

Westinghouse



## Low Voltage Cast Epoxy Bushings

For Pole Mounted, Pad Mounted and Submersible Transformer Applications

### Application

A complete line of low voltage cast epoxy bushings is available for distribution transformers from Westinghouse. In addition to being supplied on Westinghouse equipment, these bushings are available to other manufacturers. Whether the requirement is pole type, pad mounted or submersible, a wide selection is available to meet the requirement. Engineering development and research in epoxy resins has led to the development of these high quality, durable bushings.

### Features

Complete line to choose from  
High flexural strength  
Positive sealing  
Impervious to moisture  
Highly durable  
Minimum of parts  
Easy to install

### Materials

The basic materials used in the manufacture of these bushings are:

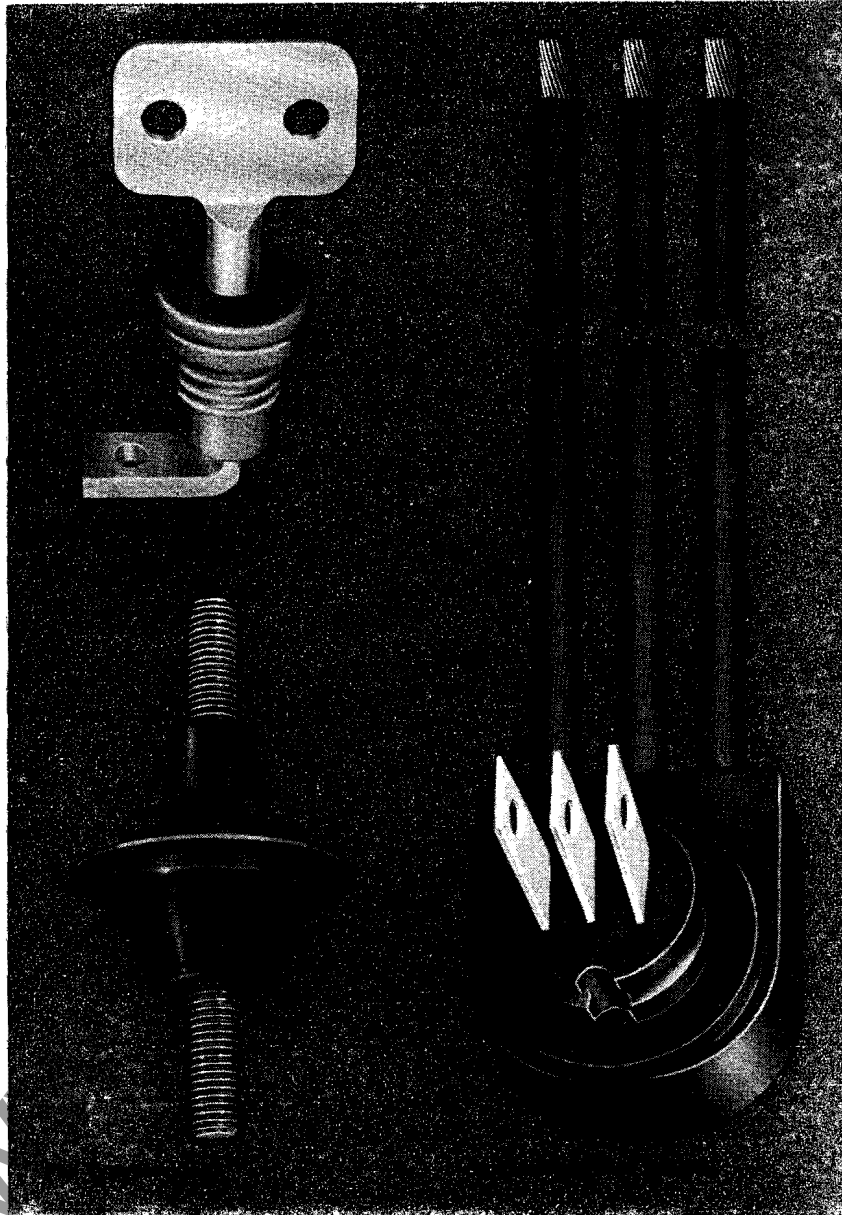
Bushing body - epoxy resin with hardener and mineral filler.

Weld Ring - Stainless Steel

Aluminum Conductors - Electrical conductor (EC) grade aluminum of 99.6% purity.

Copper Conductors - Electrical grade high conductivity copper bar.

Cable Conductors - Underground copper cable type USE suitable for 90°C temperature operation.



### Tests

Extensive tests were conducted on cast epoxy bushings in the Westinghouse Sharon Plant, Research Laboratories, and actual field installations. The tests included:

1. Tracking Resistance - Differential (wet track test)
2. Weatherometer
3. Arc Resistant
4. Dust and Fog Box
5. Outdoor Exposure
6. Thermal Coefficient of Expansion
7. Maintenance of Seal
8. Dielectric
9. Temperature Rise
10. Cyclic Loading Life
11. Adhesion
12. Temperature Rise
13. Cable Lead Water Withstand
14. Thermal Cycling

The results of these tests fully demonstrated that the bushings are satisfactory for the low voltage applications described in this bulletin. A detailed test report is available from the Westinghouse Distribution Transformer Division, Sharon, Pa.

### Resin Properties

Results of applicable ASTM tests show the resin material to have the following properties:

Compressive Strength, 25°C... 42,000 psi  
Flexural Strength, 25°C... 17,000 psi  
Tensile Strength, 25°C... 12,500 psi  
Coefficient Thermal Expansion  
in./in./°C... 23.4 x 10<sup>-6</sup>  
Water Absorption 24 hours, 25°C... 0.02%  
Flame Retardance...  
... Self Extinguishing and non-burning  
Dielectric Strength, 60 Hertz, 1/8 in.  
thickness... 400 v/mil  
Dielectric Strength, 1 1/2 x 40 impulse,  
1/8 in. thickness... 800 v/mil  
Power Factor, 60 Hertz, 25°C... 0.25%  
Heat Distortion Temperature... 130°C

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### Pole Type Bushings

#### Detailed Information

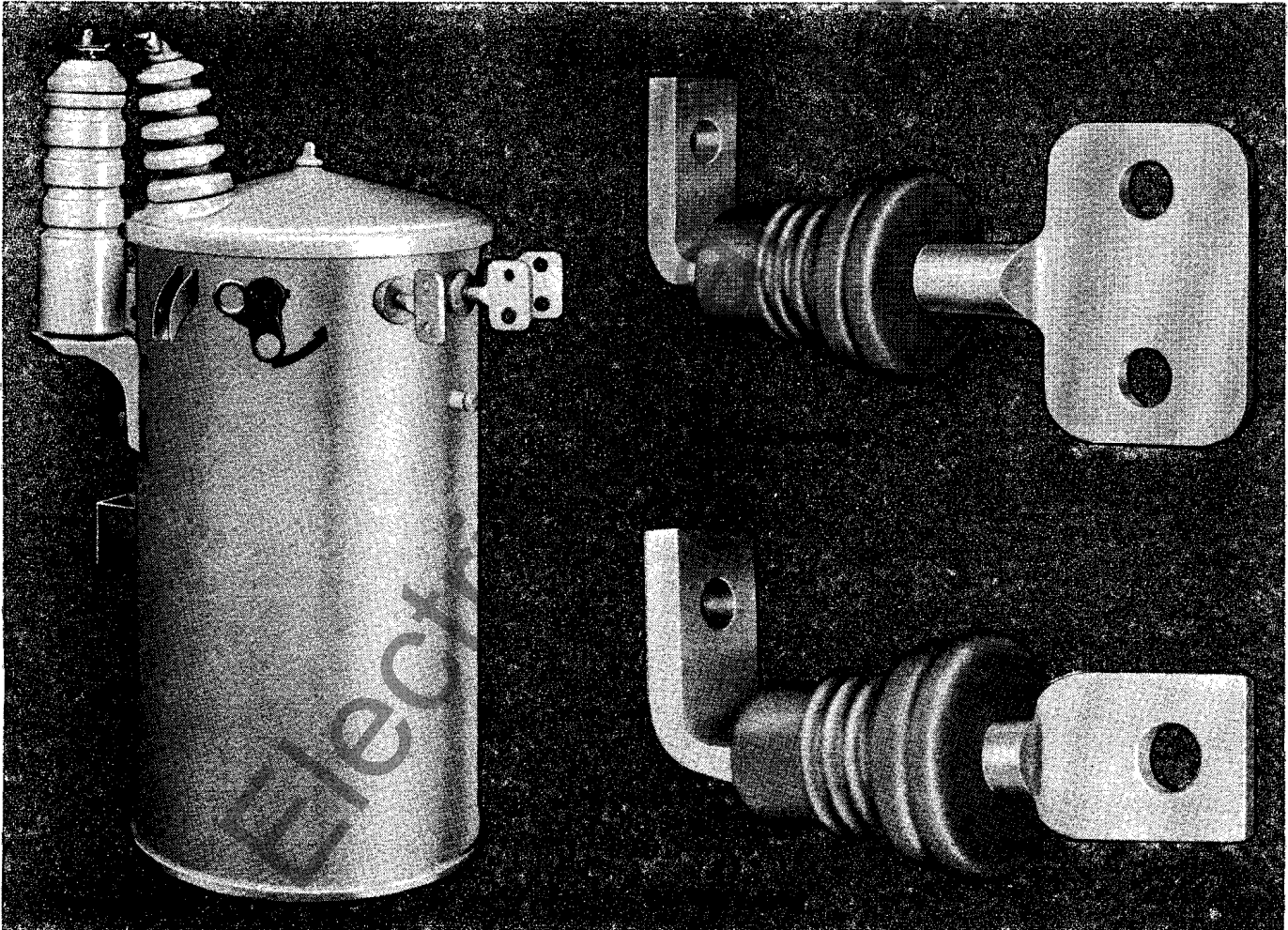
##### Types A&B (5-50 Kva)

Most low voltage pole type bushings presently in use are an assembly consisting of a porcelain insulator, copper conductor, gaskets and hardware. While they have generally performed satisfactorily for years, there have been cases of field trouble (loose studs, leaks, etc.). There have also been instances of porcelain breakage in shipment

and handling. When used with copper conductors, the porcelain bushing with a tinned bronze eyebolt connector has been quite satisfactory. However, when used with an aluminum conductor, cold flow and corrosion problems can occur. An attempted, but costly, correction has been to use a copper to aluminum transition connector. Since most utilities are using aluminum for secondaries and service drops, and since many manufacturers are using aluminum for

secondary coils, it seems uneconomical and inappropriate to use copper as an intermediate connector. It is for these numerous reasons that Westinghouse developed the cast epoxy aluminum spade bushing.

The pole type designs (type A and B) reduce the low voltage bushing to a simple form. They are easy to install, and completely unbreakable when handling.



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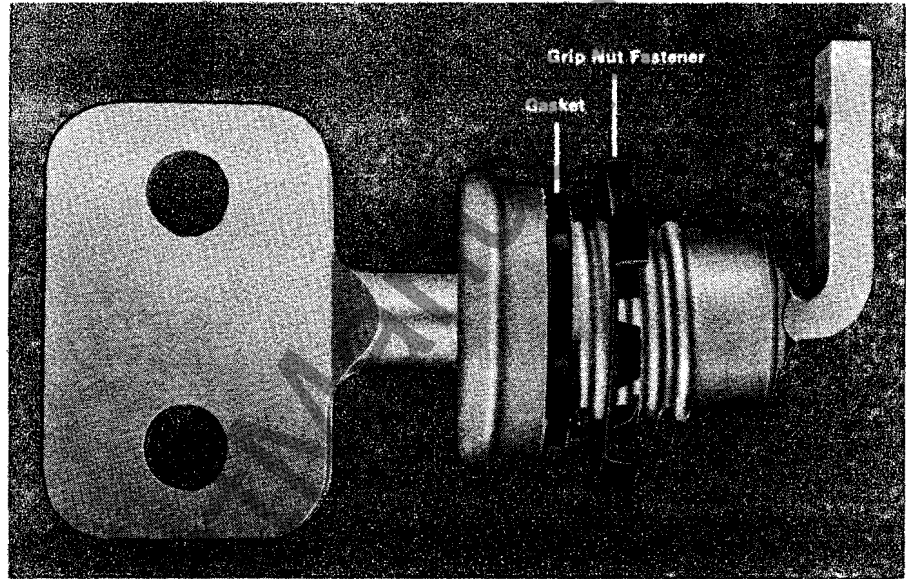
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**Ratings:**

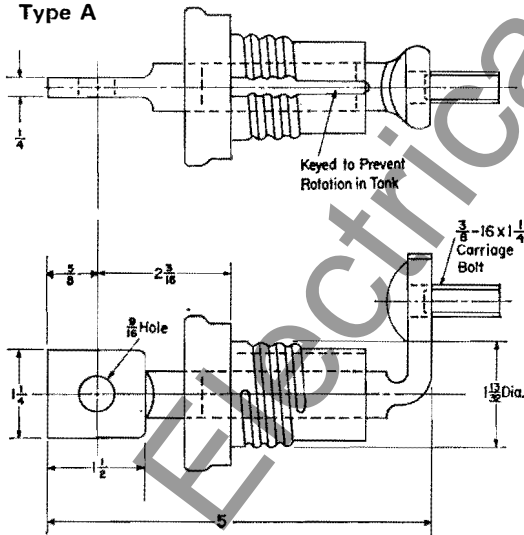
KVA	Low Voltage		
	240/120	120/240	240/480
5	Type A	Type A	Type A
10	Type A	Type A	Type A
15	Type A	Type A	Type A
25	Type A	Type A	Type A
37½	Type A	Type B	Type A
50	Type A	Type B	Type A

**Pole Type Bushing Mounting Hardware**  
 The pole type bushing is threaded to permit use of a steel grip nut fastener for mounting on the tank. The best type of sealing is achieved with a nitrile gasket and recessed mount on the tank.

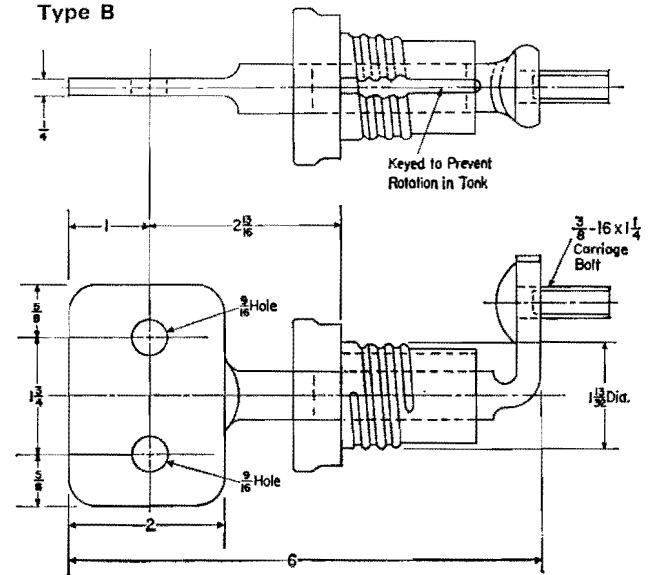


**Dimensions In Inches**

**Type A**



**Type B**



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## Pad Type Bushings Detailed Information

These bushings are for mounting in the compartment of pad mounted transformers. They are composed of a copper or aluminum conductor and a stainless steel weld ring embedded in epoxy resin. A variety of bushing designs are available.

### Maximum Ratings:

Aluminum and Copper Bar (Illustrated Page 5)

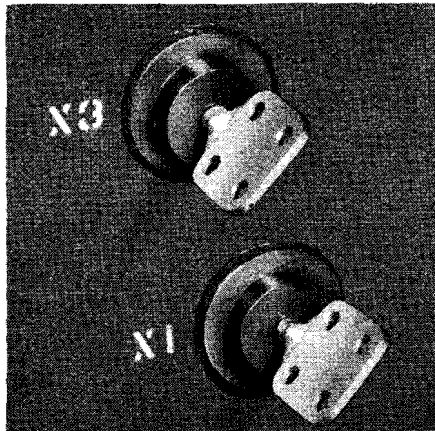
100 KVA, 416 Amps, 240/120 Volts

2 Bar Type Copper Bushing (Illustrated Page 4)

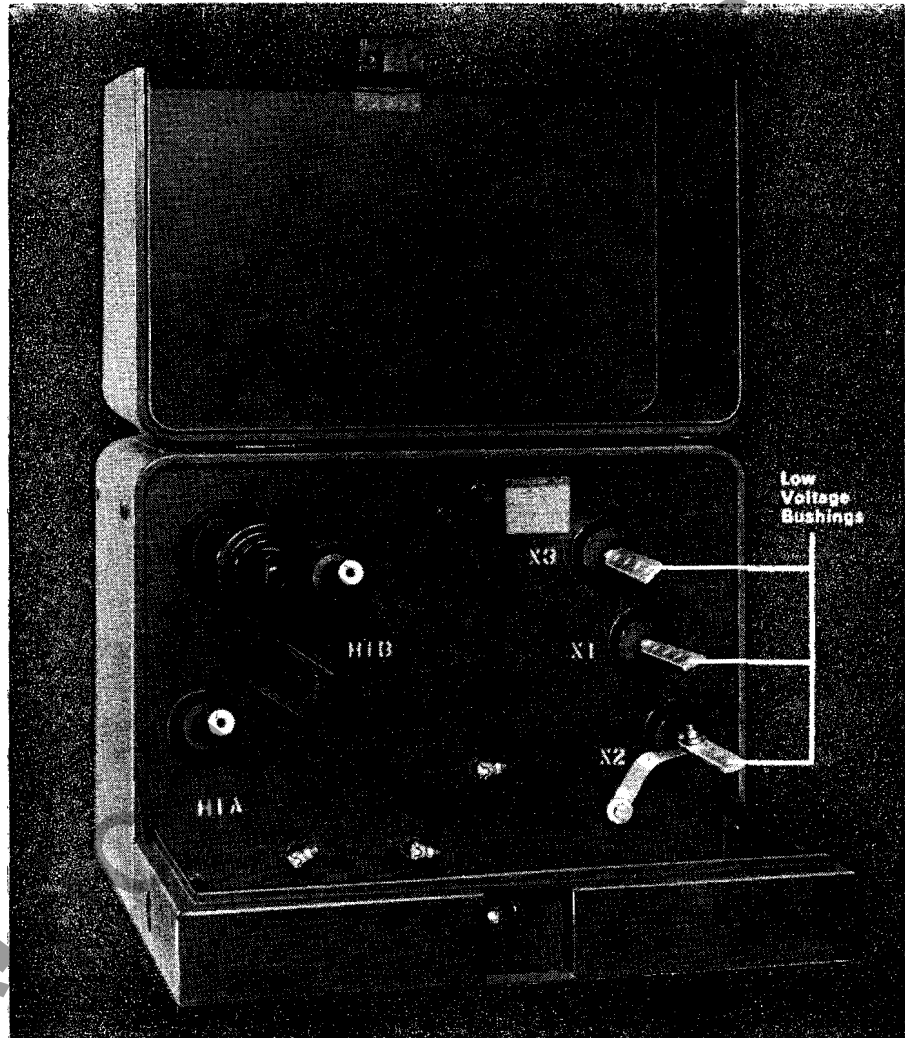
50 KVA, 208 Amps, 240/120 Volts

### Pad Type Mounting

The pad mounted transformer bushings are designed with a stainless steel ring for welding into place. Special processing insures a good adherence of the epoxy resin to the stud and weld ring. The bushings are so designed that a heat sink will easily fit over them.

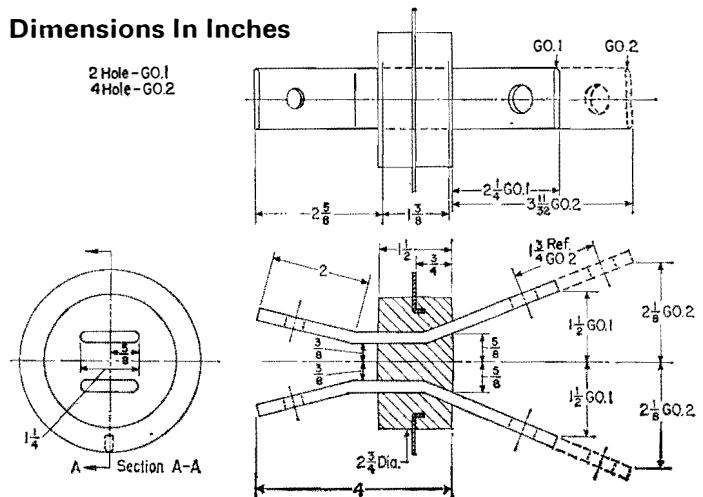


Welded Mounting



## Dimensions In Inches

2 Hole-GO.1  
4 Hole-GO.2



2 Bar Type  
Copper Bushing



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## Cable Leads for Submersibles

### Detailed Information

The Westinghouse cable lead secondary bushings are composed of an epoxy member incasing 2 or 3 internal connectors with 3 available cable sizes. The leads extend 21" out from the molded epoxy and a non-rotating key lock groove is cast into the bushing body.

The connectors are formed copper bars. The stranded secondary cable is stripped and electrically connected to the formed bar.

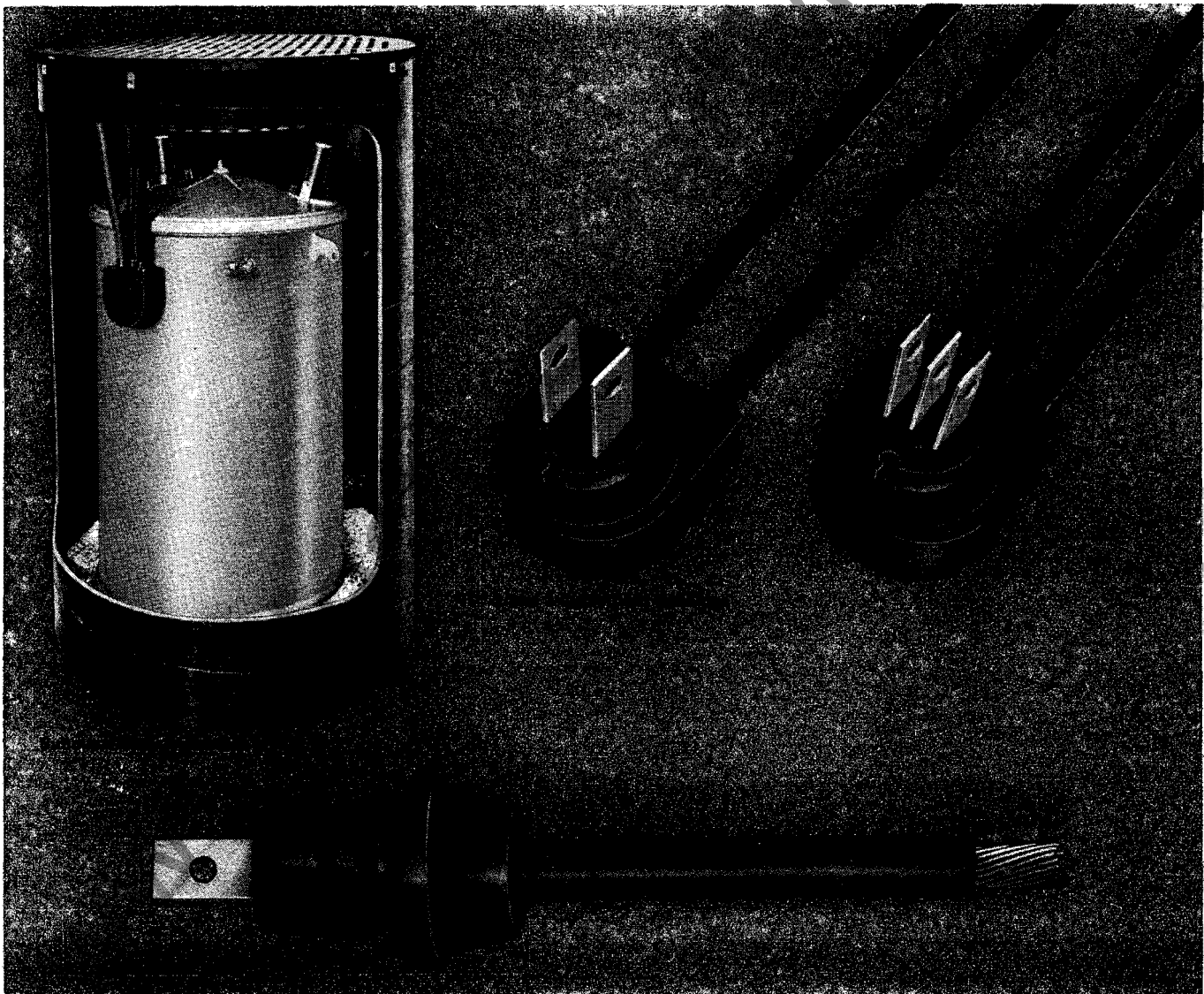
The embedded parts are treated for complete adherence to insure the integrity of the seal.

For special applications, a single lead cover mounted bushing is available. It extends 12" out from the mounting flange. The stranded cable conductor is electrically connected to an internal bar. This assembly is then encased in epoxy resin to form the complete bushing assembly. Cleaning and sealant operations used on the 2 and 3 cable lead bushings are also used on this type of bushing.

### Cable Sizes Are:

KVA <sup>①</sup>	Copper Cable Size	Ratings: Maximum Amperes
10-25	2/0	104
37½-50	4/0	208
75-100	500 MCM	416
①167	(2) 500 MCM	832

① Standard secondary voltage 240/120 with grounded neutral operation.



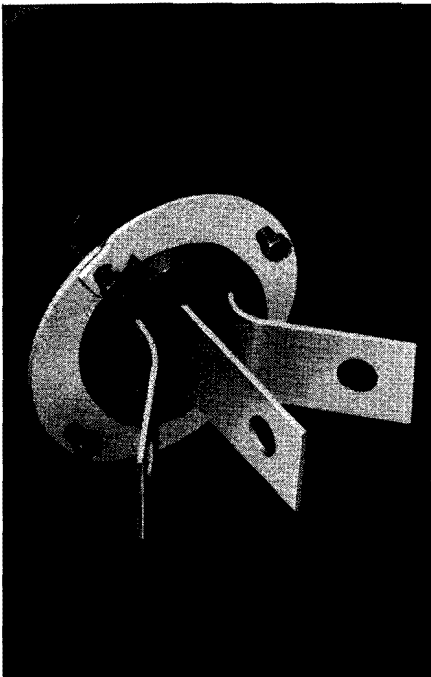
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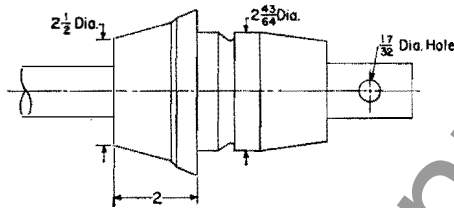
### Cable Lead Mounting Device

The submersible transformer secondary bushing is mounted with an internal clamping ring arrangement. (See illustration). An outer compression ring, fully coated with epoxy sealant, is used to insure a complete hermetic seal and provide resilience to withstand thermal cycling.

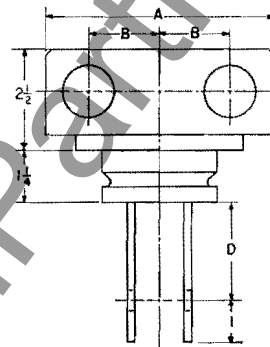
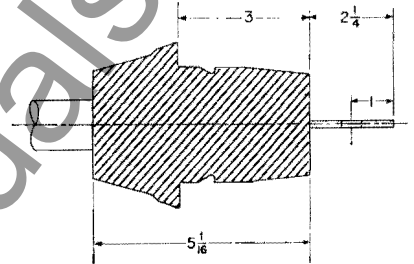


Clamp Ring Mounting (Internal)

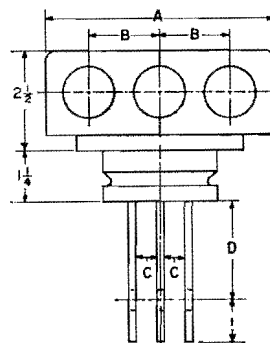
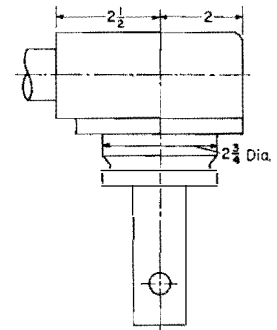
Dimensions In Inches



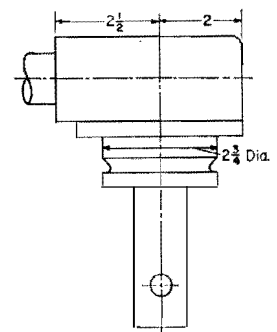
Single Cable Lead Bushing



2 Cable Lead Bushing



3 Cable Lead Bushing



### 2 and 3 Cable Dimensions

Cable Size	A	B	C	D
2/0	4	1 3/16	5/8	1 1/8
4/0	4 1/2	1 1/8	19/32	2 1/16
500 MCM	5 1/2	1 1/16	1/2	2 3/8

## **Low Voltage Cast Epoxy Bushings**

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### **Ordering Information**

For additional information and prices, contact Westinghouse Component and Special Product Sales, Distribution Transformer Division, Sharon, Pa.

### **Further Information**

Pole Mounted Transformers:  
Descriptive Bulletin 46-250

Pad Mounted Transformers:  
Descriptive Bulletins 46-351, 46-354,  
46-355

Submersible Transformers:  
Descriptive Bulletin 46-352