. It is often referred to as a Faraday shield.

Flexible Connector: A pliable conductor designed to compensate for thermal expansion and contraction or reduce the transmission of objectionable noise.

Impedance: The vector sum of resistance and reactance, which limits the current flow in an AC circuit. Impedance is identified in percentage and is used to determine the interrupting capacity of circuit breakers, which protect the primary circuit.

Tap: A connection provided in a transformer winding which has the effect of changing the nominal voltage ratio of the transformer. The taps are usually placed on the high voltage winding to correct for high or low voltage conditions found on the low voltage output side. Taps are expressed as either full capacity above nominal (FCAN) or full capacity below nominal (FCBN).

CU/AL: the commonly accepted abbreviation for either Copper or Aluminum

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DRY TAKE OFF SHEET

Your Name _____ **Company** _____

Phone # _____ **Email** _____

Qty _____ **Enclosure Type** _____ **Phase** _____

KV _____ **Conductor** _____ **Hz** _____

Hv _____ _____ **kV BIL** _____

Lv _____ _____ **kV BIL** _____

Temp Rise ○ **150°C** ○ **115°C** ○ **80°C**

K Factor ○ **K-4** ○ **K-9** ○ **K-13** ○ **K-20** ○ **K-30**

Taps _____ **DOE 2016 Efficiency** _____

Options/ Accessories (this portion is not required)

Fan & Temperature Monitor _____

High Voltage Equipment _____

Low Voltage Equipment _____

Arresters _____

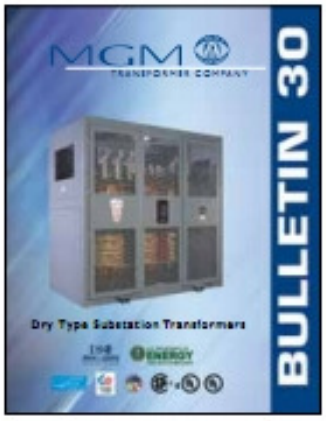
○ **Drive Isolation (SCR Duty)** ☐ **Electro-static shields**

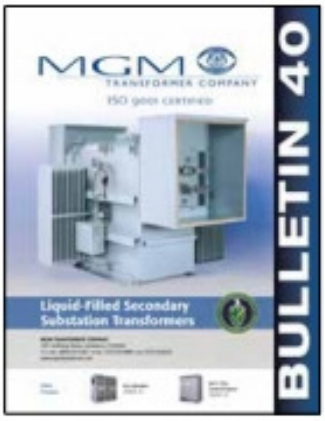
○ **Marine Duty** ☐ **Vaccum Pressure Impregnation**

○ **ABS** ☐ **Strip Heaters**

Additional Notes & Comments _____

MGM Transformer Company - Product Catalogs





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