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Testing method for insulators—
Part 2 : Post insulators for station

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS C 3801 : 1993** is replaced with **JIS C 3801-1 to 3 : 1999**.

In this revision, the contents of **JIS C 3801 : 1993** and **JIS C 3804 : 1982** are divided into three parts according to aimed products and the International Standard corresponding to this part is stated in Annex (normative) for being in conformity with International Standards.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS C 3801 consists of the following three parts with general title *Testing method for insulators*.

Part 1 : *Insulators for overhead line*

Part 2 : *Post insulators for station*

Part 3 : *Hollow insulators*

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Testing method for insulators— Part 2 : Post insulators for station

Introduction This Japanese Industrial Standard has been prepared based on **IEC 60168** *Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 000 V* published in 1994 as the fourth edition and its Amendment 1 (1997) in such a manner that the testing method for insulators specified in old **JIS** is adopted as the text and the International Standards corresponding to this **JIS** are stated in Annexes without modifying the technical contents. However, the testing solution for porosity test is specified by changing the contents of the International Standard to precede the safety. The amendments are included in this preparation.

The **IEC** Standard number is based on the new numbering system of **IEC** Standards put in force on January 1st 1997, and the Standard published before the said date is numbered by adding 60000 to the former number. This is only the change in the numbering system and the contents remain unchanged.

1 Scope This Standard specifies testing methods for porcelain station post insulators and indoor post insulators for station (hereafter referred to as “insulators”).

Either of the specifications stated in this text or those stated in the Annex (normative) shall be applied throughout to a product, and it is not allowed to apply the items and contents in the text and Annex confusedly.

Remarks : The International Standard corresponding to this Standard is given below.

IEC 60168 : 1994 *Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 000 V*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards indicated below shall be applied.

JIS C 3802 *Permissible limits of visual defects for insulating porcelains*

JIS C 3803 *Glossary of terms for insulator and bushing*

JIS H 0401 *Methods of test for hot dip galvanized coatings*

JIS K 8891 *Methanol*

3 Definitions For the purposes of this Standard, the principal definitions specified in **JIS C 3803** apply.

4 Classification of tests The tests are classified as shown in Table 1.

Table 1 Classification of tests

Classification of tests	Applicable clause for test method	Classification of tests	Applicable clause for test method
a) Construction test	5	d) Mechanical tests	8
b) Visual test	6	1) Withstand load tests	8.1
c) Electrical tests	7	1.1) Tensile withstand load test	8.1.1
1) Dry power-frequency flashover voltage test	7.1	1.2) Bending withstand load test	8.1.2
2) Dry power-frequency withstand voltage test	7.2	1.3) Torsional withstand load test	8.1.3
3) Wet power-frequency flashover voltage test	7.3	2) Mechanical failing load tests	8.2
4) Wet power-frequency withstand voltage test	7.4	2.1) Tensile mechanical failing load test	8.2.1
5) Power-frequency voltage test	7.5	2.2) Bending mechanical failing load test	8.2.2
6) Lightning impulse flashover voltage test	7.6	2.3) Torsional mechanical failing load test	8.2.3
6.1) Determination of 50 % flashover voltage	7.6.3	e) Temperature cycle test	9
6.2) Determination of voltage-time curve	7.6.4	f) Porosity test	10
7) Lightning impulse withstand voltage test	7.7	g) Galvanizing test	11
8) Dry switching impulse flashover voltage test	7.8		
9) Dry switching impulse withstand voltage test	7.9		
10) Wet switching impulse flashover voltage test	7.10		
11) Wet switching impulse withstand voltage test	7.11		

5 Construction test The construction and dimensions of test specimens shall be checked.

6 Visual test The porcelain part of test specimens shall be visually checked in accordance with **JIS C 3802**. Parts other than porcelain shall be checked whether cracks, flaws and other detrimental defects to practical service exist or not.

7 Electrical tests Unless otherwise specified, the following electrical tests shall be made on clean test specimens under dry condition.

7.1 Dry power-frequency flashover voltage test

7.1.1 Mounting method of test specimens The electrical tests of test specimens shall be made under the standard mounting conditions specified below. However, the test may be made under the condition that simulates the actual service condition subject to the agreement between the parties concerned.

a) **Station post insulators and indoor post insulators (nominal voltage less than 275 kV)**

- 1) **Electrode** The specimen shall be mounted vertically to the centre of an earthed horizontal channel. The width of the channel shall be almost equal to the lower metal fitting of the test specimen and the length shall be at least twice the height of the test specimen. The height of the channel above the earth shall be not less than 1 m when the height of the test specimen is not more than 1.8 m, and be not less than 2.5 m when the specimen height exceeds the said value.

A conductor shall be mounted to the top of specimen so that the conductor is at right angle to the channel. The conductor shall have a length not less than 1.5 times the height of the test specimen and shall extend on both ends of the test specimen by not less than 1 m each. The diameter of conductor shall be at least 25 mm and be approximately 1.5 % of the height of test specimen.

- 2) **Proximity to other objects** No earthed objects other than earthed parts of the testing apparatus shall be nearer to the electrode than 1.5 times the height of test specimen. However, the distance shall be 1 m at the minimum.

b) **Station post insulators (nominal voltage 275 kV or more)**

- 1) **Electrode** The specimen shall be mounted vertically to an earthed vertical metal support.

The metal support shall have a width equal to one to two times the diameter of lowest metal fitting of test specimen and a square mounting face. The height of the mounting face above the earth shall be as stated in Table 2 according to the height of test specimen.

Table 2 Height of mounting face above earth

Unit : mm

Height of specimen	Height above earth
2 500 or under	2 500
Over 2 500 up to and incl. 3 200	3 000
Over 3 200 up to and incl. 4 200	4 000
Over 4 200	5 000

The conductor shall be mounted horizontally to the top of the test specimen.

The length of the conductor shall extend at least 0.75 times the height of test specimen on each side of the test specimen. The diameter shall be 1.5 % to 2.0 % of the height of test specimen. Flashover from both ends of the conductor shall be prevented by means of the shield of adequate shape attached to both ends of the conductor.

2) **Proximity to other objects** As specified in a) 2).

7.1.2 Application of voltage The test voltage shall be suitably increased up to about 75 % of the expected flashover voltage, and thereafter at an increment of about 2 % of this value per second until flashover takes place.

7.1.3 Dry power-frequency flashover voltage The average of flashover voltages measured consecutively 5 times or more shall be taken as the dry power-frequency flashover voltage of a specimen. The interval of voltage application shall be sufficiently long to avoid the effect of preceding applied voltage within a period during which the test specimen is not affected by the outer atmospheric condition.

7.1.4 Correction of voltage

- a) **Standard atmospheric condition** The standard atmospheric condition means an air pressure 1 013 hPa, temperature 20 °C and absolute humidity 11 g/m³.
- b) **Correction related to atmospheric condition** When the air pressure, temperature and absolute humidity at the time of test differ from those of the standard atmospheric condition, the flashover voltage and withstand voltage shall be corrected by the following formula:

$$V_s = V_{\delta h} \times \frac{K_h}{K_d}$$

where, V_s : flashover voltage at the standard atmospheric condition

$V_{\delta h}$: Flashover voltage at relative air density δ and absolute humidity h

K_d : air density correction factor

K_h : humidity correction factor

When the atmospheric condition is temperature t (°C), air pressure b (hPa) and absolute humidity h (g/m³), K_d and K_h are given by the following formulae:

$$K_d = \left(\frac{b}{1\,013} \right)^m \left(\frac{273+20}{273+t} \right)^n$$

$$K_h = (K)^w$$

K shall be obtained from Fig. 2, and m , n and w shall be obtained, correlating with the gap construction, polarity and waveform of the voltage, from Table 3 and Fig. 1.

When carrying out the test under water spray, correction of humidity is not conducted.

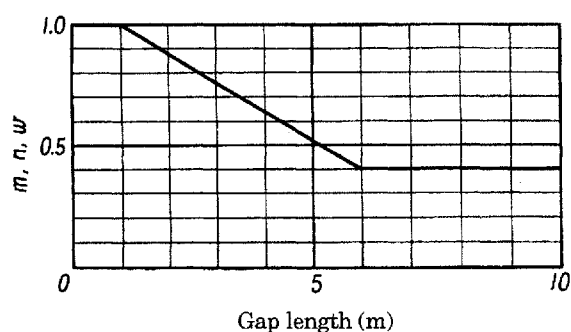


Fig. 1 Relation between gap length and m, n, w

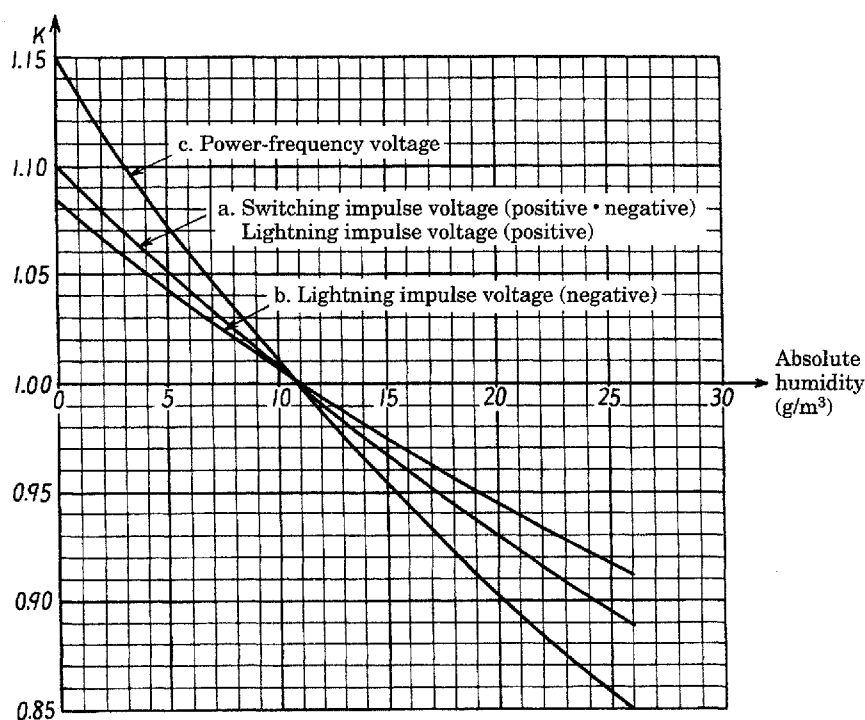


Fig. 2 Relation between K and humidity

Table 3 Correlation between gap construction, polarity and waveform of voltage, m, n, w

Waveform of voltage	Lightning impulse voltage				Switching impulse voltage				Power-frequency voltage	
Polarity	Positive		Negative		Positive		Negative		—	
Gap construction	A	B	A	B	A	B	A	B	A	B
Value of m, n	1.0	1.0	1.0	1.0	1.0	Fig. 1	1.0	0	1.0	Fig. 1
Curve of K	a of Fig. 2		b of Fig. 2		a of Fig. 2		a of Fig. 2		c of Fig. 2	
Value of w	0	1.0	0	0	0	Fig. 1	0	0	0	Fig. 1

Remarks : A is uniform gap or similar one.

B is rod-flat sheet gap, asymmetrical non-uniform gap such as suspension insulator.

7.2 Dry power-frequency withstand voltage test

7.2.1 Mounting method of specimen The mounting method shall follow 7.1.1.

7.2.2 Application of voltage The voltage shall be suitably increased up to about 75 % of the test voltage, and thereafter at an increment of about 2 % of the test voltage per second. The specified voltage shall be applied for 1 min, and whether the specimen causes flashover or insulation breakdown or not shall be examined.

7.2.3 Correction of voltage In the dry power-frequency withstand voltage test, the value of test voltage appropriate to the atmospheric condition at the time of test shall be obtaining in accordance with 7.1.4. The test shall be made with the test voltage so obtained.

7.3 Wet power-frequency flashover voltage test

7.3.1 Mounting method of specimen The mounting method shall follow 7.1.1.

7.3.2 Water spray When carrying out the test under water spray, water shall be sprayed from spray nozzles under a constant pressure. The water drops shall be as small and uniform as possible and the spraying area shall be wide enough to cover the test specimen sufficiently. The spraying quantity shall be not less than 3 mm/min in vertical component.

The spraying angle shall, as a rule, be 45° against vertical direction at the almost central part of the test specimen.

The resistivity of spray water shall be $100 \Omega \cdot m \pm 20 \%$.

7.3.3 Application of voltage The voltage shall be applied in accordance with 7.1.2.

7.3.4 Wet power-frequency flashover voltage The average of flashover voltages measured consecutively 5 times or more shall be taken as the wet power-frequency flashover voltage of a test specimen. The interval of voltage application shall be sufficiently long to avoid the effect of preceding applied voltage within a period during which the test specimen is not affected by the outer atmospheric conditions.

7.3.5 Correction of voltage The wet power-frequency flashover voltage shall be corrected to that under the standard atmospheric condition in accordance with the method specified in 7.1.4.

7.4 Wet power-frequency withstand voltage test

7.4.1 Mounting method of specimen The mounting method shall follow 7.1.1.

7.4.2 Water spray The water spray requirements are the same as that in 7.3.2.

7.4.3 Application of voltage The test voltage shall be applied in the same manner as that specified in 7.2.2.

7.4.4 Correction of voltage In the wet power-frequency withstand voltage test, the test voltage appropriate to the atmospheric condition at the time of test shall be obtained in accordance with 7.1.4. The test shall be made with the test voltage so obtained.

7.5 Power-frequency voltage test This test shall be carried out only on the test specimen whose shortest puncture path through the solid insulation is not more than 1/2 of its flashover distance.

a) **Mounting method of test specimen**

Indoor post insulators The top metal fitting and bottom metal fitting of a specimen shall serve as the both electrodes.

b) **Application of voltage** The specified power-frequency voltage shall be applied across both electrodes of this test specimen in air for 2 min, and whether any abnormality occurs at various parts of the test specimen or not shall be examined. During the power-frequency voltage test, instantaneous flashover is permitted.

7.6 Lightning impulse flashover voltage test

7.6.1 Voltage waveform The standard lightning impulse voltage used for this test shall be a mono-polarity full-wave voltage having a time to peak of 1.2 μ s and a time to half-value of 50 μ s. This voltage waveform is expressed as 1.2/50 impulse. The tolerances on waveform shall be $\pm 30\%$ on the time to peak, $\pm 20\%$ on the time of half-value and $\pm 3\%$ on the crest value. The crest value of this impulse voltage shall be verified by either of a sphere gap or an oscilloscope.

7.6.2 Mounting method of specimens The mounting method shall follow 7.1.1.

7.6.3 Determination of 50 % flashover voltage The 50 % impulse flashover voltage value shall be determined by either of the following methods:

a) **Up and down method** Voltage U'_{50} , which is expected to be nearly equal to 50 % flashover voltage shall be applied, and if flashover occurs the voltage of $U'_{50} - \Delta U$, or if this voltage does not cause flashover, the voltage of $U'_{50} + \Delta U$ shall be applied. As exemplified above the voltage level shall be adjusted by the results of previous test in such a manner that the voltage is lowered by ΔU if flashover occurs or increased by ΔU if flashover does not occur. The ΔU shall be 0.5 to 2 times the standard deviation of the flashover voltage. The voltage shall be applied about 40 times.

When the number of flashovers or non-flashovers in each voltage level is expressed $n_0, n_1, \dots, n_k$, starting from the level in which flashover or non-flashover was less, then the 50 % flashover voltage U_{50} can be obtained from the following formula:

$$U_{50} = U_0 + \Delta U \left(\frac{\sum_{i=0}^k i n_i}{\sum_{i=0}^k n_i} \pm \frac{1}{2} \right)$$

The double sign shall be read (+) when utilizing the number of non-flashovers, and (-) when utilizing the number of flashovers, and U_0 corresponds to voltage for $i = 0$.

- b) **Interpolation method** The flashover factor shall be obtained by applying the same impulse voltage V_m on the specimen at least 10 times. The flashover factor so obtained shall be recorded as m %. Next, the flashover factor n % shall be obtained in the same way but by changing the voltage from V_m to V_n . It is necessary to adjust the applied voltages V_m and V_n so that $80 > m > 50$ and $50 > n > 20$ are established. From these 2 measured values, the 50 % flashover voltage shall be obtained from the following formula:

$$V_{50} = \frac{V_m(50 - n) + V_n(m - 50)}{m - n}$$

7.6.4 Voltage-time curve The voltage-time curve shall be obtained by causing flashover on the specimen in such a manner that the lightning impulse voltage applied across both electrodes of the specimen is gradually increased, and that the crest value is changed at least 5 times, starting from a voltage close to the 50 % flashover voltage.

7.6.5 Correction of voltage The value of dry lightning impulse 50 % flashover voltage shall be corrected to that at the standard atmospheric condition in accordance with 7.1.4.

7.7 Lightning impulse withstand voltage test

7.7.1 Voltage waveform The waveform shall be as specified in 7.6.1.

7.7.2 Mounting method of test specimen The mounting method shall follow 7.1.1.

7.7.3 Application of voltage The lightning impulse withstand voltage test shall be made with both positive and negative polarities. But if it is clear that which polarity gives lower flashover voltage, then the test may be made with that polarity. The method to obtain lightning impulse withstand voltage shall comply with either of the following two methods.

- a) **Method by withstand voltage** The specified lightning impulse voltage shall be applied 15 times on the specimen. When the number of flashover is within 2, the product is accepted by this test.
- b) **Method by 50 % flashover voltage** The 50 % flashover voltage shall be obtained in accordance with the method specified in 7.6.3 a). If the value corrected by the method specified in 7.1.4 is $\frac{1}{1 - 1.3\sigma} = 1.04$ times or more of the value of the specified withstand voltage, the product is accepted by this test. Where σ is the standard deviation assumed as 3 %. The number of voltage application shall be at least 30.

7.7.4 Correction of voltage In the dry lightning impulse withstand voltage test (withstand voltage method), the value of the test voltage appropriate to the atmospheric condition at the time of the test shall be obtained in accordance with 7.1.4. The test shall be made with this value.

7.8 Dry switching impulse flashover voltage test

7.8.1 Voltage waveform The standard switching impulse voltage used for the switching impulse voltage test shall be mono-polarity full-wave voltage having a time to peak of 250 µs and a time to half value of 2 500 µs. This voltage waveform is expressed as a 250/2 500 impulse. The tolerances on waveform shall be ± 20 % on the time to peak, ± 60 % on the time to half-value, and ± 3 % on the crest value. The crest value of test voltage shall be verified by either of a sphere gap or an oscilloscope.

7.8.2 Mounting method of specimen The mounting of specimen shall be made in accordance with the following standard mounting method. However, the test may be made under the condition simulating the practical service, subject to the agreement between the parties concerned.

For station post insulators The mounting shall be made as specified in 7.1.1 b).

7.8.3 Determination of 50 % flashover voltage The voltage shall be determined in accordance with 7.6.3.

7.8.4 Correction of voltage The dry switching impulse 50 % flashover voltage shall be corrected to that at the standard atmospheric condition in accordance with the method specified in 7.1.4.

7.9 Dry switching impulse withstand voltage test

7.9.1 Voltage waveform The waveform shall be as given in 7.8.1.

7.9.2 Mounting method of specimen The mounting method shall follow 7.8.2.

7.9.3 Application of voltage The switching impulse withstand voltage test shall be made with both positive and negative polarities. The method to obtain the switching impulse withstand voltage shall comply with either of the following two methods.

- a) **Method by withstand voltage** The specified switching impulse voltage shall be applied 15 times on the specimen. When the number of flashover is within 2, the product is accepted by this test.
- b) **Method by 50 % flashover voltage** The 50 % flashover voltage shall be obtained in accordance with the method specified in 7.6.3 a). If the value corrected by the method specified in 7.1.4 is $\frac{1}{1-1.3\sigma} = 1.085$ times or more of the value of the specified withstand voltage, the product is accepted by this test. Where σ is the standard deviation assumed as 6 %. The number of voltage application shall be at least 30.

7.9.4 Correction of voltage In the dry switching impulse withstand voltage test (withstand voltage method), the value of test voltage appropriate to the atmospheric condition at the time of the test shall be obtained in accordance with 7.1.4. The test shall be made with this value.

7.10 Wet switching impulse flashover voltage test

7.10.1 Voltage waveform The waveform shall be as given in 7.8.1.

7.10.2 Mounting method of specimens The mounting method shall follow 7.8.2.

7.10.3 Water spray The water spray requirements are the same as that given in 7.3.2.

7.10.4 Determination of 50 % flashover voltage The voltage shall be determined in accordance with 7.6.3.

7.10.5 Correction of voltage The wet switching impulse 50 % flashover voltage shall be corrected to that at the standard atmospheric condition in accordance with the method specified in 7.1.4.

7.11 Wet switching impulse withstand voltage test

7.11.1 Voltage waveform The waveform shall be as given in 7.8.1.

7.11.2 Mounting method of specimen The mounting method shall follow 7.8.2.

7.11.3 Water spray The water spray requirements are the same as that given in 7.3.2.

7.11.4 Application of voltage The voltage shall be applied in accordance with 7.9.3.

7.11.5 Correction of voltage In the wet switching impulse withstand voltage test (withstand voltage method), the value of test voltage appropriate to the atmospheric condition at the time of the test shall be obtained in accordance with 7.1.4. The test shall be made with this value.

8 Mechanical tests

8.1 Withstand load test

8.1.1 Tensile withstand load test

a) Mounting method of specimen

For station post insulators and indoor post insulators The specimen shall be so mounted by means of an adequate manner that the load is applied between both metal fittings of specimen in the direction of the axis of the specimen.

b) Application of load

- 1) The load shall be increased suitably up to about 75 % of the specified withstand load, and thereafter increased gradually to the specified load. The specified load shall be kept for 1 min, and the examination shall be made on various parts of the specimen for defects.

- 2) In the case of 100 % test, the specified load shall be applied for 10 s, and the examination shall be made on various parts of the specimen for defects.

8.1.2 Bending withstand load test

a) **Mounting method of specimen**

For station post insulators and indoor post insulators The specimen shall be mounted as in practical service on a fixed iron base by means of regular mounting bolts or the ones at least equivalent thereto. The load shall be applied to the free end side in the direction perpendicular to the axis of the specimen.

- b) **Application of load** The load shall be applied as stated in 8.1.1 b).

8.1.3 Torsional withstand load test

a) **Mounting method of specimen**

For station post insulators and indoor post insulators The specimen shall be mounted as in practical service on a fixed iron base by means of regular mounting bolts or the ones at least equivalent thereto. The torsional load shall be applied with the axis of the specimen being at the centre.

- b) **Application of load** The load shall be applied as stated in 8.1.1 b).

8.2 Mechanical failing load tests

8.2.1 Tensile mechanical failing load test

- a) **Mounting method of specimen** The mounting method shall follow 8.1.1 a).

- b) **Application of load** The load shall be increased suitably up to about 75 % of the specified mechanical failing load, and thereafter increased gradually until mechanical failure occurs.

8.2.2 Bending mechanical failing load test

- a) **Mounting method of specimen** The mounting method shall follow 8.1.2 a).

- b) **Application of load** The load shall be applied as specified in 8.2.1 b).

8.2.3 Torsional mechanical failing load test

- a) **Mounting method of specimen** The mounting method shall follow 8.1.3 a).

- b) **Application of load** The load shall be applied as specified in 8.2.1 b).

9 Temperature cycle test The temperature cycle test shall be made by immersing the specimen into hot water, cold water, hot water and cold water by turn. The specimen shall be completely immersed in the respective baths. The number of immersion in hot and cold water shall be 3 each, and the transfer time to another bath shall be as short as possible within 30 s. The duration of the immersion, the range of cold water temperature and the temperature difference between the cold water and the hot water shall be as specified.

The quantity of cold water and hot water in the baths shall be sufficient enough not to cause temperature variation of 5 °C or more due to immersion of the specimen.

Then, visual inspection shall be made on the porcelain part and the cementing of metal fittings. For the specimen whose shortest puncture path through the solid insulating material is not more than 1/2 of its flashover distance, existence or non-existence of abnormalities shall be examined by carrying out the power-frequency voltage test specified in 7.5.

10 Porosity test

10.1 Sampling The porcelain portion of the insulator under test shall be broken and the fragments having fresh clean broken surfaces shall be taken as the specimen.

10.2 Testing solution The testing solution used in this test shall be prepared by dissolving about 3 units (in mass) of Astrazon in 100 units (in mass) of the methanol specified in JIS K 8891.

10.3 Test method The specimen shall be completely immersed in the testing solution, and a pressure not less than 9.8 MPa shall be applied continuously at least for 4 h, at ordinary temperature. Then the specimen shall be taken out, dried and broken. Penetration of the dye shall be examined on the newly broken surface.

11 Galvanizing test

11.1 Sampling The test shall be made on zinc coating of the metal fittings forming a component of the insulator under test, and the sampling method shall comply with JIS H 0401.

11.2 Test method The test shall be carried out in accordance with Informative reference of JIS H 0401.

Information : For obtaining the mass of deposit per unit area from the measured film thickness, the following equation is used:

$$A = 7.2 \times t$$

where, A : mass of zinc deposit per unit area (g/m²)

7.2 : density of coated layer (g/cm³)

t : film thickness (μm)

Example : Film thickness corresponding to mass of deposit per unit area 500 g/m²:
69.4 μm

Annex (normative)

Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 000 V

Introduction This Annex has been prepared based on **IEC 60168** : 1994 *Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 000 V*, which corresponds to the provisions of the main text, without modifying the technical contents.

In this Annex, the portions underlined with dots are the matters not included in the original International Standard.

Section 1: General

1.1 Scope and object This Annex is applicable to post insulators and post insulator units of ceramic material or glass, for indoor and outdoor use in electrical installations or equipment, operating on alternating current with a nominal voltage greater than 1 000 V and a frequency not greater than 100 Hz.

This Annex may be regarded as a provisional standard for post insulators for use on d.c. systems. **IEC 60438** gives general guidance for those insulators.

This Annex does not apply to composite insulators, or to those indoor post insulators in organic material which are covered by another **IEC** standard [1]*.

The objects of this Annex are to define:

- the terms used;
- the electrical and mechanical characteristics of post insulators;
- the conditions under which the specified values of these characteristics are verified;
- the methods of test;
- the acceptance criteria.

Numerical values of characteristics of post insulators are specified in **IEC 60273**.

This Annex does not include requirements dealing with the choice of post insulators for specific operating conditions.

NOTE 1 A guide for the choice of insulators under polluted conditions is available, see [2].

NOTE 2 This Annex does not include radio interference tests or artificial pollution tests. These subjects and relevant test methods are dealt with in other **IEC** publications, see [3], [4] and [5].

NOTE 3 When this Annex is applied to hollow post insulators, other **IEC** publications shall also be taken into account, see [6] and [7].

* The figures in square brackets refer to Annex C (Bibliography).

1.2 Normative references The following normative documents contain provisions which, through reference in this text, constitute provisions of this Annex. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent edition of the normative documents listed below. Member of **IEC** and **ISO** maintain registers of currently valid normative documents.

- IEC 60050(471) : 1984 *International Electrotechnical Vocabulary (IEV)—Chapter 471 : Insulators*
- IEC 60060-1 : 1989 *High-voltage test techniques—Part 1 : General definitions and test requirements*
- IEC 60071-1 : 1993 *Insulation co-ordination—Part 1 : Definitions, principles and rules*
- IEC 60071-2 : 1976 *Insulation co-ordination—Part 2 : Application guide*
- IEC 60071-3 : 1982 *Insulation co-ordination—Part 3 : Phase-to-phase insulation co-ordination. Principles, rules and application guide*
- IEC 60273 : 1990 *Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1 000 V*
- IEC 60438 : 1973 *Tests and dimensions for high-voltage d.c. insulators*
- ISO 1459 : 1973 *Metallic coatings—Protection against corrosion by hot dip galvanizing—Guiding principles*
- ISO 1460 : 1992 *Metallic coatings—Hot dip galvanized coatings on ferrous metals—Gravimetric determination of the mass per unit area*
- ISO 1461 : 1973 *Metallic coatings—Hot dip galvanized coatings on fabricated ferrous products—Requirements*
- ISO 1463 : 1982 *Metal and oxide coatings—Measurement of coating thickness—Microscopical method*
- ISO 2064 : 1980 *Metallic and other non-organic coatings—Definitions and conventions concerning the measurement of thickness*
- ISO 2178 : 1982 *Non-magnetic coatings on magnetic substrates—Measurement of coating thickness—Magnetic method*

1.3 Definitions For the purposes of this Annex, the following definitions apply.

The definitions given below are those which either do not appear in **IEC 60050(471)**, or differ from those given in **IEC 60050(471)**.

1.3.1 insulator the term “insulator” is used in this Annex to refer to the object being tested. Unless otherwise specified, this refers to an assembled post insulator, complete with metal fittings. In this Annex, the term “post insulator” shall be taken to mean post insulator, or post insulator unit, as required by the text

NOTE 1 The term “approximately cylindrical shape” covers a unit of circular cross-section, which may vary in diameter.

NOTE 2 For indoor installations subject to excessive condensation, outdoor post insulators, or special indoor post insulators may be used.

1.3.2 lot a group of insulators offered for acceptance from the same manufacturer, of the same design and manufactured under similar conditions of production. One or more lots may be offered together for acceptance; the lot(s) offered may consist of the whole, or part, of the quantity ordered

1.3.3 dry lightning-impulse withstand voltage The lightning-impulse voltage which the post insulator withstands dry, under the prescribed conditions of test

1.3.4 50 % dry lightning impulse flashover voltage the value of the lightning-impulse voltage which, under the prescribed conditions of test, has a 50 % probability of producing flashover on the post insulator, dry

NOTE: The term "flashover" used in this Annex includes flashover across the insulator surface as well as disruptive discharges by sparkover through air adjacent to the insulator. Disruptive discharges should only occur occasionally elsewhere (for instance, to other structures or to earth), in which event they should not be taken into account for the purpose of this Annex.

1.3.5 dry or wet switching-impulse withstand voltage the switching-impulse voltage which the post insulator withstands, dry or wet respectively, under the prescribed conditions of test

1.3.6 50 % dry or wet switching-impulse flashover voltage the value of the switching-impulse voltage which, under the prescribed conditions of test, has a 50 % probability of producing flashover on the post insulator, dry or wet respectively

1.3.7 dry or wet power-frequency withstand voltage the power-frequency voltage which the post insulator withstands dry or wet respectively, under the prescribed conditions of test

1.3.8 dry or wet power-frequency flashover voltage the arithmetic mean value of the measured voltages which cause flashover on the post insulator, dry or wet respectively, under the prescribed conditions of test

1.3.9 puncture voltage the voltage which causes puncture of a post insulator under the prescribed conditions of test

1.3.10 mechanical failing load the maximum load reached when a post insulator is tested under the prescribed conditions of test

1.3.11 creepage distance the shortest distance, or the sum of the shortest distances, along the contours of the external surfaces of the ceramic or glass insulating parts of the post insulator between those parts which normally have the operating voltage between them