**33 kV and 11 kV Post Insulator**

* + 1. **GENERAL REQUIREMENTS** 
       1. The porcelain shall be sound and free from defects, thoroughly vitrified and smoothly glazed.
       2. Unless otherwise specified the glaze shall be brown in colour. The glaze shall cover all the expose porcelain part of the insulator except those area which serve as support or required to be left un-glazed.
       3. Precaution shall be taken during design and manufacture to avoid the following:

1. Stress due to expansion and contraction which may lead to deterioration .
2. Stress concentration due to direct engagement of the porcelain with the metal fittings.
3. Retention of water in the recesses of metal fitting and
4. Shapes which do not facilitate easy cleaning by normal methods.
   * + 1. Cement used in the construction of the post insulator shall not cause fracture by expansion or loosening by contraction and proper care shall be taken to locate the individual parts correctly during cementing. Further, the cement shall not give rise to chemical reaction with metal fittings and its thickness shall be as uniform as possible.
       2. All ferrous metal parts except those of stainless steel, shall be hot dip galvanized and the uniformity of zinc coating shall satisfy the requirements of IS : 2633. The parts shall be galvanized after mechanising . The finished galvanized surface shall be smooth.
       3. The threads of the tapped holes in the post insulators metal fittings shall be cut after giving anti- corrosion protection and shall be protected against rest by greasing or by other similar means. All other threads shall be cut before giving anti-corrosion protection. The tapped holes shall be suitable for bolts with threads having anti - corrosion protection and shall confirm to IS : 4218(Part-I to VI). The effective length of thread shall not be less than the nominal diameter of the bolt.
       4. The post insulator unit shall be assembled in a suitable jig to ensure the correct positioning of the top and bottom metal fitting relative to one another. The faces of the metal fittings shall be parallel and at right angles to the axis of the insulator and the corresponding holes in the top and bottom metal fittings shall be in a vertical plan containing the axis of insulator.
     1. **CLASSIFICATION**

The post insulators shall be of type ’B’ according to their construction, which is defined here under :

A post insulator or a post insulator unit in which the length of the shortest puncture path through solid insulating material is less than half the length of the shortest flash over path through air outside the insulator.

* + 1. **Standard insulation levels :**
       1. The standard insulator levels of the post insulator or post insulator unit shall be as under :

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Highest system voltage | Visible discharge test | Dry one minute power frequency withstand test. | Wet one minute power frequency withstand test. | Power frequency puncture withstand test. | Impulse voltage withstand test. |
| 12 KV (rms) | 9 KV(rms) | 35 KV(rms) | 35 KV(rms) | 1.3 times the actual dry flash over voltage of the unit(KVrms) | 75 KV peak |
| 36 KV (rms) | 27 KV(rms) | 75 KV(rms) | 75 KV(rms) | 1.3 times the actual dry flash over voltage of the unit(KVrms) | 170 KV peak |

* + - 1. In this standard, power frequency voltage are expressed as peak values divided by √2. The impulse voltages are expressed as peak values.
      2. The withstand and flashover voltage are referred to the atmospheric condition.
    1. **TESTS**
       1. The insulators shall comply with the following constitute the type tests :

a) Visual examination.

b) Verification of dimensions.

c) Visible discharge test.

d) Impulse voltage withstand test.

e) Dry power frequency voltage withstand test.

f) Wet power frequency voltage withstand test.

g) Temperature cycle tests.

h) Mechanical strength tests.

i) Puncture test.

j) Porosity test.

k) Galvanising test.

Type test certificates for the tests carried out on prototype of same specifications shall be enclosed with the tender and shall be subjected to the following acceptance test in the order indicated below.\

* + - 1. **Acceptance test:**

The test samples after having withstood routine test shall be subjected to the at least following acceptance test in the order indicated below :

a) Verification of dimensions.

b) Temperature cycle tests.

c) Mechanical strength tests.

d) Puncture test.

e) Porosity test.

f) Galvanising test.

* + - 1. **Routine tests:**

The following shall must be covered under routine tests on each post insulator or post insulator unit.

a) Visual examination as per Cl. No.- 9.12 of IS : 2544/1973

b) Mechanical routine test as per Cl. No.- 9.14 of IS : 2544/1973

c) Electrical routine test as per Cl. No.- 9.13 of IS : 2544/1973

* + 1. **MARKING**
       1. Each post insulator shall be legibly and indelibly marked to show the following.
  1. Name or trade mark of the manufacturer.
  2. Month & year of manufacture.
  3. Country of manufacture.
     + 1. Marking on porcelain shall be printed and shall be applied before firing.
       2. Post insulator or post insulator units may also be mark with I.S.I. certification mark.
     1. **PACKING**

All post insulators shall be pack in wooden crates suitable for easy but rough handling and acceptable for rail, transport. Where more than one insulator is packed in a crate wooden separators shall be fixed between the insulators to keep individual insulator in position without movement within the crate.

**Table-I**

|  |  |
| --- | --- |
| **Highest System Voltage in kV** | **Minimum Creepage distance in mm** |
| Post insulator |
| 12 | 320 |
| 36 | 900 |

**ANNEXURE – A**

* + 1. **Hydraulic Internal Pressure Test on Shells (if applicable)**

The test shall be carried out on 100% disc strain insulator shells before assembly. The details regarding test will be as discussed and mutually agreed to by the Contractor and Owner in Quality Assurance Programme.

* + 1. **Thermal Mechanical Performance Test**

Thermal Mechanical Performance Test shall be performed in accordance with IEC-383-1-1993 Clause 20 with the following modifications:

(1) The applied mechanical load during this test shall be 70% of the rated electromechanical or mechanical value.

(2) The acceptance criteria shall be

(a) X greater than or equal to R+ 3S.

Where,

X Mean value of the individual mechanical failing load.

R Rated electro-mechanical / mechanical failing load.

S Standard deviation.

(b) The minimum sample size shall be taken as 20 for disc insulator units.

(c) The individual electromechanical failing load shall be at least equal to the rated value. Also puncture shall not occur before the ultimate fracture.

* + 1. **Electromechanical/Mechanical Failing Load Test.**

This test shall be performed in accordance with clause 18 and 19 of IEC 383 with the following acceptance

(i) X greater than or equal to R + 3S

Where,

X Mean value of the electro-mechanical/mechanical/ failing load.

R Rated electro-mechanical / mechanical failing load.

S Standard deviation.

(ii) The minimum sample size shall be taken as 20 for disc insulators units. However, for larger lot size, IEC 591 shall be applicable.

1. The individual electro-mechanical/mechanical failing load shall be at least equal to the rated value. Also electrical puncture shall not occur before the ultimate fracture.
   * 1. **Chemical Analysis of Zinc used for Galvanizing**

Samples taken from the zinc ingot shall be chemically analysed as per IS:209. The purity of zinc shall not be less than 99.95%.

* + 1. **Tests for Forgings**

The chemical analysis, hardness tests and magnetic particle inclusion test for forgings, will be as per the internationally recognised procedures for these tests. The sampling will be based on heat number and heat treatment batch. The details regarding test will be as discussed and mutually agreed to by the Contractor and Owner in Quality Assurance Programme.

* + 1. **Tests on Castings**

The chemical analysis, mechanical and metallographic tests and magnetic particle inclusion for castings will be as per the internationally recognised procedures for these tests. The samplings will be based on heat number and heat treatment batch. The details regarding test will be as discussed and mutually agreed to by the Contractor and Owner in Quality Assurance Programme