

DISTRIBUTION TRANSFORMERS

Single-Phase Pad-Mounted



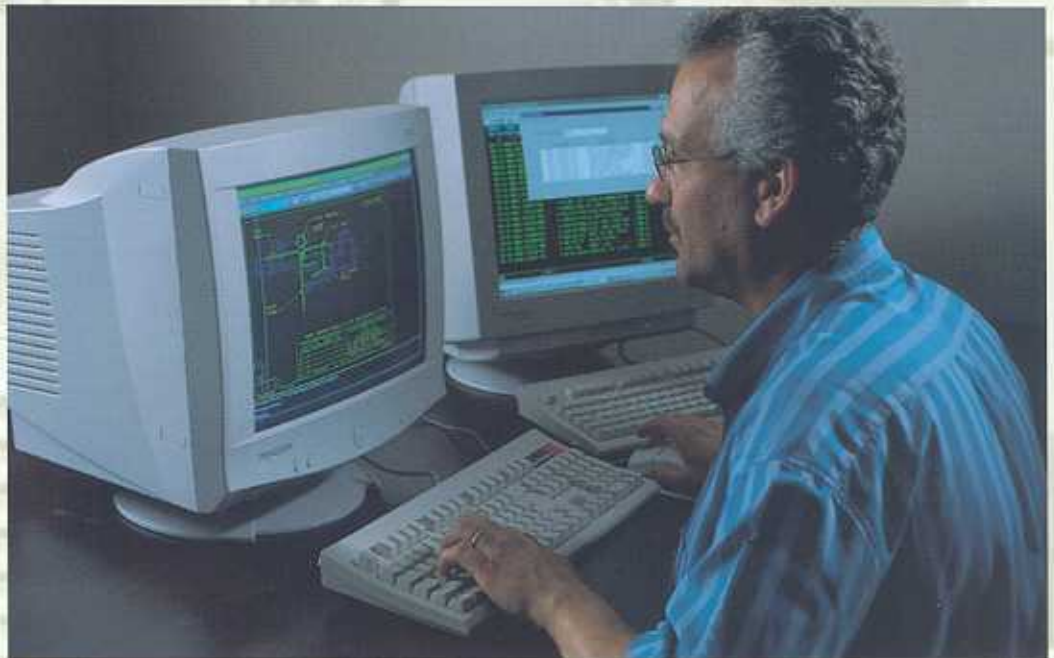
**HOWARD
INDUSTRIES, INC.**

ISO-9001 CERTIFIED
Bulletin 1002



Howard Industries Excels at Delivering Exactly What Our Customers Want.

The Product Automated Design System (PADS) insures that each customer's unique requirements are satisfied.



Life-Cycle Cost Reduction

Howard Industries' Customer Assistance Team excels at helping customers find ways to reduce cost. Using activity-based cost analysis techniques, our commercial and technical experts help customers analyze costs throughout the transformer supply chain, identifying and eliminating activities which add cost but have little or no value.

Quality and Reliability Built into Every Transformer

Higher quality means lower failure rates ... and that translates into lower operating and maintenance costs. Higher quality also means customers can reduce cost by reducing or eliminating incoming receipt inspection and testing.

At Howard Industries our Quality Assurance Program is designed to achieve the high level of quality required by our most demanding customers. Abandoning the traditional manufacturing-only focus, we have created a quality system that links all aspects of the company's operations including Marketing, Engineering, Management Information Systems, Manufacturing, Shipping and Accounting to make sure that not only our products, but everything we do for our customers is of the highest quality.

Howard Industries' quality management system has earned ISO-9001 certification. ISO-9001, the most comprehensive standard in the internationally recognized ISO-9000 series, covers design, manufacturing and servicing systems. This achievement demonstrates Howard Industries' commitment to continuous quality improvement.



Automated and robotic welders perform 100% of all oil-compartment seam welds.



Electrostatically applied powder paint provides a durable, corrosion-resistant finish.



Computerized final test stations perform a complete series of electrical tests prior to shipment.

Designs Optimized for Superior Performance and Economy

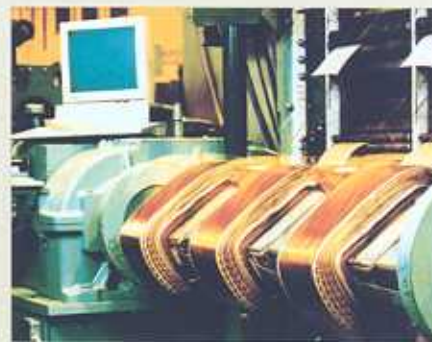
Our design philosophy is to provide our customers exactly what they want. That means transformers that are individually designed in precise accordance with each customer's specifications. Each transformer design is optimized to satisfy the customer's needs at the lowest possible cost.

Howard's Product Automated Design System (PADS) is driven directly by each customer's specifications to insure that all the necessary

requirements are satisfied. PADS synthesizes each transformer design and produces all critical manufacturing documents. PADS then links with a sophisticated computer-integrated-manufacturing (CIM) system to automatically carry-out fabrication on the factory floor. The PADS and CIM systems eliminate manual processes and their inherent inefficiency and error, and make it possible to quickly modify and customize transformer designs.

Advanced Manufacturing

Howard transformers are manufactured in the largest, most advanced facility of its kind. The 1.6 million square foot Laurel plant is the result of a recent three-year, \$50 million expansion project, which saw the introduction of the latest and most sophisticated robotics and automated process equipment available.





Single-Phase Pad-Mounted Transformer Features

Howard Industries offers a complete line of low profile single-phase pad-mounted distribution transformers that are ideal for use on any residential or commercial underground distribution system. Basic styles include the ANSI Type-1, ANSI Type-2 and the compact Space-Saver™, all designed to satisfy the most demanding requirements for safety, reliability and aesthetics. In addition to a full complement of standard features, many value-added options and customized design services are available to serve special applications.

Standard Features

- Meets or exceeds current ANSI, NEMA and RUS standards as applicable
- Full compliance with ANSI C57.12.28 enclosure integrity standards
- Two externally clamped universal high-voltage bushing wells for loop feed operation or one externally clamped bushing well for radial feed operation
- Three externally clamped low-voltage bushings with threaded copper studs, including a fully insulated neutral terminal with removable ground strap (removable ground strap standard on 240/120 and 480/240 ratings only)
- Embossed bushing mounts
- Threaded, flush mounted stainless steel lifting provisions
- Automatic pressure relief device
- Electrical grade mineral oil with oxidation inhibitor
- Removable hood with corrosion resistant stainless steel hinge pins and barrels
- Mild steel enclosure and detachable sill fastened with stainless steel hardware
- Recessed oil compartment bottom
- Electrostatically applied powder paint finish with polyurethane top coat for excellent resistance to chipping, fading, abrasion and corrosion
- Front panel accessory mounting bracket
- Domed top surfaces on hood and oil compartment to prevent water retention
- Oil fill/oil level plug
- Oil drain plug
- Tank grounding provisions
- Corrosion resistant locking assembly with captive penta-head security bolt, floating nut and padlock provision
- Decal or stenciled bushing designations
- Laser engraved anodized aluminum nameplate



Standard KVA and Voltage Ratings



Transformer shown on optional Pad/Pallet™

ANSI Type 2

KVA Ratings (65° rise)

5, 10, 15, 25, 37.5, 50, 75, 100, 167, 250

High-Voltage Ratings

4160GrdY/2400 through 34500GrdY/19920 or 2400/4160Y through 19920/34500Y (60kV through 150kV BIL)

Low-Voltage Ratings

240/120, with 3 low-voltage bushings
 120/240, with 4 low-voltage bushings
 480/240, with 3 low-voltage bushings
 240/480, with 4 low-voltage bushings
 120, with 2 low-voltage bushings
 240, with 2 low-voltage bushings
 277, with 2 low-voltage bushings
 480, with 2 low-voltage bushings (30kV BIL)

ANSI Type 1

KVA Ratings (65° rise)

5, 10, 15, 25, 37.5, 50, 75, 100, 167, 250

High-Voltage Ratings

4160GrdY/2400 through 34500GrdY/19920 or 2400/4160Y through 19920/34500Y (60kV through 150kV BIL)

Low-Voltage Ratings

240/120, with 3 low-voltage bushings
 120/240, with 4 low-voltage bushings
 480/240, with 3 low-voltage bushings
 240/480, with 4 low-voltage bushings
 120, with 2 low-voltage bushings
 240, with 2 low-voltage bushings
 277, with 2 low-voltage bushings
 480, with 2 low-voltage bushings (30kV BIL)

Space-Saver™

KVA Ratings (65° rise)

5, 10, 15, 25, 37.5, 50

High-Voltage Ratings

4160GrdY/2400 through 24940GrdY/14400 (60 through 125kV BIL)

Low-Voltage Ratings

240/120, with 3 low-voltage bushings or 3 cable leads
 120/240, with 4 cable leads
 480/240, with 3 low-voltage bushings or 3 cable leads
 240/480, with 4 cable leads
 120, with 2 low-voltage bushings or 2 cable leads
 240, with 2 low-voltage bushings or 2 cable leads
 277, with 2 low-voltage bushings or 2 cable leads
 480, with 2 low-voltage bushings or 2 cable leads (30kV BIL)

(Note: Contact your distributor or factory representative for availability of other KVA sizes, voltage ratings, features, accessories and design standards not listed.)



Optional Features, Accessories and Design Standards

- Total stainless steel or hybrid (mild steel/stainless steel) enclosure; hybrid enclosure may have stainless steel applied to any of the following components: hood, sill, oil-compartment riser, bottom/front panel, and high-voltage bushing clamps. Available grades of stainless steel include 409, 304 and 304L
- High density polyethylene protector strips on bottom contact surfaces to prevent paint damage during storage and installation
- Molded polymer Pad/Pallet™ serves as both shipping pallet and permanent mounting pad; can be factory mounted to transformers through 50 kVA
- Temporary service access provision (conduit hole)
- High-voltage, load-break on/off or sectionalizing switch
- Fault indicator
- Fault indicator provision only
- Load-break high-voltage bushing inserts
- Removable low-voltage ground strap (standard for 240/120 and 480/240 ratings)
- Low-voltage terminals, including various screw-on spades or slip-fit connectors
- Internally mounted expulsion fuse (alone or in combination with internally mounted, partial-range current limiting fuse)
- Draw-out expulsion fuse in combination with internally mounted partial-range current limiting fuse or isolation link (current limiting fuse not available on Space-Saver™ designs)
- Draw-out (dry well) full-range current limiting fuse (not available on Space-Saver™ designs)
- Drip shield for use with draw-out expulsion fuse
- Internally mounted full-range current limiting fuse (not available on Space-Saver™ designs)
- Low-voltage circuit breaker with or without emergency overload lever (not available on Space-Saver™ designs)
- MOV high-voltage lightning arrester: external plug-in elbow type, or under-oil mounted with or without external disconnect
- High-voltage tap switch with operating handle in the terminating compartment with one of the following tap ranges: four 2.5% taps above normal; or four 2.5% taps below normal; or two 2.5% taps above and two 2.5% taps below normal; or taps at 13800/13200/12870/12540 for transformers with a nominal high-voltage rating of 14400 (high-voltage taps not available in combination with dual high-voltage ratings)
- Dual high-voltage switch with operating handle in the terminating compartment (not available in combination with high-voltage tap switch)
- Interlaced low-voltage windings
- Drain valve with or without sampling device
- Temperature gauge
- Liquid level gauge
- Pressure/vacuum gauge
- Tank ground connectors
- Hold-down cleats
- Lifting bolts
- Custom stenciling and labeling
- Laser engraved stainless steel nameplate
- NEMA safety labels
- Energy-efficient amorphous metal cores (available through 100 kVA)
- Rural Utilities Service (RUS) design standards
- Canadian Standards Association (CSA) design standards and other non-U.S. standards
- NEMA TP-1 compliant designs



(Note: Contact your distributor or factory representative for availability of other kVA sizes, voltage ratings, features, accessories and design standards not listed.)

Howard Industries Distribution Transformers are Available in a Complete Range of Types, Sizes and Voltage Ratings.



Single-Phase Pole-Mounted

Available in capacities ranging from 1.0 through 833 kVA. Voltage ratings through 19.9/34.5 kV, 200 kV BIL. Refer to *Bulletin 1001*



Three-Phase Pole-Mounted

Available in capacities ranging from 30 through 150 kVA. Voltage ratings through 34.5/19.9 kV, 150 kV BIL. Refer to *Bulletin 1001*



Single-Phase Pad-Mounted

Available in capacities ranging from 10 through 250 kVA. Voltage ratings through 19.9/34.5 kV, 150 kV BIL. Refer to *Bulletin 1002*



Single-Phase Subsurface

Available in capacities ranging from 10 through 250 kVA. Voltage ratings through 19.9/34.5 kV, 150 kV BIL. Refer to *Bulletin 1003*



Three-Phase Unit Substation

Available in capacities ranging from 45 through 10,000 kVA. Voltage ratings through 34.5/19.9 kV, 250 kV BIL. Refer to *Bulletin 1004*



Three-Phase Pad-Mounted

Available in capacities ranging from 15 through 10,000 kVA. Voltage ratings through 34.5/19.9 kV, 250 kV BIL. Refer to *Bulletin 1005*

Facilities

Howard Industries operates three manufacturing facilities including locations in Laurel, Sandersville and Mendenhall, Mississippi, and two service locations in Ellisville, Mississippi, and Weirton, West Virginia. Every Howard facility utilizes the latest available technologies to provide its customers with world-class products and services.



Laurel Transformer Facility

Located in Laurel, Mississippi, the 1.6 million square foot facility is responsible for production of the company's electrical distribution transformer product lines and is also corporate headquarters for Howard Industries, Inc.



Sandersville Ballast Facility

The Sandersville, Mississippi facility is headquarters for the Lighting Ballast Division and produces the company's line of electronic fluorescent lighting ballasts. The Sandersville facility is also home for Howard Computers.



Mendenhall Ballast Facility

The Lighting Ballast Division's lines of magnetic fluorescent ballasts and high-intensity-discharge ballasts are produced at its facility located in Mendenhall, Mississippi.



Ellisville Transportation Facility

The Ellisville, Mississippi facility is the location for Howard Transportation, Inc., including its corporate headquarters, truck maintenance shop and computerized dispatch center. A regional terminal is located in Weirton, West Virginia (not pictured).

Howard Industries' Business Units



www.howard-ind.com

Transformer Division

Howard Industries' Transformer Division is this country's leading manufacturer of oil-filled electrical distribution transformers. The Laurel manufacturing facility produces a complete line of overhead, pad-mounted, subsurface and unit substation transformers that are widely used by electric utilities, and by industrial and commercial operations.



www.howard-ballast.com

Lighting Ballast Division

Howard Industries' Lighting Ballast Division is a world-class supplier of magnetic and energy-efficient electronic fluorescent ballasts, and of high-intensity-discharge (HID) ballasts for the lighting industry.



www.howardcomputers.com

Computer Division

Howard Industries' newest business unit, Howard Computers, manufactures a complete selection of built-to-order personal computers, including servers, desktops, towers and notebooks.



www.howard-ind.com

Transportation Division

Howard Transportation, Inc., a wholly-owned subsidiary of Howard Industries, Inc., operates as a full-load, flat-bed common carrier truck line and brokerage operation, transporting commodities and industrial goods throughout the continental United States.

ISO-9001 CERTIFIED

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