HH-I-4358
August 23, 1977
SUPERSEDING
Fed. Spec. HH-I-435A
January 15. 1970

FEDERAL SPECIFICATION

INSULATORS, ELECTRIC, PORCELAIN AND GLASS

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal Agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers toughened glass insulators and glazed and unglazed, wet and dry process, porcelain insulators for use in electrical transmission and distribution systems.

1.2 Classification.

1.2.1 Types, classes, styles, and sizes. Insulators shall be of the following types, classes, and styles, as specified (see 6.2); sizes shall be as shown on the applicable figures, and shall be as specified (see 6.2):

Type I - Strain insulators.

Class 1 - Guy.

Style A - Standard guy.
Style B - Multifin guy.

Class 2 - Primary spool.
Class 3 - Secondary spool.

Style A - Corrugated.
Style B - Plain.

Type II - Pin insulators.

Class 1 - 35,000 volts wet flashover.
Class 2 - 25,000 volts wet flashover.
Class 3 - 60,000 volts wet flashover.

Type III - Knob insulators.

Class 1 - Solid.
Class 2 - Split.

Type IV - Suspension insulators.

Class 1 - 30,000 volts wet flashover.
Class 2 - 50,000 volts wet flashover.
Class 3 - 55,000 volts wet flashover.

Type V - Standoff insulators.

Class 1 - Wire holder.
Class 2 - Screw eye.

Type VI Cleat insulators.

Class 1 - Single-wire.
Class 2 - Two-wire.

2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein:

Federal Specifications:

QQ-S-781	- Strapping, Steel, and Seals.
QQ-Z-325	- Zinc Coating, Electrodeposited, Requirements for.
PPP-B-566	- Boxes, Folding, Paperboard.
PPP-B-601	- Boxes, Wood, Cleated-Plywood.
PPP-B-636	- Boxes, Shipping, Fiberboard.
PPP-B-640	- Boxes, Fiberboard, Corrugated, Triple-Wall.

PPP-B-665	- Boxes: Paperboard, Metal Edged and Components.
PPP-B-676	- Boxes, Setup.

Federal Standards:

Fed. Std. No. 123	- Marking for Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specification:

MIL-P-116	- Preservation-Packaging, Methods of.

Military Standards:

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	- Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American National Standards Institute, Inc., (ANSI) Standards:

C29.1 - Insulator Tests.
C29.2 - Wet-Process Porcelain Insulators (Suspension Type).
C29.3 - Wet-Process Porcelain Insulators (Spool Type).
C29.4 - Wet-Process Porcelain Insulators (Strain Type).
C29.5 - Wet-Process Porcelain Insulators (Low- and Medium-Voltage Pin Type).
C29.6 - Wet-Process Porcelain Insulators (High-Voltage Pin Type).

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018).

American Society for Testing and Materials (ASTM) Standards:

A108 - Steel Bars, Carbon, Cold Finished, Standard Quality, Standard Specification for.
A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
A576 - Steel Bars, Carbon, Hot Rolled, Special Quality, Specification for.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

Underwriters' Laboratories, Inc., (UL):

UL No. 511 - Standard for Porcelain Cleats, Knobs, and Tubes.

(Application for copies should be addressed to Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, IL 60611; 1655 Scott Lane, Santa Clara, CA 95050.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., ATTN: Traffic Department, 1616 P Street, NW, Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, ATTN: Tariff Publishing Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

3. REQUIREMENTS

3.1 Description. The insulators shall be as shown on the applicable figures and as specified herein.

3.2 Type I, strain insulators.

3.2.1 Class 1, guy. Class 1, Styles A and B insulators shall be as shown in Figure 1 and shall conform to ANSI C29.4

3.2.2 Class 2, primary spool, and Class 3, secondary spool. Class 2 insulators and Class 3, Styles A and B insulators shall be as shown in Figures 2 and 3, respectively, and shall conform to ANSI C29.3.

3.3 Type II, pin insulators. Type II, Classes 1 and 2 insulators shall be as shown in Figure 4 and shall conform to ANSI C29.5. Type II, Class 3 insulators shall be as shown in Figure 5 and shall conform to ANSI C29.6.

3.4 Type III, knob insulators. Type III, Classes 1 and 2 insulators shall be as shown in Figures 6 and 7, respectively, and shall conform to UL No. 511 for porcelain cleats, knobs, and tubes.

3.5 Type IV, suspension insulators. Type IV, Class 1 insulators shall be as shown in Figure 8 and shall conform to ANSI C29.2, Type IV, Classes 2 and 3 insulators shall be as shown in Figure 9 and shall conform to ANSI C29.2. Type IV, Class 2 insulators shall be made of porcelain and Type IV, Class 3 insulators shall be made of toughened glass (see 6.3). However, the porosity and flashover requirements of ANSI C29.2 shall not be required for Type IV, Class 3 toughened glass insulators. In addition to the requirements of ANSI C29.2, toughened glass insulators shall be able to withstand the thermal shock tests described in 4.4.2.1.3 and 4.4.2.1.4.

3.5.1 Material. Porcelain and toughened glass shells shall be sound and free from defects and blemishes which might adversely affect the life of the insulator. All exposed glass parts shall have a smooth surface. The entire porcelain surface of the insulators that will be exposed after assembly shall be glazed (see 6.4).

3.6 Type V, standoff insulators.

3.6.1 Material. The insulating material shall be porcelain, commercial grade. The entire surface (except the firing surface on Class 1 insulators) shall be glazed and free of imperfections. The screw shall be made of steel conforming to ASTM A576 or ASTM A108, Composition 1026, 1029, 1030, or 1035; and shall be zinc coated in accordance with ASTM A153 or QQ-Z-325, Type I, Class 2 (see 6.4).

3.6.2 Class 1, wire holders. Class 1 insulators shall be as shown in Figure 10. The mounting screw shall be a No. 22 wood screw. The screw shall not twist, turn, or pull out of the insulators. The insulators shall have a minimum breaking strength of 1200 pounds.

3.6.3 Class 2, screw eye. Class 2 insulators shall be as shown in Figure 11.

3.7 Type VI, cleat insulators. Type VI, Classes 1 and 2 insulators shall be as shown in Figures 12 and 13, respectively, and shall conform to UL No. 511 for porcelain cleats, knobs, and tubes.

3.8 Workmanship. Insulators shall be free from cracks, chips, rough projections, sharp edges, or other defects that might impair their intended use.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to the prescribed requirements.

4.1.1 Component and material inspection. The contractor is responsible for insuring that components and materials used are manufactured, examined, and tested in accordance with referenced specifications and standards, as applicable.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) Quality conformance inspection (see 4.3).
(b) Inspection of packaging (see 4.5).

4.3 Quality conformance inspection.

4.3.1 Sampling. Sampling for examination and tests shall be in accordance with MIL-STD-105. Examination shall be Inspection Level II; tests shall be Inspection Level S-1.

4.3.2 Examination. Samples selected in accordance with 4.3.1 shall be examined for the defects specified in 4.4.1. AQL shall be 4.0 percent defective.

4.3.3 Tests.

4.3.3.1 Individual. Each Type IV, Class 3 toughened glass insulator shall be tested as specified in 4.4.2.1.2, 4.4.2.1.3, and 4.4.2.1.4. Failure of any test shall be cause for rejection. Each Type IV porcelain insulator shall be tested as specified in 4.4.2.1.1 and 4.4.2.1.2. Failure of any test shall be cause for rejection. Each Type II porcelain insulator shall be tested as specified in 4.4.2.1.1. Failure of this test shall be cause for rejection.

4.3.3.2 Samples. Samples selected in accordance with 4.3.1 shall be tested as specified in 4.4.2.2.1, 4.4.2.2.2, or 4.4.2.2.3, as applicable. AQL shall be 1.5 percent defective.

4.4 Inspection procedure.

4.4.1 Examination. The insulator shall be examined as specified herein for the following defects:

101. Dimensions not as specified.
102. Material not as specified.
103. Design not as specified.
104. Any area not glazed where required.
105. Screw, when required, not zinc coated.
106. Type V, Class 1 only, screw loose.
107. Workmanship not as specified.

4.4.2 Tests.

4.4.2.1 Individual tests.

4.4.2.1.1 Flashover. Each Type II and Type IV porcelain insulator shall be subjected to a routine flashover test in accordance with 7.1 of ANSI C29.1. All insulators that puncture shall constitute failure of this test.

4.4.2.1.2 Tension proof. Each Type IV insulator shall be subjected to a tension-proof test in accordance with 7.2.1 of ANSI C29.1. The load applied shall be that shown in the applicable figure. Nonconformance to 3.5 shall constitute failure of this test.

4.4.2.1.3 Cold-to-hot thermal shock test. Each Type IV, Class 3 toughened glass shell shall be submitted to a thermal shock, bringing it from ambient temperature to a temperature at least 540° F (300° C) higher, and shall be maintained at the higher temperature for at least 1 minute. Any toughened glass shells which fracture constitute failure of this test.

4.4.2.1.4 Hot-to-cold thermal shock test. Each Type IV, Class 3 toughened glass shell shall be quickly and completely immersed in water at a temperature not exceeding 122° F (50° C), the shell having been heated by hot air or other suitable means to a uniform temperature at least 180° F (100° C) higher than that of the water. Fracture of any toughened glass shells shall constitute failure of this test.

4.4.2.2 Quality conformance tests.

4.4.2.2.1 Types I, II, and IV. Types I, II, and IV, strain, pin, and suspension insulators, respectively, shall be tested in accordance with the applicable electrical, mechanical, and galvanizing tests of ANSI C29.1. However, the porosity test shall not be required for Type IV, Class 3 toughened glass insulators. Nonconformance to ANSI C29.1 shall constitute failure of this test.

4.4.2.2.2 Types III and VI. Types III and VI, knob and cleat insulators, respectively, shall be tested in accordance with UL No. 511. Any evidence of damage to the insulator shall constitute failure of this test.

4.4.2.2.2.1 Certification. The presence of the UL label on the insulators may be accepted as proof that Types III and VI meet the requirements of UL No. 511.

4.4.2.2.3 Type V. Type V, Class 1 standoff insulators shall be mounted in normal position on the crossarm or a mount of equal strength. A tensile test (dead end pull) shall be applied to the insulator by inserting through the hole of the insulator a wire rope or a shackle attached to a wire rope. The pull shall be started at zero and increased at a rapid, uniform rate to 900 pounds, and then increased at a gradual rate to 1200 pounds. Any evidence of damage to the insulator tested shall constitute failure of this test.

4.5 Inspection of packaging.

4.5.1 Quality conformance inspection of pack.

4.5.1.1 Unit of product. For the purpose of inspection, a completed pack prepared for shipment shall be considered a unit of product.

4.5.1.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.5.1.3 Examination. Samples selected in accordance with 4.5.1.2 shall be examined for the following defects. AQL shall be 2.5 percent defective:

108. Materials, methods, and containers not as specified for Level A or B. Each incorrect material, method, or container shall be considered one defect.
109. Insulators preserved by a procedure different than those specified for Level A.
110. Insulators of unlike description consolidated together for Level A.
111. Gross weight or size exceeds the limitations of the box for Level A or B.
112. Strapping not as specified for Level A.
113. Marking missing, illegible, incorrect, or incomplete for Level A, B, or C.

5. PREPARATION FOR DELIVERY

5.1 Preservation. Preservation shall be Level A or C as specified (see 6.2).

5.1.1 Level A. Insulators shall be preserved by the most applicable procedure depending on size and weight as follows:

(a) Each insulator shall be placed in a close-fitting box conforming to PPP-B-566, Variety 1, style, type, and class optional; PPP-B-665, Class 1, style optional; PPP-B-676, Variety 1, type, class, and style optional; or PPP-B-636, Type CF, Class Domestic, Variety SW, Grade 125. Cushioning to prevent movement or damage shall be provided. The insulators shall then be consolidated as specified in 5.1.1.1.

(b) Each insulator shall be preserved in accordance with MIL-P-116, Method IC-1 or IC-3. The insulators shall then be consolidated as specified in 5.1.1.1.

(c) Insulators of like description shall be placed together in a close-fitting box conforming to PPP-B-636, W5c, style optional, in quantities not to exceed the weight or size limitation of the box. The insulators shall be protected from contacting each other by the use of fiberboard separators and pads. Box closure shall be in accordance with the appendix to the box specification.

5.1.1.1 Consolidation. Insulators of like description, preserved as specified in 5.1.1(a) or (b), shall be consolidated together in a close-fitting box conforming to PPP-B-636, W5c, style optional, in quantities not to exceed the weight or size limitation of the box. Box closure shall be in accordance with the appendix to the box specification.

5.1.2 Level C. Insulators shall be clean, dry, and preserved to afford protection against corrosion, deterioration, and physical damage during shipment from the contractor to the initial destination. This level may conform to the contractor's commercial practice when such meets the requirements of this level.

5.2 Packing. Packing shall be Level A, B, or C as specified (see 6.2).

5.2.1 Level A. Insulators, preserved as specified in 5.1, shall be packed in close-fitting boxes conforming to PPP-B-601, Overseas Type, Grade B, style optional; in quantities not to exceed the weight limitation of the box. Box closure and strapping shall be in accordance with the appendix to the box specification. Strapping shall conform to QQ-S-781, Class 1, Type I or IV, size as applicable. Unless otherwise specified (see 6.2), strapping shall be Finish B.

5.2.2 Level B. Insulators, preserved as specified in 5.1, shall be packed in close-fitting boxes conforming to PPP-B-636, V3c, style optional or PPP-B-640, Class 2, style optional, in quantities not to exceed the weight or size limitation of the box. Box closure and strapping shall be in accordance with the appendix to the applicable box specification.

5.2.3 Level C. Insulators shall be packed to afford protection against damage during shipment from the contractor to the initial destination and acceptable to the carrier at lowest rates. Packing shall comply with Uniform Freight Classification rules or National Motor Freight Classification rules and may be the contractor's commercial practice when such meets the requirement of this level.

5.3 Marking. Marking shall be in accordance with 5.3.1, 5.3.2, or 5.3.3, as specified (see 6.2).

5.3.1 Civil agencies. In addition to any special marking required by the contract or order (see 6.2), all packages and shipping containers shall be marked in accordance with FED. STD. No. 123.

5.3.2 Military agencies. In addition to any special marking required by the contract or order (see 6.2), all containers shall be marked in accordance with MIL-STD-129.

5.3.3 Commercial. In addition to any specifial marking required by the contract or order (see 6.2), marking for commercial (Level C) packaging shall be by any means which provides legibility and shall include the National Stock Number (NSN) or part number, nomenclature, quantity and unit of issue, contract, purchase order, or delivery order, and address.

6. NOTES

6.1 Intended use. The various types of insulators are intended for the following uses:

Type I, strain. For insulating guy wires on transmission line poles.
Type II, pin. For supporting medium- and high-voltage transmission lines on crossarms.
Type III, knob. For use in low-voltage interior wiring.
Type IV, suspension. For supporting transmission lines from crossarms.
Type V, standoff. For general purpose low-voltage exterior wiring.
Type VI, cleat. For use in low-voltage interior wiring.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

(a) Title, number, and date of this specification.
(b) Type, class, style, and size of insulator required (see 1.2.1).
(c) When porcelain or toughened glass suspension insulators are required (see 3.5).
(d) Degree of preservation and packing required (see 5.1 and 5.2).
(e) When other than Finish B strapping is required (see 5.2.1).
(f) Whether civil agency, military, or commercial marking is required and if special marking is required (see 5.3).

6.3 Definitions. The following definitions shall apply throughout this specification.

6.3.1 Toughened glass. Toughened glass is a glass in which permanent pre-stresses are set by a rapid and well controlled cooling process during manufacturing.

6.4 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of the specification (see 3.5.1 and 3.6.1).

MILITARY INTERESTS:

Custodians:
Army - ME
Navy - YD
Air Force - 85

Review activities:
Air Force - 99
DLA - GS

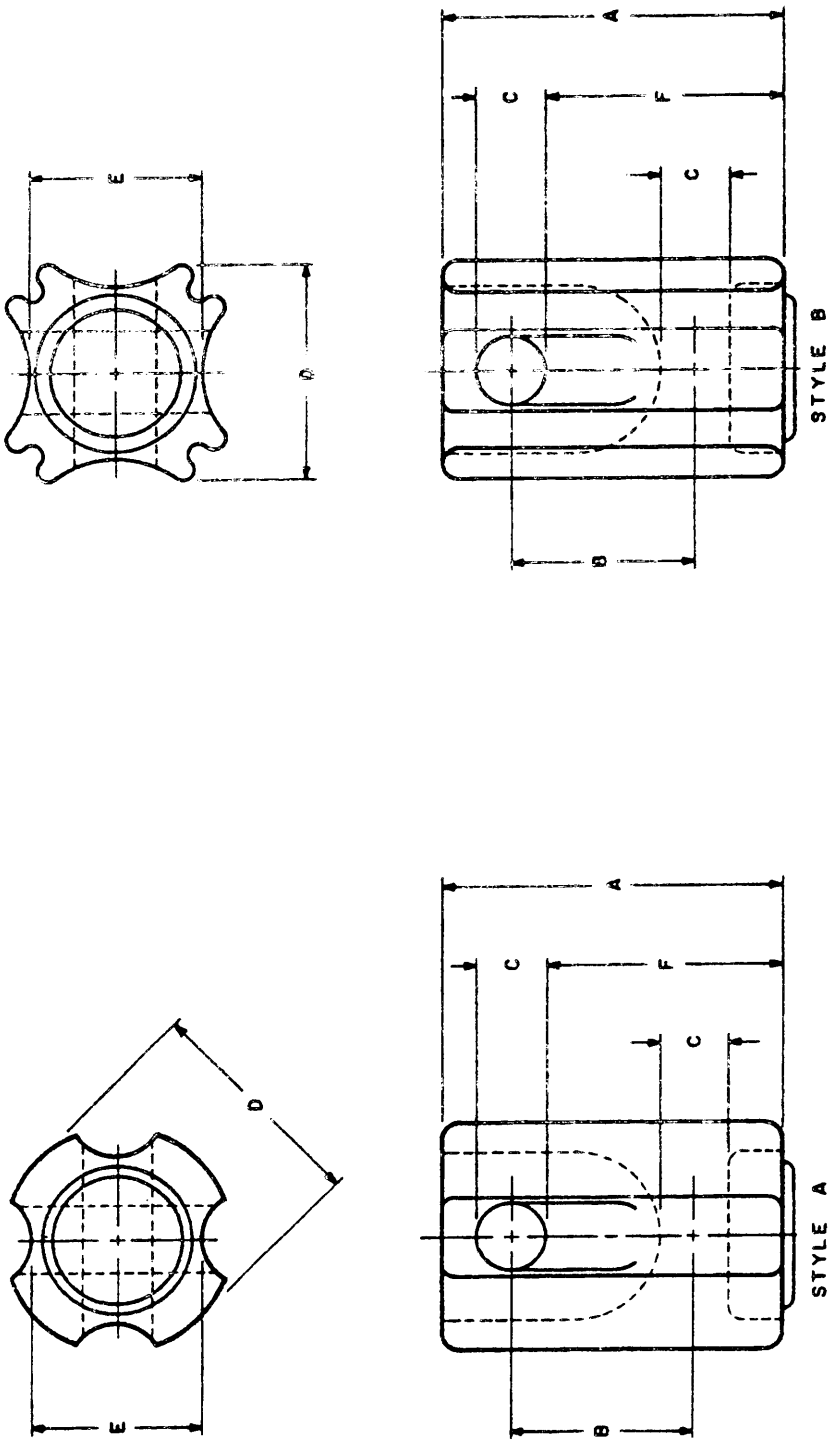
User activities:
Navy - SH, EC, MC, EL

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS

Preparing activity: Army - ME

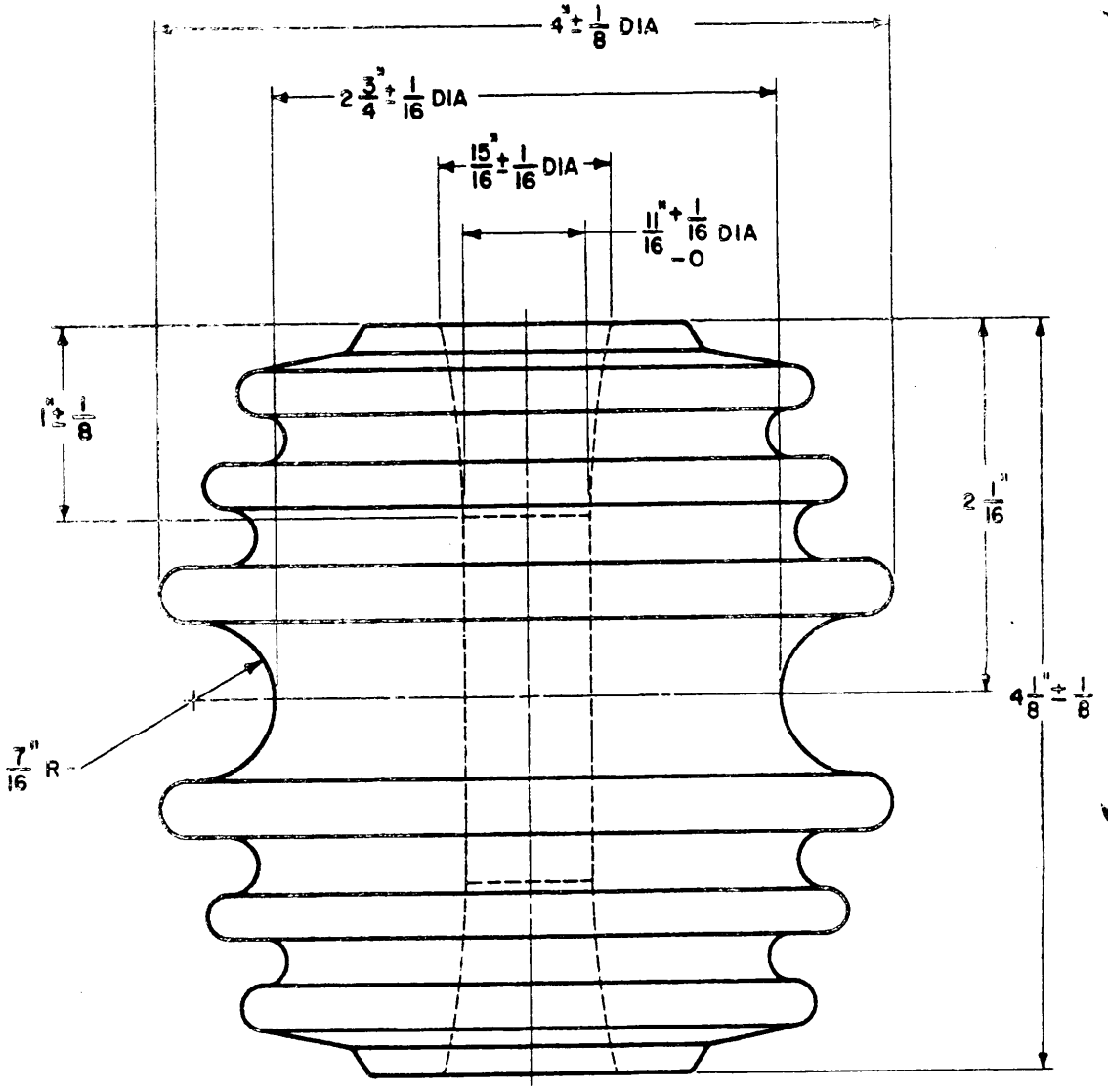
Orders for this publication are to be place with General Services Administration, acting as an agent for the Superintendent of Documents. See Section 2 of this specification to obtain extra copies and other documents referenced herein. Price 65 cents each.



SIZE	STYLE A NOMINAL DIMENSIONS IN INCHES						STYLE B NOMINAL DIMENSIONS IN INCHES					
	A	B	C	D	E	F	A	B	C	D	E	F
1	3 1/2	1 3/4	5/8	2 1/2	1 3/4	2 1/2	3 3/8	1 1/2	3/8	2 1/2	1 1/2	
2	4 1/4	2 1/4	7/8	2 7/8	2 1/8	3	3 7/8	1 5/8	5/8	2 1/2	1 1/2	
3	5 1/2	3 1/8	1	3 3/8	2 3/8	4 1/16	5 1/2	2 3/4	7/8	3 1/16	2 1/16	
4							6 3/4	2 5/8	1	3 1/2	2 3/8	4 1/2

X-3265

FIGURE 1 - Type I, class 1, strain insulators.

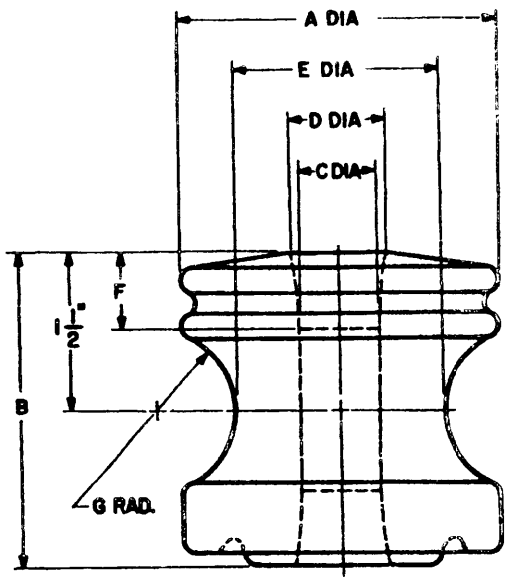


NOTE: LOW FREQUENCY FLASHOVER—WET:
VERTICAL 18 KV
HORIZONTAL 25 KV
FOR USE WITH CLEVISES, FORK BOLTS, UPSET BOLTS, OR THROUGH BOLTS.

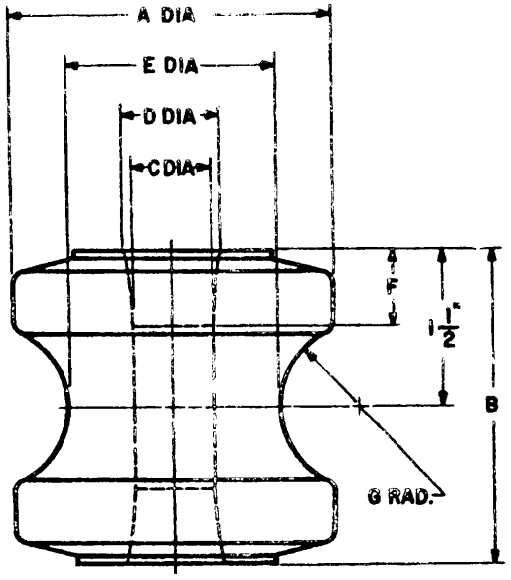
FIGURE 2 - Type I, class 2, strain insulator.

X-3266

...tops shall not be less than 0.100 inch. ...is smaller. The outside diameter of ...



STYLE A



STYLE B

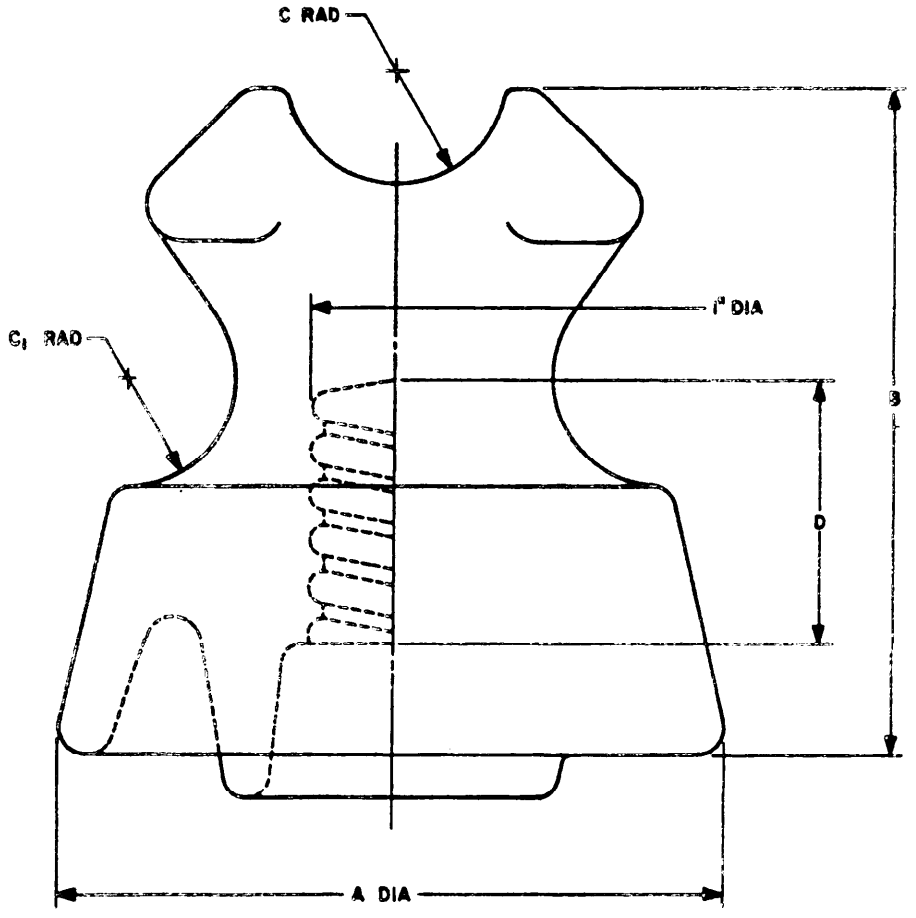
SIZE	NOMINAL DIMENSIONS IN INCHES							MFG. PROCESS
	A	B	C	D	E	F	G	
1	†3 1/8	3	11/16	15/16	1 3/4	3/4	11/16	WET
2	*13 1/8	3	3/4					DRY
3	*3	3	11/16					DRY

† FOR USE WITH CLEVISES, FORK BOLTS, UPSET BOLTS, OR THROUGH BOLTS.

* FOR USE ON SECONDARY RACKS

FIGURE 3 - Type I, class 3, strain insulator.

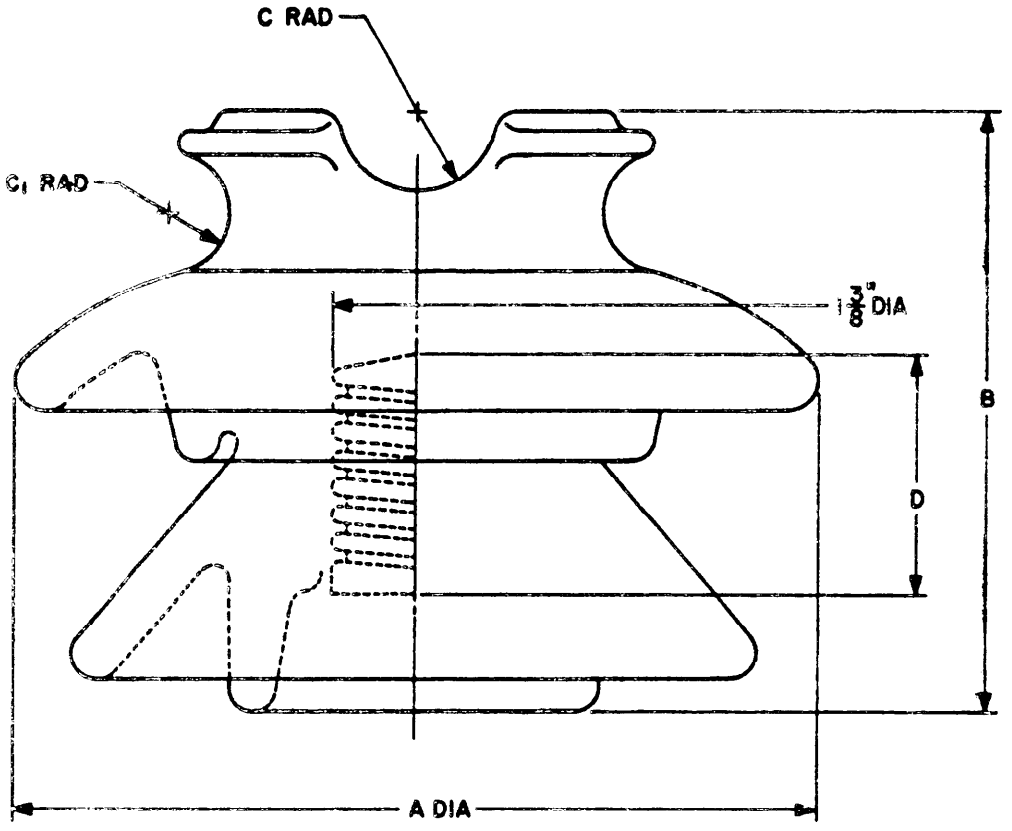
X-3267



CLASS	SIZE	NOMINAL DIMENSIONS IN INCHES					WET FLASHOVER
		A	B	C	C_1	D	
1	1	$4\frac{3}{4}$	$3\frac{3}{4}$	$\frac{9}{16}$	$\frac{9}{16}$	$1\frac{1}{2}$	35,000 V
1	2	$4\frac{3}{4}$	$3\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{8}$	$1\frac{1}{2}$	35,000 V
2	3	$3\frac{3}{4}$	$3\frac{1}{4}$	$\frac{5}{8}$	$\frac{5}{8}$	$1\frac{1}{2}$	25,000 V
2	4	$3\frac{5}{8}$	4	$\frac{3}{4}$	$\frac{3}{4}$	$1\frac{1}{2}$	25,000 V

FIGURE 4. TYPE II, PIN INSULATORS

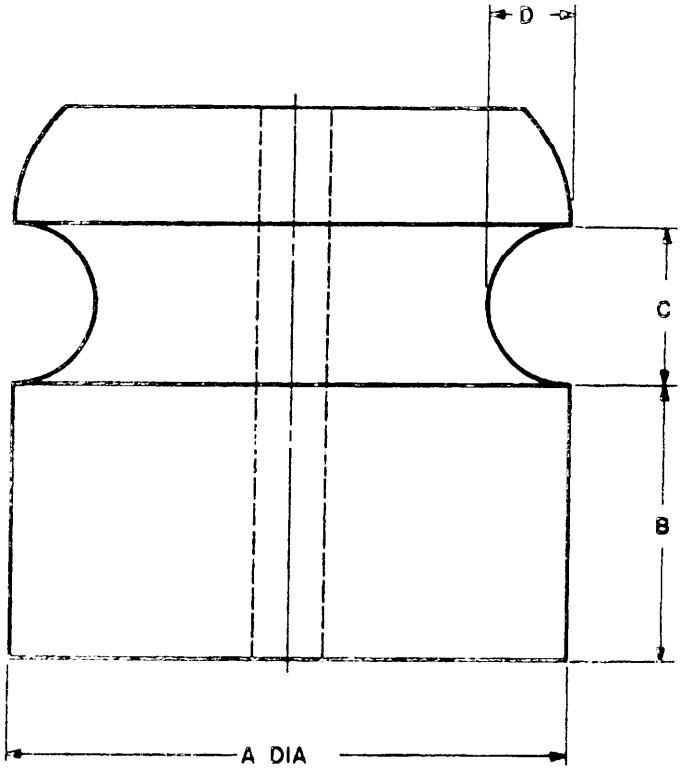
DX-1318



CLASS	SIZE	NOMINAL DIMENSIONS IN INCHES					WET FLASHOVER
		A	B	C	C_1	D	
3	5	$7\frac{1}{2}$	$5\frac{3}{4}$	$\frac{3}{4}$	$\frac{9}{16}$	2	60,000 V

FIGURE 5. TYPE II, PIN INSULATORS

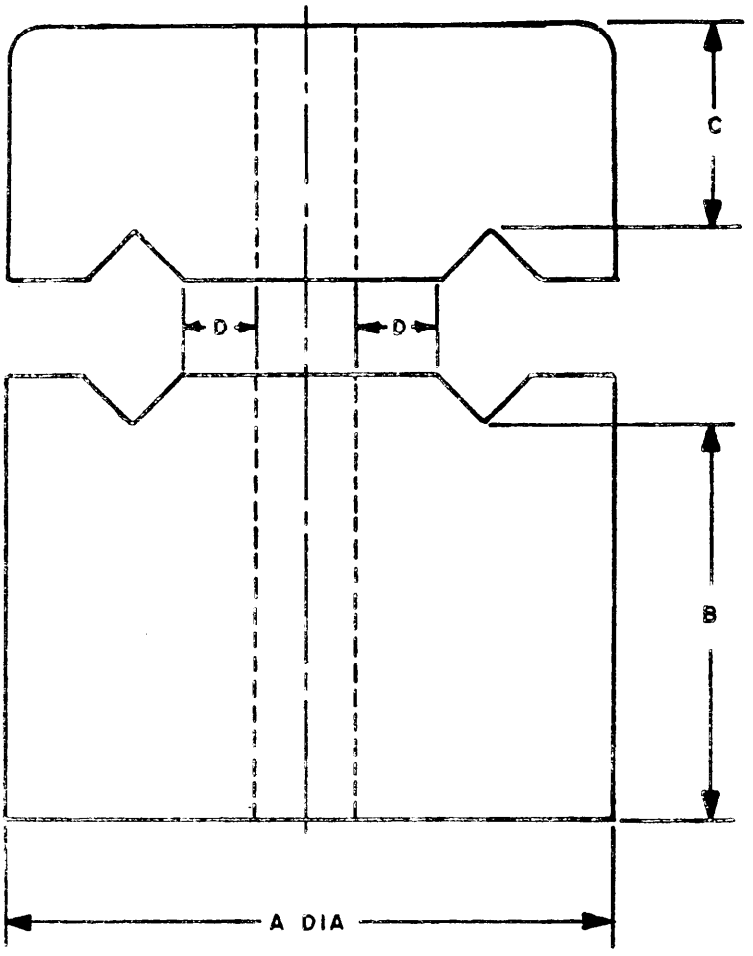
DX-1319



SIZE	MINIMUM DIMENSIONS IN INCHES			
	A	B	C	D
1	1 1/8	1	1/4	3/16
2	1 1/2	1	1/4	3/16
3	1 1/2	1	5/16	1/4
4	1 1/2	1	3/8	1/4
5	1 1/2	1	1/2	5/16
6	1 3/4	1	5/8	3/8
7	1 3/4	1	3/4	7/16
8	2	1	9/16	3/8
9	2	1	5/8	3/8
10	2	1	11/16	7/16
11	2 1/2	1	3/4	7/16
12	2 1/2	1	13/16	1/2
13	2 1/2	1	1 3/8	3/4

FIGURE 6 - Type III, class 1, knob insulators.

X-3268

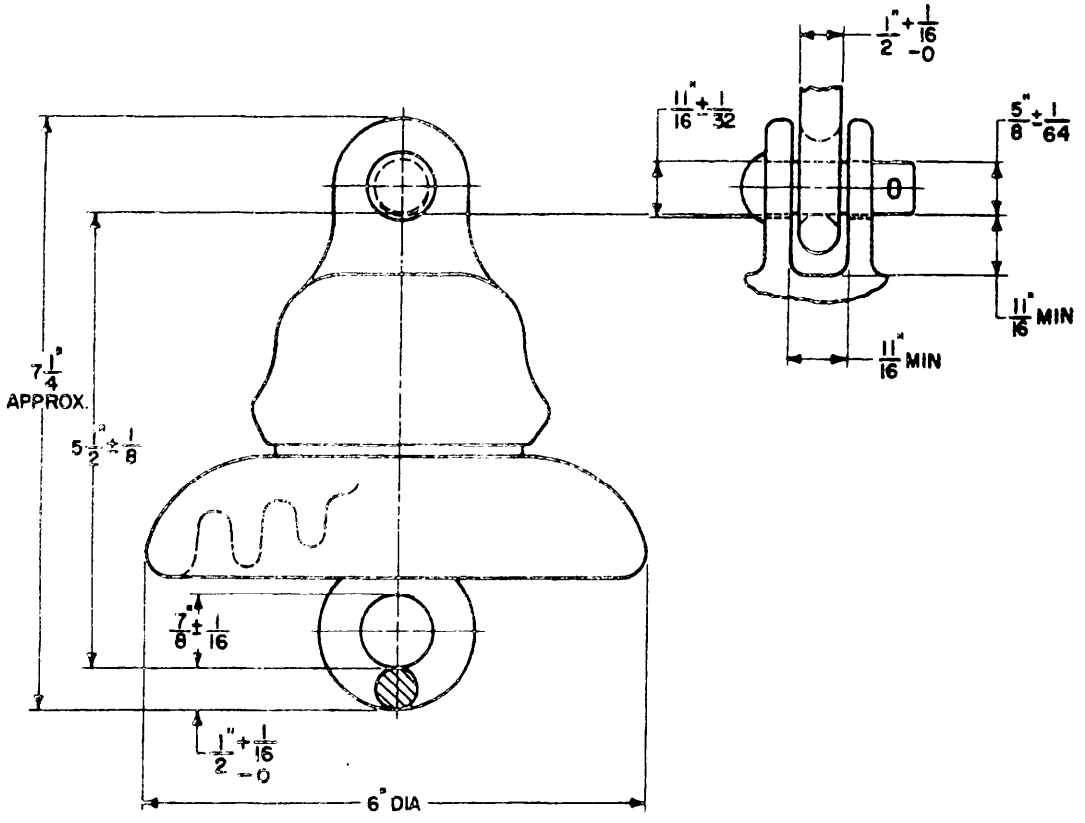


SIZE	MINIMUM DIMENSIONS IN INCHES			
	A	B	C	D *
1	1 1/8	1	3/8	1/4
2	1 1/2	1	1/2	1/4
3	2	1	5/8	1/4
4	1 1/2	1 1/8	5/8	1/4

* MAY BE MEASURED BETWEEN THE EDGE OF THE HOLE FOR THE SECURING NAIL AND THE CENTER OF THE INSULATED CONDUCTOR.

FIGURE 7. Type III, class 2, knob insulators.

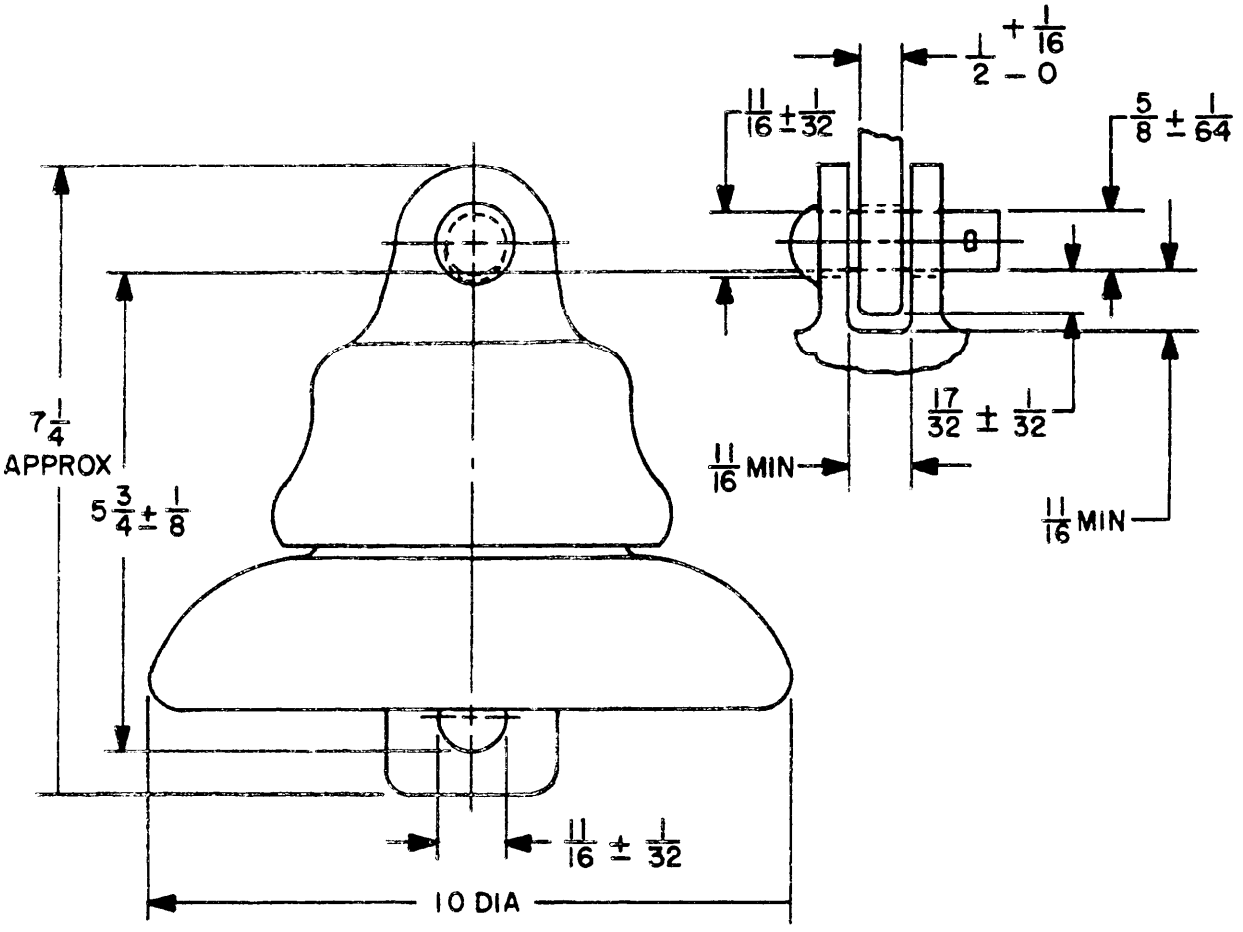
X-3269A



NOTE: LOW FREQUENCY FLASHOVER-WET 30 KV

FIGURE 8 - Type IV, class 1, suspension insulator.

X-3270



NOTES:
1. LOW FREQUENCY FLASHOVER-WET 50KV (PORCELAIN); 55KV (GLASS)
2. DIMENSIONS ARE IN INCHES

FIGURE 9- Type IV, classes 2 and 3, suspension insulator.

X-3271

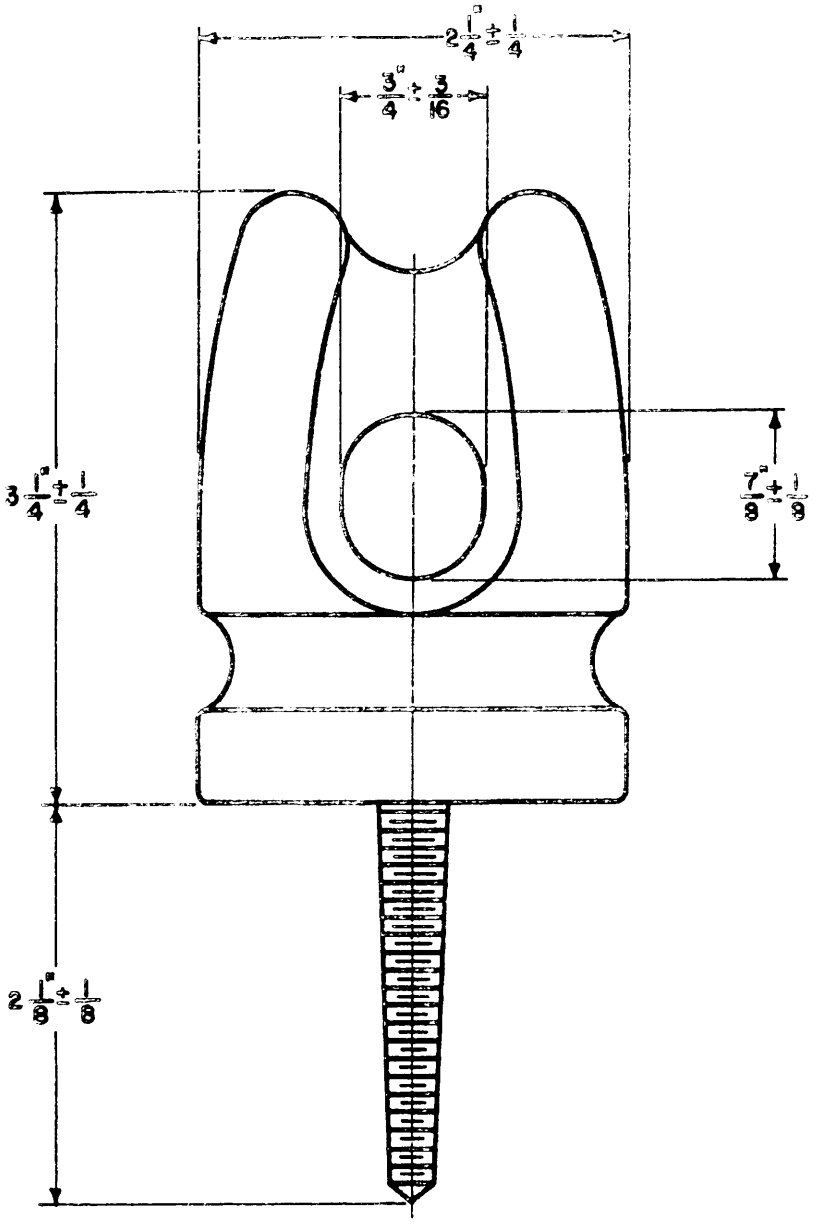
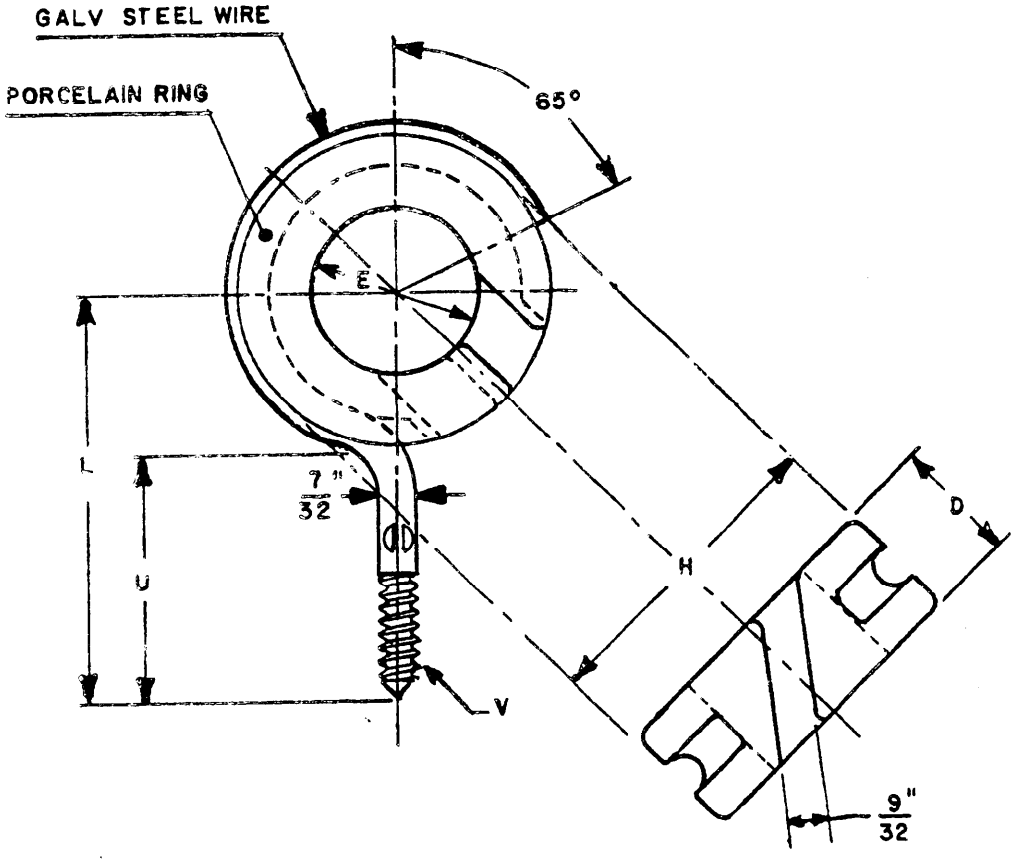


FIGURE 10 - Type V, class 1, standoff wireholder insulator.

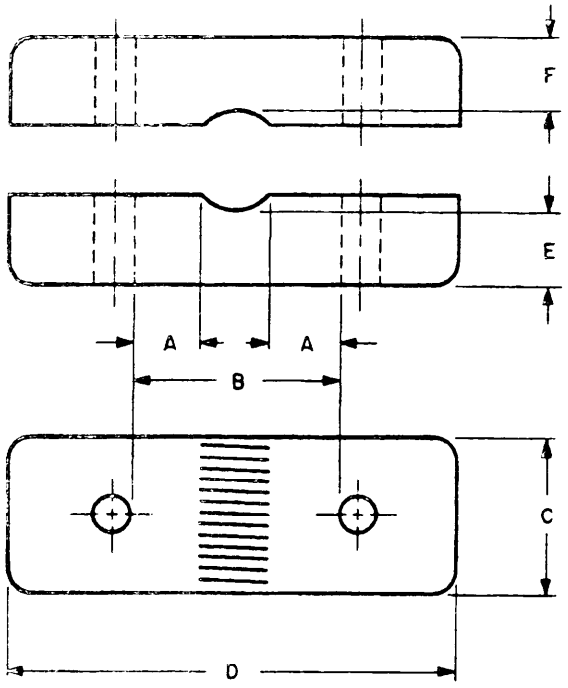


SIZE	NOMINAL DIMENSIONS IN INCHES					
	H	D	L	U	V	E
1	1 3/8	5/8	1 9/16	1	10-14	5/8
2	1 7/8	3/4	1 29/32	1 1/8	10-14	1

NOTES:

1. INSIDE & EDGES OF RING MUST BE GLAZED.
2. EDGES OF RING MUST BE ROUNDED.
3. G.P. WOOD SCREW THREAD ON ALL SIZES.

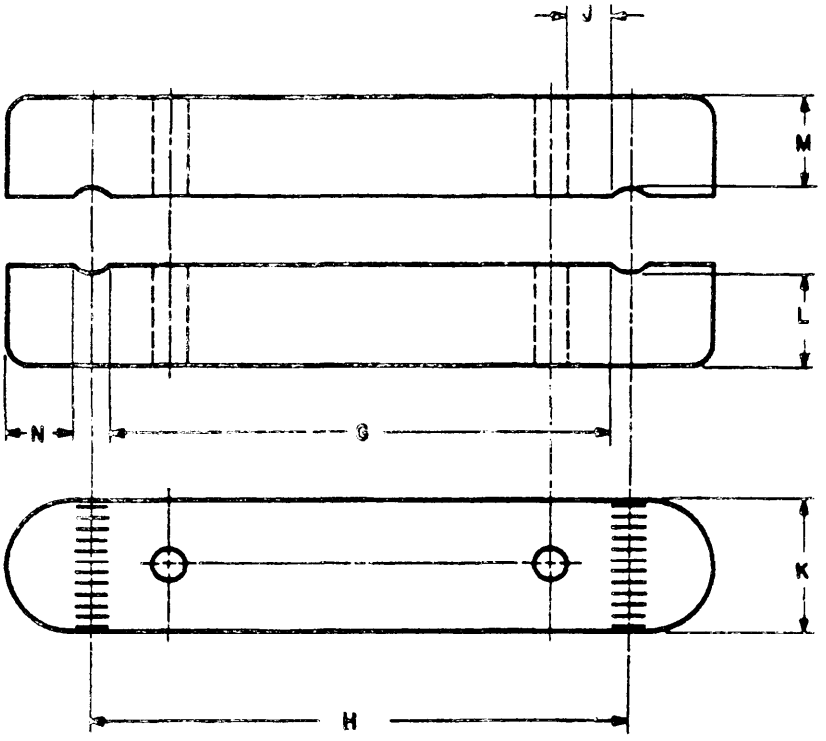
FIGURE 11. Type V, Class 2, standoff screw eye insulator. X-3273A



SINGLE—WIRE CLEATS							
MAXIMUM AWG SIZE OF CONDUCTOR	MINIMUM DIMENSIONS IN INCHES						
	A	B	C	D	E		F
	SPACING FROM CONDUCTOR TO SCREW	SPACING BETWEEN MOUNTING HOLES	WIDTH OF CLEAT	LENGTH OF CLEAT	SPACING FROM WIRE GROOVE TO BOTTOM OF BASE		SPACING FROM WIRE GROOVE TO TOP OF CAP
					300 VOLTS	600 VOLTS	
10	1/4	3/4	3/4	1 3/4	1/2	1	1/2
8	1/4	13/16	7/8	1 15/16	1/2	1	1/2
6	1/4	7/8	7/8	2	1/2	1	1/2
4	1/4	1	7/8	2 3/16	1/2	1	1/2
2	1/4	1 1/16	1	2 3/8	1/2	1	1/2
0	1/4	1 3/16	1	2 1/2	1/2	1	1/2
00	1/4	1 3/16	1	2 9/16	1/2	1	1/2
000	1/4	1 1/4	1 1/8	2 3/4	1	1	1
0000	1/4	1 5/16	1 1/8	2 13/16	1	1	1
300M	1/4	1 1/2	1 1/8	3	1	1	1
500M	1/4	1 5/8	1 3/8	3 7/16	1	1	1
1MM	1/4	2	1 3/8	3 13/16	1	1	1

FIGURE 12 - Type VI, class 1, cleat insulators.

X-3274



TWO-WIRE CLEATS							
MAXIMUM AWG SIZE OF CONDUCTORS	MINIMUM DIMENSIONS IN INCHES						
	G	H	J	K	L	M	N
	SEPARATION OF WIRES	SPACING BETWEEN CENTERS OF GROOVES	SPACING FROM CONDUCTOR TO SCREW	WIDTH OF CLEAT	SPACING FROM WIRE GROOVE TO BOTTOM OF BASE	SPACING FROM WIRE GROOVE TO TOP OF CAP	SPACING FROM WIRE GROOVE TO END OF CLEAT
12	2 1/2	2 3/4	1/4	5/8	1/2	1/2	1/4
10	2 1/2	2 3/4	1/4	5/8	1/2	1/2	1/4
8	2 1/2	2 13/16	1/4	5/8	1/2	1/2	1/4
6	2 1/2	2 7/8	1/4	3/4	1/2	1/2	5/16
4	2 1/2	3	1/4	3/4	1/2	1/2	5/16

FOR CLEATS DESIGNED TO ACCOMMODATE WIRES NOT LARGER THAN NO. 12 AWG. THE G SPACING MAY BE MEASURED BETWEEN CENTERS OF CONDUCTORS, AND THE J SPACING MAY BE MEASURED BETWEEN THE EDGE OF THE NAIL HOLE AND THE CENTER OF THE CONDUCTOR.

FIGURE 13 - Type VI, class 2, cleat insulators.

X-3275

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