



INDEPENDENT POWER TRANSMISSION OPERATOR S.A.
NTPD/ SPECIFICATIONS & EQUIPMENT SECTOR S/S – EHVS S/S

March 2006

TECHNICAL DESCRIPTION TD- 82
30KV OUTDOOR SOLID-CORE CYLINDRICAL POST INSULATORS WITH
EXTERNAL METAL FITTINGS.

I. SCOPE

This technical description covers IPTOs requirements with regard the design features, rated characteristics and testing of 30kV, outdoor cylindrical post insulators with external metal fittings.

II. KEYWORDS

Outdoor cylindrical post insulators, solid core cylindrical post insulators.

III. STANDARDS

The cylindrical post insulators shall be in accordance with IEC-60273 and IEC-60168 standards.

IV. USE

The outdoor cylindrical post insulators shall be used for bus support at the 30kV voltage level at the 400/150/30kV air insulated ehv substations.

V. OPERATING CONDITIONS

- | | |
|------------------------------|---|
| 1. Installation | : Outdoors |
| 2. Ambient temperature range | : maximum + 45°C |
| | : minimum - 25°C |
| 3. Altitude | : Up to 1000m above sea level |
| 4. Relative humidity | : ≤ 95% |
| 5. Pollution level | : Moderate to heavy depending on location |
| 6. Wind speed | : 150Km/h |
| 7. Other conditions | : Snow, Ice (10mm) and fog |

VI. IPTO's 30kV ELECTRICAL SYSTEM CHARACTERISTICS

- | | |
|--|---------|
| 1. Nominal Voltage | : 30KV |
| 2 Maximum Operating Voltage | : 36KV |
| 3. Lightning impulse withstand voltage | : 250KV |
| 4. Short circuit level | : 20KA |

- | | |
|--------------------------------|--|
| 5. Number of phases | : 3 |
| 6. Nominal frequency | : 50Hz |
| 7. Earthing (grounding method) | : The 30KV system is earthed (grounded) only when the 30kV shunt reactors are energized. |

VII. INSULATORS REQUIRED CHARACTERISTICS

- | | |
|---|---|
| 1. Type | : Outdoor solid core cylindrical post insulators of porcelain and with external metal fittings. |
| 2. Material of the outer housing of the insulators | : Porcelain |
| 3. Color of porcelain | : Grey |
| 4. Designation of the insulators as per IEC- 60273 | : C8-250 |
| 5. Power frequency withstand voltage wet | : 95KV rms |
| 6. Lightning impulse voltage withstand | : 250KV peak |
| 7. Height of the insulators | : 560mm \pm 1mm |
| 8. Creepage distance | : \geq 1200mm |
| 9. Failing load | |
| a. Bending | : 8000N |
| b. Tortion | : 2500Nm |
| 10. Maximum nominal diameter of the insulating part | : 215mm |
| 11. Bottom metal fitting pitch circle diameter | : 127mm |
| 12. Top metal fitting pitch circle diameter | : 127mm |
| 13. Material of all metal fittings | : hot-dip galvanized cast iron or equivalent |
| 14. Method of mounting of the insulators | : Uptight |
| 15. Number of units of which the insulators consist of | : One (1) |
| 16. Number of bolts for the top metal fitting | : Four (4) |
| 17. Number of bolts for the bottoms metal fitting | : Four (4) |
| 18. Size of the bolt holes for all fittings | : M16 |
| 19. Nominal maximum diameter of mounting face of all fittings | : 165mm |
| 20. Accessories | : Bolts, nuts and washers must be of hot dip galvanized steel and part of the supply |

VIII. TESTS

The insulators shall be subjected to the following tests as per IEC-60168.

A. Routing Tests

Shall be carried out on all insulators of the order

1. Visual inspection

- a. Each insulator shall be examined visually to confirm that the metallic fittings are on the insulating part in accordance with the approved drawings.

b. The color of the post insulator shall correspond to the color specified in this hereby technical description, which is grey.

c. The glaze defects are defined as spots without glaze, chips, inclusions in the glaze and pinholes.

Given the above definition, the visual inspection shall confirm the following.

- The total area of glaze defects shall not exceed $100 + \frac{D \times F}{2000} \text{ mm}^2$
- The area of any single glaze defect shall not exceed $50 + \frac{D \times F}{20000} \text{ mm}^2$
- The maximum area without glaze shall not exceed 20 mm^2

Where

- D is the greatest diameter of the insulator unit in millimetres
- F is the creepage distance of the insulator unit in millimetres

d. With regard to pinholes

- In an area of 50mmx 10mm, the number of pinholes ≤ 15
- The total number of pinholes on the insulator $\leq 50 + \frac{D \times F}{1500} \text{ mm}^2$

B. Sample tests

The following sample tests shall be performed on the following number (n) of post insulators of the order, selected at random.

For $n \leq 100$ - on one (1) post insulator

For $101 < n \leq 300$ - on two (2) post insulators

For $301 < n \leq 500$ - on three (3) post insulators

For $n \geq 501$ - on four (4) post insulators

1. Verification of dimensions
2. Temperature cycle test
3. Mechanical failing load test (bending, tensile, torsion and compression).
4. Porosity test
5. Galvanizing test (Accepted values are for the cast iron sections $85 \mu\text{m}$ and for the bolts, nuts and washers $54 \mu\text{m}$).

C. Type tests

1. Dry lightning impulse withstand voltage test. Test voltage 250kV
2. Wet power frequency withstand voltage test. Test voltage 95kV rms
3. Mechanical failing load test (bending, tensile, torsion and compression).
 - With Bending withstand : 8000N
 - and Torsion withstand : 2500Nm

IX. DATA WHICH MUST BE SUBMITTED BY ALL BIDDERS

1. Outline drawing of the insulator, in which all its physical dimensions are clearly depicted (cross section, top view, side view).
2. Brochures, technical pamphlets and any other information which is deemed necessary for the technical evaluation process.
3. All bidders are required to answer all items of **Attachment A**. Failure to comply or partial filling of the attachment will constitute sufficient reason for rejection of the offer.
4. Any test certificates for the type tests specified in this hereby technical description.
Acceptance or not of these certificates lies on IPTO's judgment.
5. A drawing indicating all metal fittings of the insulator

X. DATA WHICH MUST BE SUBMITTED BY THE SUCCESSFUL BIDDER

1. Complete physical drawing of the insulator (cross section, top view, side view) for approval before the construction of the insulators.
2. Complete physical drawing of all metal fittings, for approval before the construction of the insulators.
3. Maintenance and assembly instructions in detail
4. Mounting instructions for the insulators

XI. WARRANTY

The supplier must provide a warranty of two (2) years, beginning from the date of delivery of the insulator, for damages by faulty design, or by unreliable components, or by combination of the two.

XII. PACKING

The insulators shall be delivered inside robust wooden boxes, three (3) per box.

ATTACHMENT "A"
30KV OUTDOOR, SOLID-CORE, CYLINDRICAL POST INSULATORS WITH
EXTERNAL METAL FITTINGS,

All bidders must provide the following data. Failure to comply in full, shall constitute sufficient reason for rejection of the offer.

1. Type :.....
:.....
2. Manufacturer :.....
:.....
3. Ambient temperature range during operation :.....
4. Material of the outer housing of the insulators :.....
5. Material on the inner part of the insulators :.....
:.....
6. Color of the porcelain :.....
7. Designation of the insulators as per IEC-60273 :.....
8. Power frequency withstand voltage wet :.....
9. Lightning impulse voltage withstand :.....
10. Height of the insulators :.....
11. Creepage distance of the outer housing :.....
12. Failing load :.....
 - a. Bending :.....
 - b. torsion :.....
 - c. tension :.....
 - d. compression :.....

13. Maximum nominal diameter
of the insulating part :.....
14. Bottom metal fitting pitch circle diameter :.....
15. Top metal fitting pitch circle diameter :.....
:.....
16. Type of material of all metal fittings :.....
17. Number of units of which the insulators consist :.....
:.....
18. Number of bolts for the top metal fitting :.....
19. Number of bolts for the bottom metal fitting :.....
20. Size of the bolt holes for all metal fittings :.....
21. Nominal maximum diameter of mounting
face of all metal fittings :.....
22. Are all connecting parts such as bolts,
nuts and washers part of the supply? :.....
23. Are all connecting parts such as bolts,
nuts and washers of hot-dip galvanized steel? :.....
24. Weight of each insulator :.....