



INDEPENDENT POWER TRANSMISSION OPERATOR S.A.
TNPRD/ SUBSTATION SPECIFICATION & EQUIPMENT SECTION

March 2017

TECHNICAL DESCRIPTION TD-28B
SINGLE-POLE OUTDOOR TYPE SEALING ENDS SUITABLE
FOR XLPE, 400 KV, SINGLE CORE CABLES

I. SCOPE

This technical description sets forth the requirements for the technical and constructional characteristics of single-pole sealing ends of outdoor type, suitable for XLPE 400 KV single core cables which are in accordance with the Terminal Description TD-102.

II. KEY WORDS

Outdoor sealing ends, cable sealing ends, cable terminations.

III. STANDARDS

The sealing ends shall be constructed and tested in accordance with this hereby technical description and also in accordance with the latest version of IEC 62067 standard.

IV. USE

The sealing ends are to be used at the ends of XLPE 400KV underground cables, which are in accordance with the Technical Description TD-102, inside EHV substations or at the ends of underground cables inside terminal installations.

V. OPERATING CONDITIONS

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| 1. Installation | : Outdoors |
| 2. Ambient temperature range | : Maximum + 45°C |
| | : Minimum - 25°C |
| 3. Altitude | : Up to 1000m above
sea level |
| 4. Other conditions | : Snow, Ice and fog |

VI. ELECTRICAL CHARACTERISTICS OF THE SYSTEM

1. Nominal Voltage : 400 kV
2. Maximum Operating Voltage : 420 kV
3. Frequency : 50 Hz
4. Basic insulation level (lightning impulse level) : 1550 kV, peak
5. Short circuit level : 40 kA for 1 sec
6. Method of earthing : The 400 kV system is solidly earthed

VII. REQUIRED CONSTRUCTIONAL AND OTHER CHARACTERISTICS OF THE SEALING ENDS

1. Insulation housing of the sealing end : Porcelain or silicon rubber
2. Sealing end installation : The sealing ends shall be installed in a vertical position, on a metallic support structure and they will be mounted on the support structure through porcelain insulators or silicon rubber insulators.
3. Sealing end terminal : The terminal shall be of cylindrical shape with diameter of 40mm and from material which shall be suitable for connection with copper conductor via bronze clamp unless it is specified otherwise in the inquiry.
4. Sealing end earthing : The earthing of the sealing ends and in extension of the cable's sheath shall be through a single cable of special reinforced insulation, of copper conductor of 120mm² in cross section, to the grounding (earthing) mat of the substation or terminal site. For this purpose, therefore, the sealing ends shall be equipped with a proper earthing bronze terminal.
5. Characteristics of the cable which is to be connected to the sealing end : According to the Technical Description TD-102

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| 6. | Metallic parts of the sealing end | : Any metallic parts of the sealing end shall either be of stainless steel or of other metal but with proper plating (such as zinc-plated or tin-plated). |
| 7. | Filling of the insulating housing (insulator) | : The insulating housing shall be filled with non-toxic synthetic oil which shall be free from PCB's or PCT's. |
| 8. | Life duration of the Sealing end's parts | : The life duration of the parts shall be at least five (5) years from their construction date |
| 9. | Minimum creepage distance | : 10500mm |

VIII. BASIC REQUIRED PARTS OF THE SEALING END

The sealing end shall consist of the following basic parts.

- Upper metal fitting
- Conductor connector (metallic)
- Insulator (Porcelain or silicon rubber*)
- Filling oil
- Stress cone
- Base plate
- Support insulators (four (4) insulators)
- Cable gland

* The silicon rubber insulator consists of fibre glass reinforced cast resin tube on the surface of which, sheds of silicon rubber are applied

IX. REQUIRED CHARACTERISTICS OF THE SUPPORT (PEDESTAL) INSULATORS OF THE SEALING ENDS

The porcelain or silicon rubber insulators with which the sealing ends are supported on the metallic support structure, must have the following characteristic :

Cantilever load withstand : ≥ 5000 N

X. REQUIRED ELECTRICAL AND OTHER CHARACTERISTICS OF THE SEALING ENDS

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| 1. Nominal (rated) Voltage | : 400kV |
| 2. Maximum Operating Voltage | : 420kV |
| 3. Lightning impulse Voltage
withstand (1.2 / 50 μ s) | : 1550kV peak |
| 4. Short circuit current withstand capability | : 40kA for 1 sec |

XI. TESTING

A. Routine Tests

All routine tests mentioned in the IEC 62067 Standard will be carried out.

B. Type Tests

All type tests mentioned in the IEC 62067 Standard will be carried out.

XII. NAMEPLATE INFORMATION

Each sealing end at its metallic base, shall have attached to it, a nameplate made of aluminium or other non-corrosive metal which must bear the following data:

- Name of the equipment
- Name of the manufacturer
- Serial number
- Year of manufacturing
- Lightning impulse (1.2/50 μ s) voltage withstand

XIII. INFORMATION WHICH MUST BE PROVIDED BY ALL BIDDERS

1. A drawing of the offered sealing end on which all parts of the sealing end are shown, in addition, details of connection of the sealing end to the cable must be shown.
2. Technical pamphlets and complete description of the offered sealing end and of its parts.
3. Each Bidder must fill in the attachment "A". Failure to do so or incomplete filling of attachment "A", shall constitute sufficient reason for rejection of the offer.
4. Life duration (expiration date) of the sealing end parts
5. Each Bidder can submit along with the technical offer any type test certificate that may have for all tests which are listed in paragraph XI-B of this hereby technical description. Whether these certificates will be taken into consideration remains at the discretion of IPTO.

XIV. DATA WHICH MUST BE PROVIDED BY THE SUCCESSFUL BIDDER

1. Complete drawing of the sealing end in which all parts are shown and described in detail before shipment of the sealing end.
2. Detailed drawing in which the connection of the sealing end to the cable is explicitly shown in addition to any instructions which may be required for this purpose before shipment of the sealing end.
3. Detailed drawing showing the erection of the sealing end on the support structure end before shipment of the sealing end.
4. Detailed drawing showing the assembly of **all** parts of the sealing end before shipment of the sealing end.

XV. PACKING

Any sealing end along with its parts must be packaged inside a robust wooden box. (on sealing end along with its parts per one box)

The outer surface of the box must bear, with large letters the following:

- Contact Number
- Name of the equipment
- Year of manufacturing
- Serial number of the equipment
- Expiration date of equipment
- Weight of any box

XIV. WARRANTY PERIOD

The supplier must provide a warranty period of three (3) years beginning from the date of delivery of the sealing ends.

ATTACHMENT 'A'

All Bidders must provide the following data. Failure to fill or partial filling of this attachment shall constitute sufficient reason for rejection of the offer.

1. Manufacturer of sealing end :
2. Type of sealing end :
3. Operating Temperature range :
4. Type of material of the insulating housing of the sealing end :
5. Shape and type of sealing end terminal :
6. Brief description of the earthing of the sealing end :
7. Support (pedestal) insulator data:
 - a. Mechanical strength of the supporting insulators in compression :
 - b. Cantilever load withstand :
 - c. Number of support insulators :
 - d. Mechanical withstand force due to short circuit :
 - e. Type of material of the support insulators :
8. Nominal voltage of the sealing end :
9. Maximum Operating Voltage :
10. Lightning impulse voltage (1,2/50 μ s) withstand of the sealing end :
11. Power frequency voltage withstand of the sealing end, 50 Hz, for (1) min under dry and wet conditions. :
12. Creepage distance of the porcelain or silicon rubber housing :
13. Short circuit current withstand for one (1) sec. :
14. Continuous current withstand :

