



Post insulators of ceramic material or glass for nominal voltages greater than 1000 V

Part 2. Specification for dimensions

Isolateurs supports en céramique ou verre pour tensions nominales supérieures à 1000 V
Partie 2. Spécification des dimensions

Stützisolatoren aus Kermik oder Glas für Nennspannungen über 1000 V
Teil 2. Spezifikation für die Abmessungen

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Foreword

This Part of this British Standard has been prepared under the direction of the Power Electrical Engineering Standards Committee. It is based on IEC Publication 273 'Dimensions of indoor and outdoor post insulators and post insulator units for systems with nominal voltages greater than 1000 V', published in 1979 by the International Electrotechnical Commission (IEC). It also incorporates the amendment to clause 5 as given in the IEC Corrigenda of December 1979.

The purpose of this revision is to implement the IEC Publication as far as possible technically and in keeping with UK practice. Changes and improvements include the removal of references to agreement between purchaser and manufacturer because they are of a contractual nature and not appropriate to this British Standard. The IEC designation and table numbering has been retained with the following main change.

The original tables VI, VIII and AII of IEC Publication 273 have been deleted because they gave imperial unit

equivalents for the information given in tables V, VII and AI, respectively, and are no longer relevant. The original table VII of IEC Publication 273 has been renumbered table VI.

For ease of production it has been found convenient to reproduce the figures and some of the tables from IEC Publication 273 for the figures and tables in this standard. Certain conventions are not identical with those used in British Standards; attention is especially drawn to the following.

The comma has been used in the tables and in figure 2 as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

The tables have been set in a different type-face from that used in British Standards and the column headings are not in bold type.

In table IV the French 'ou' has been left in the text for ease of production.

In tables IV, V and A1, 'Nm' should be read as 'N·m'.

British Standard

Post insulators of ceramic material or glass for nominal voltages greater than 1000 V

Part 2. Specification for dimensions

Section one. General

1. Scope

This Part of this British Standard specifies dimensions for post insulators and post insulator units of ceramic material or glass intended for indoor or outdoor service, and for post insulators of organic material intended for indoor service in electrical installations or equipment operating on alternating current systems with a nominal voltage greater than 1 000 V and a frequency not greater than 100 Hz.

The dimensions are specified in association with values of electrical and mechanical characteristics in order to ensure interchangeability of post insulators and post insulator units of the same type.

The insulators covered by this Part are primarily intended for use in isolators (disconnectors) or as bus-bar or fuse supports.

This Part covers five types of post insulators:

- (a) indoor post insulators of ceramic material or glass and with internal metal fittings;
- (b) indoor post insulators of organic material and with internal metal fittings;
- (c) outdoor cylindrical post insulators of ceramic material or glass and with internal metal fittings;
- (d) outdoor cylindrical post insulators of ceramic material or glass and with external metal fittings;
- (e) outdoor pedestal post insulators of ceramic material or glass.

NOTE 1. The term 'cylindrical insulators' includes insulators of the truncated conical form.

The five types of insulators are distinguished by their electrical, mechanical and dimensional characteristics. Figures 1, 2, 3, 4 and 5 give typical details of examples of each type of insulator.

2. References

The titles of the standards publications referred to in this standard are listed on the inside back cover.

3. Definitions

For the purposes of this Part of BS 3297, the definitions given in BS 3297 : Part 1 apply.

4. Electrical characteristics

Each post insulator of a specified height shall be designed for the corresponding specified lightning impulse withstand voltage in accordance with BS 5622 : Part 1, which also specifies corresponding switching impulse and power-frequency withstand voltages.

NOTE. The operating voltage is not specified because, depending on service conditions, it may be necessary to choose different insulators for a given operating voltage.

5. Mechanical characteristics

Each post insulator shall be designed for a specified failing load in the bending test in accordance with the standardized mechanical strength classes, as follows.

(a) Indoor post insulators of ceramic material or glass and with internal metal fittings

(1) Strength class 2	2 000 N
(2) Strength class 4	4 000 N
(3) Strength class 8	8 000 N
(4) Strength class 16	16 000 N
(5) Strength class 25	25 000 N

(b) Indoor post insulators of organic material and with internal metal fittings

(1) Strength class 2	2 000 N
(2) Strength class 4	4 000 N
(3) Strength class 6	6 000 N
(4) Strength class 8	8 000 N
(5) Strength class 10	10 000 N
(6) Strength class 16	16 000 N
(7) Strength class 25	25 000 N

(c) Outdoor cylindrical post insulators of ceramic material or glass and with internal metal fittings

(1) Strength class 2	2 000 N
(2) Strength class 4	4 000 N
(3) Strength class 8	8 000 N
(4) Strength class 16	16 000 N
(5) Strength class 31.5	31 500 N

(d) Outdoor cylindrical post insulators of ceramic material or glass and with external or internal metal fittings

(1) Strength class 2	2 000 N
(2) Strength class 4	4 000 N
(3) Strength class 6	6 000 N
(4) Strength class 8	8 000 N
(5) Strength class 10	10 000 N
(6) Strength class 12.5	12 500 N
(7) Strength class 16	16 000 N
(8) Strength class 20	20 000 N
(9) Strength class 25	25 000 N
(10) Strength class 31.5	31 500 N
(11) Strength class 40	40 000 N

(e) Outdoor pedestal post insulators of ceramic material or glass

(1) Strength class A	3 000 N to 5 000 N
(2) Strength class B	5 000 N to 7 500 N
(3) Strength class C	7 500 N to 12 000 N
(4) Strength class D	12 000 N to 18 000 N
(5) Strength class E	18 000 N to 30 000 N

NOTE. The dimensions of outdoor cylindrical post insulators according to (d) above are only specified for strength classes 2 to 20. For strength classes 25, 31.5 and 40 these dimensions are left for future consideration.

The standardized strength classes shall be based on the minimum failing load in the bending test with the post insulator mounted upright and the load applied horizontally at the top surface of the insulator.

NOTE 1. Where insulators are to be mounted underhung, the standard values of bending strength may not be applicable except for those insulators included in table III. Other positions of mounting (e.g. horizontal) may also affect the strength if the weight of the post insulator is not negligible. The appropriate strength rating for methods of mounting other than upright is not specified.

The bending strength at different points along the axis of a post insulator shall be defined in different ways, depending on the type of insulator (see tables I to VI and notes).

NOTE 2. A failing load P_x may also be specified and will refer to a load applied at x mm above the top face of the insulator.

The value of such loads is not specified, except for indoor insulators, where values of P_{50} ($x = 50$ mm) shall be as detailed in tables I to VI.

NOTE 3. These values have been determined from the formula

$$P_x = P_0 \frac{h}{h+x} \text{ where } h \text{ is the overall height of the insulator.}$$

NOTE 4. Mechanical strengths in tension or compression are not specified.

NOTE 5. Mechanical strength in torsion is specified only for outdoor post insulators according to (d) and (e).

For insulators of organic material according to (b), the following shall also apply.

(f) For circular cross-sections, the specified failing loads shall normally apply for any load direction perpendicular to the axis of the insulator.

(g) For non-circular cross-sections, the applicable load directions shall be specified.

(h) Unless otherwise agreed, the specified failing loads shall apply at ambient temperature.

NOTE 6. In table II, the difference in deflection between 20 % and 50 % of the failing load is given to permit the evaluation of the flexibility of post insulators of organic material.

6. Dimensional characteristics

The overall heights of post insulators shall be specified on the basis of their lightning impulse withstand voltage performances.

NOTE 1. The specified heights permit the insulators to comply with all the electrical characteristics when tested in accordance with the second edition of BS 3297 : Part 1. The arrangement of the insulators in service may differ appreciably from the standard arrangement for tests. In these cases, the electrical characteristics under service conditions may be different, for instance much lower. Exceptional cases may require special precautions or even the choice of a larger standard insulator. Attention is drawn to the fact that the switching impulse withstand voltage in service can only be guaranteed if the arrangement is similar to the standard arrangement specified in BS 3297 : Part 1.

Each post insulator shall be designed in accordance with the specified dimensional characteristics as given in tables I to VI as follows.

- (a) overall height;
- (b) maximum nominal diameter of the insulating part;
- (c) fixing arrangements (see clause 7);
- (d) tolerances;
- (e) minimum nominal creepage distance (for outdoor post insulators only).

The dimensions of an insulator shall not be greater than the specified maximum nominal or less than the specified minimum nominal values. The actual dimensions of insulators shall be subject to the appropriate manufacturing tolerances. Tolerances of the insulator heights shall be as given in tables I to IV; other tolerances shall be in accordance with clause 24 of BS 3297 : Part 1 : 1982, except that in checking the creepage distance the nominal value shall be subject only to the negative tolerance.

The normal maximum values for the tolerances of parallelism, eccentricity and angular deviation, when measured in accordance with appendix A of BS 3297 : Part 1 : 1982 shall be as follows.

(f) *Parallelism*:

for $h \leq 1$ m: 0.5 mm

for $h > 1$ m: 0.5 h mm

h in m

Parallelism measured for diameter $D = 250$ mm

(g) *Eccentricity*:

2 (1 + h) mm

h in m

(h) *Angular deviation*: 1° either clockwise or anti-clockwise.

NOTE 2. Other values may, however, be agreed upon according to the demands which the application of the insulators makes on the accuracy.

NOTE 3. For post insulators of more than one unit, experience shows that if the units comply with the above tolerances there are usually no problems of alignment when they are used in stacks of two or more units.

Reference should be made to BS 3297 : Part 1, regarding action to be taken when units do not comply with the above tolerances.

NOTE 4. For post insulators detailed in tables III, V and VI, only one class of minimum creepage distance is specified.

For post insulators detailed in table IV, there are two classes of creepage distance.

7. Fixing arrangements

The fixing arrangements of standard post insulators and post insulator units shall be as detailed in tables I to V.

Where applicable, fixing holes shall be equally spaced on the appropriate pitch circle, which shall be concentric with the axis of the insulator. Holes in top and bottom fittings shall be in line, unless otherwise specified, and they shall be so arranged as to permit the use of normal hexagon boltheads and nuts.

The tapped holes shall be of standard size except that the diameter shall be oversize by not more than 0.25 mm (0.01 in). They shall be suitable for steel bolts having standard dimensions after galvanizing. The length of full thread shall be not less than the nominal bolt diameter for outdoor post insulators and indoor post insulators of ceramic material or glass and not less than 1.5 times the nominal bolt diameter for indoor post insulators of organic material.

NOTE. The threads of tapped holes in galvanized fittings may be cut after galvanizing.

Standard insulators shall have ISO metric threads in accordance with BS 3643 : Part 1.

The axial distance between the bottom mounting face of an insulator of organic material and the lower end of the bottom thread (dimension l in figure 2 shall normally be zero but the values given in the last column of table I shall be specified,

8. Plan of the standard

The specified characteristics shall be as given in the following tables:

- | | |
|---|------------------------------|
| (a) indoor post insulators of ceramic material or glass and with internal metal fittings | table I; |
| (b) indoor post insulators of organic material and with internal metal fittings | table II; |
| (c) outdoor cylindrical post insulators of ceramic material or glass and with internal metal fittings | table III; |
| (d) outdoor cylindrical post insulators of ceramic material or glass and with external metal fittings | table IV; |
| (e) outdoor pedestal post insulator units of ceramic material or glass | tables V and VI; |
| (f) fixing arrangements | tables IA, IIA, IIIA and VA. |

NOTE 1. In tables which relate to complete post insulators, all insulators of the same lightning impulse withstand voltage are grouped together. In tables relating to pedestal post insulator units, the units are arranged with the type numbers in sequence.

The basis of standardization of cylindrical post insulators shall be the full specification of the complete post insulator.

The basis of standardization of pedestal post insulators shall be the full specification of the units detailed in tables V to VII.

NOTE 2. Complete pedestal post insulators are composed of one or more of these units. For stacks of more than one unit, it is often possible to reach a given voltage and strength rating in a number of alternative ways. The alternative pedestal post insulators may differ in certain respects, such as stiffness, radio interference performance, etc. Examples of combinations of units to form pedestal post insulators are given in appendix A; other combinations are also possible.

9. Designation of post insulators

Each standard post insulator shall be assigned a reference symbol which indicates:

(a) Insulator type:

- | | |
|--|-----------------|
| (1) indoor post insulator of ceramic material or glass | designation J; |
| (2) indoor post insulator of organic material | designation JO; |
| (3) outdoor cylindrical post insulator of ceramic material or glass and with internal metal fittings | designation H; |

(4) outdoor cylindrical post insulator of ceramic material or glass and with external metal fittings designation C;

(5) outdoor pedestal post insulator unit of ceramic material or glass designation E;

(6) outdoor pedestal post insulator of ceramic material or glass designation P.

(b) Mechanical strength class (see clause 4):

- | | |
|--------------------------------------|--|
| (1) 2-4-8-16-25 | for indoor post insulators of ceramic material or glass; |
| (2) 2-4-6-8-10-16-25 | for indoor post insulators of organic material; |
| (3) 2-4-8-16-31.5 | for outdoor cylindrical post insulators of ceramic material or glass and with internal metal fittings; |
| (4) 2-4-6-8-10-12.5-16-20-25-31.5-40 | for outdoor cylindrical insulators of ceramic material or glass and with external metal fittings; |
| (5) A-B-C-D-E | for outdoor pedestal post insulators of ceramic material or glass. |

(c) Creepage distance class I-II

for outdoor cylindrical insulators of ceramic material or glass and with external metal fittings.

(d) Lightning impulse withstand voltage (in kV) 60 to 2550.

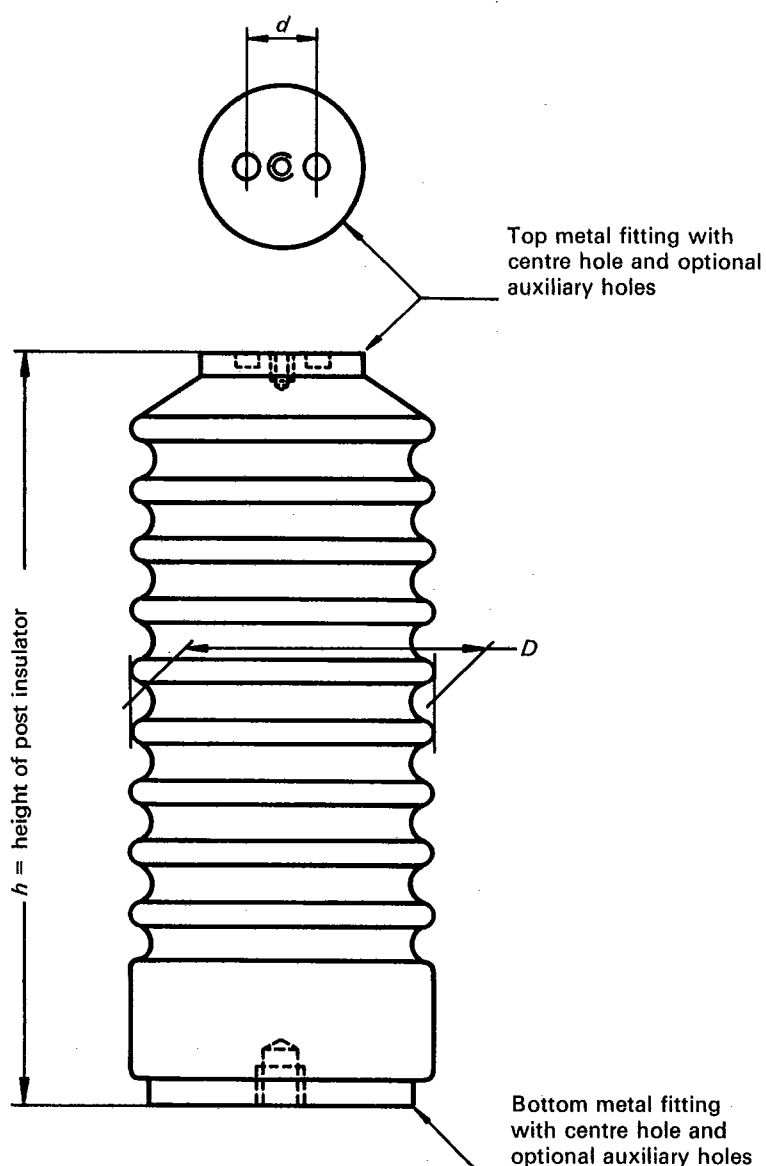
NOTE 1. The designation does not always fully specify the insulator, as sometimes alternative constructions are included in this standard.

NOTE 2. The strength class and lightning impulse withstand voltage designations are not used for pedestal post insulator units, which are designated by a reference number.

NOTE 3. The following examples illustrate the use of the designations.

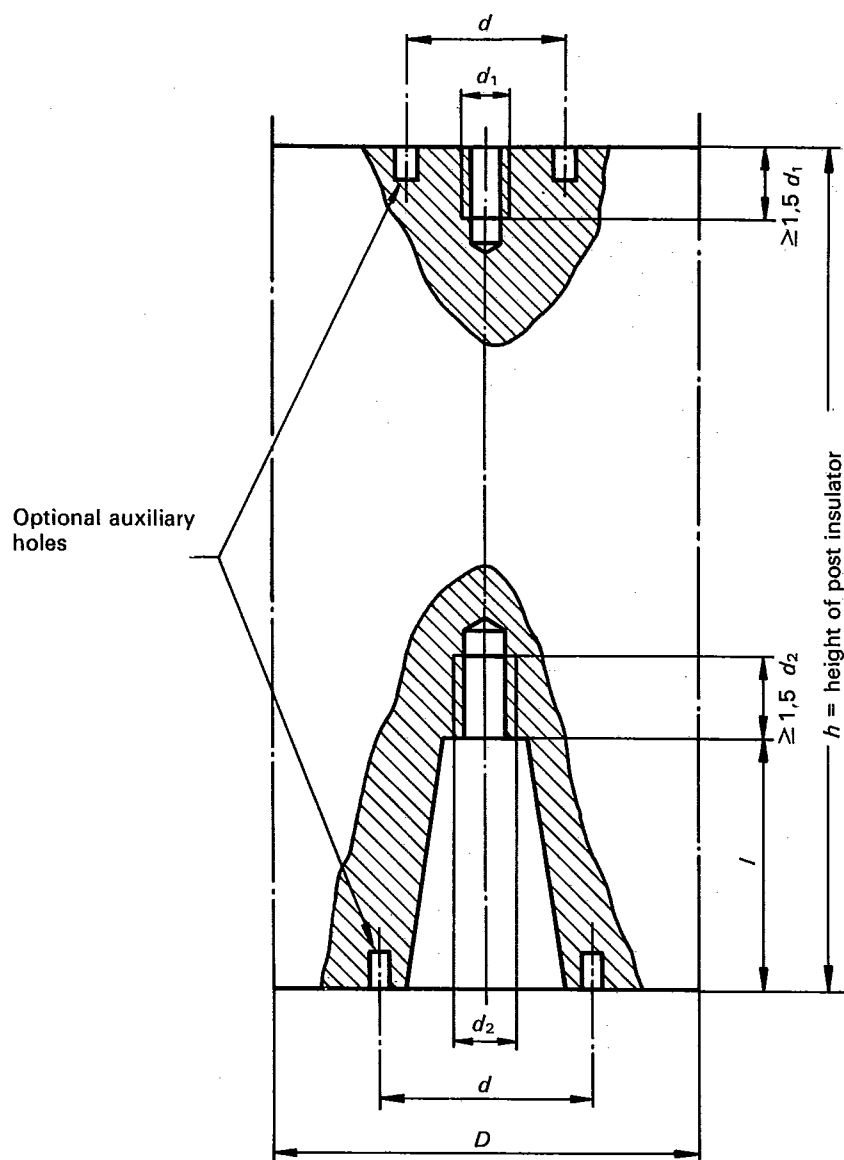
- Post insulator type J4-125, indicates an indoor post insulator of ceramic material or glass of strength class 4 and with lightning impulse withstand voltage 125 kV.
- Post insulator type JO8-60, indicates an indoor post insulator of organic material of strength class 8 and with lightning impulse withstand voltage 60 kV.
- Post insulator type H16-75, indicates an outdoor cylindrical post insulator of ceramic material or glass with internal metal fittings of strength class 16 and with lightning impulse withstand voltage 75 kV.
- Post insulator type C6-1050-I, indicates an outdoor cylindrical post insulator of ceramic material or glass with external metal fittings of strength class 6 and with lightning impulse withstand voltage 1 050 kV and class I creepage distance.
- Post insulator type PD-1050, indicates an outdoor pedestal post insulator of ceramic material or glass of strength class D and with lightning impulse withstand voltage 1050 kV.

Section two. Examples of insulator types



D = insulating part diameter

Figure 1. Example of an indoor post insulator of ceramic material or glass
(The shape of the insulating part may be different.)



l = axial distance between bottom face and lower end of bottom thread (may be zero)

Figure 2. Example of an indoor post insulator of organic material
(The shape of the insulating part is not standardized and may or may not be ribbed.)

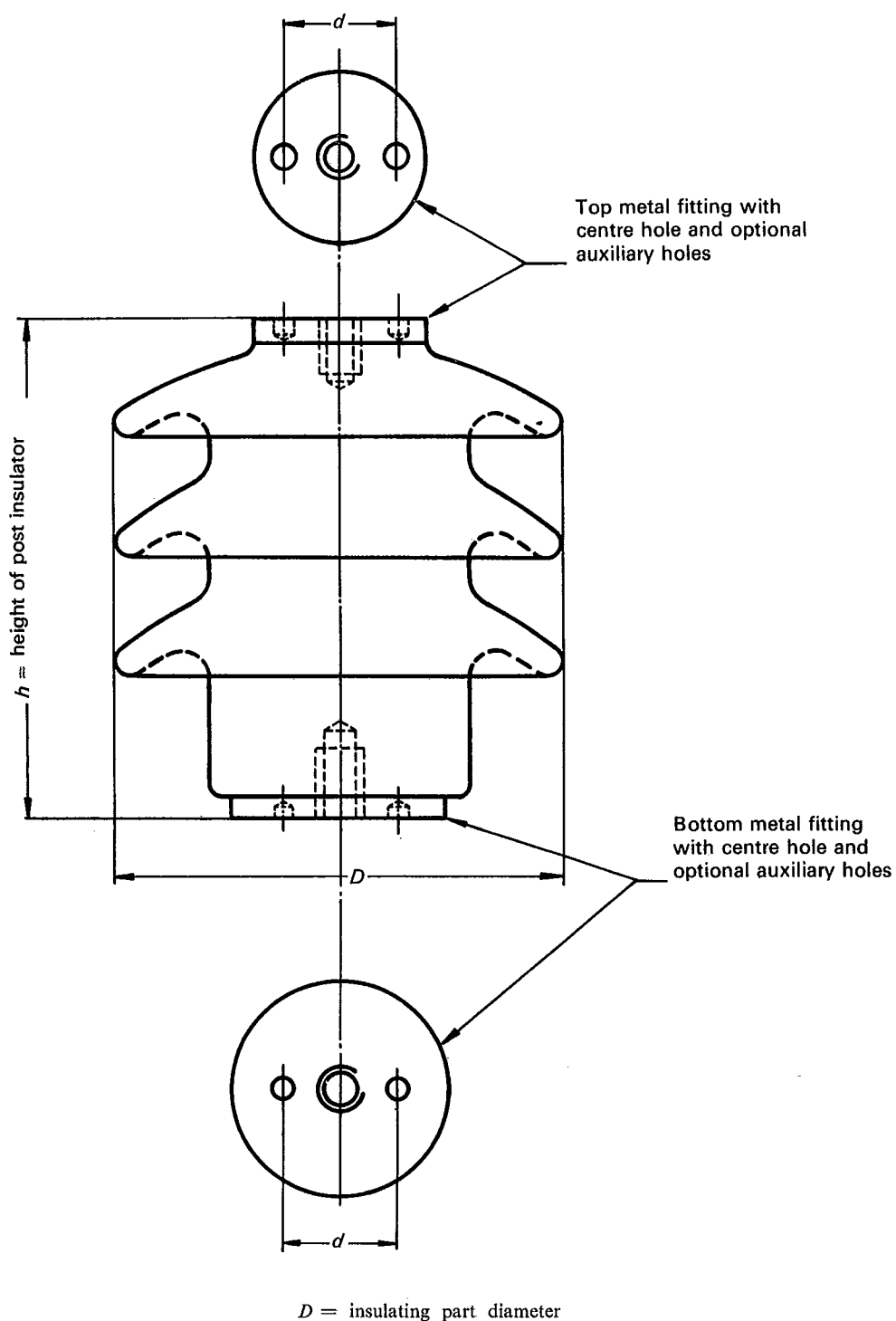


Figure 3. Example of an outdoor cylindrical post insulator with internal metal fittings
 (The shape of the insulating part may be different.)