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## **TECHNICAL SPECIFICATION FOR VERTICAL CABLE BOOTS FOR TRANSFORMER HT BUSHING WITH WATER DRAINING ARRANGEMENT**

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### **1.0 SCOPE:**

This specification covers the technical requirements of design, manufacturing & testing at manufacturer's works, packing, forwarding, supply and unloading at store of Terminal protector or cable boot for 11KV Transformer required for safe and satisfactory operation of various makes of Transformers.

### **2.0 DESIGN FEATURES –**

- Accommodates a large cable cross section, 70-300 sq.mm
- Prevents Flashover Due to Humid Environment in HT Cable Entry Box
- Protection from Flashover to Intervention by Reptiles, Birds, Animals
- It is easy to fit during installation and maintenance.
- It is re-openable and re-usable

The vertical cable boots should be manufactured from electrically insulating, anti-tracking, UV resistant, flame retardant, temperature resistant and weather resistant rubber material.

The cable boot should have an inspection hole which should be covered with removable cap. The cable boot should have following dimensions –

Length: >300 mm (vertical Boot),

Cable/conductor Entry top of boot: >Ø15 mm,

Thickness: 4.5 ± 0.5 mm

Inside diameter of bottom of boot: Ø72 mm

Inside diameter of Grommet: Ø35 mm

Rain shade cable/conductor entry hole: Ø10 mm

The vertical cable boot should be fitted on the transformer bushing using a grommet. Grommets must have Slots for Water Passage and 3 legs attached to the grommet to ensure draining of water.

### **3.0 GUARANTEED TECHNICAL PARTICULARS:**

Guaranteed Technical particulars are given in enclosed Annexure A.

Bidder shall submit the data in given Performa at time of bid offer.

### **4.0 DOCUMENTS:**

Following documents/certificates shall be furnished by the bidder along with offer.

- i) Guaranteed technical particulars (GTP).
- ii) Test Certificate.
- iii) Quality Assurance Plan (QAP)

### **5.0 TYPE TEST CERTIFICATE:**

Type testing to done for 11KV Transformer and the vertical cable boot is suitable for transformer of 11KV.

The bidder shall submit following Type Test report from any NABL accredited Lab or Govt. approved Lab. Test certificate Tested as per IEC: 60060 - 1 – 2010. Type Test Certificate should not be older than 7 years as on the date of tender Opening.

1. Dry Power Frequency Voltage Withstand Test – 70 kV for 1 min
2. Impulse Withstand Test – 125 kVp
3. Leakage Current Test at 36 kV.(Required testing standard)
4. Exposure to UV Radiation – 500 Hours
5. Salt Fog Test – 500 Hours
6. Heat Ageing Test 7 Days at 70°C
7. Tracking test (Comparative Tracking Index) IEC 60112:2003 +A1:2009
8. Water absorption test 0.5 max
9. DC Voltage Withstand 54 kv DC for 5 min.

#### **5.1 ROUTINE TEST:**

Manufacturer has to carryout routine test during production to check the essential Requirements that is likely to vary during production. Manufacture has to keep records Of the same and to be produced for verification of inspector when asked at the time of Inspection of lot.

#### **5.2 ACCEPTANCE TEST:**

Visual examination and dimensional check to be carried out at manufacturer location of the material on samples randomly selected from supply lot. Minimum 10 nos. is to be selected from supplied lot material for acceptance test. Material is acceptable after conform all samples in dimensions given in this specification and also examine for freedom from flaws, cracks and other defects.

1. Dimensional Inspection Report
2. Hardness of the material of the lot (On Test Button) As per ASTM D2240
3. Tensile Testing on specimen of the material of the lot (As per ASTM D412)
4. Elongation Testing specimen of the material of the lot (As per ASTM D412)
5. Dielectric Strength Test on specimen of the material of the lot (As per ASTM D149)
6. Volume Resistivity (As per ASTM D257)
7. Flame Retardant Test for one minute – No burning (self – extinguish) EN 13501

#### **6.0 General and Tender Sample:**

The tenders received without complete details required as per specifications and GTP enclosed is liable to be rejected without Prior Information.

The Sample of two nos. of sets as per specifications will have to be submitted before the Date of Physically bid submission at RSO Mehsana UGVCL.

The bidder should submit Performance certificate not bellow the rank of Executive from DISCOM under GUVNL and its Subsidiary Company. In support of fulfillment of the past supply criteria, the bidder shall furnish documentary evidence along with bid i.e. Work Order Copies duly attested by the Authority.

**7.0 FACILITY:**

The bidder shall have facility to perform testing as per Acceptance Test. The bidder shall furnish the details of manufacturing and testing facilities available with him. Bidder must have testing facility to carry out routine tests at their works

**8.0 MARKING:**

The product should contain –

1. Manufacturer's Logo
2. Brand Name
3. PROPERTY OF UGVCL
4. Manufacturing month & year

**9.0 GUARANTEE OF BOOTS:**

The boots shall be guaranteed for satisfactory and trouble free operation for a period of 18 months from the date of installation at site against defects in the materials or design.

In case of any manufacturing defect observed during guaranteed period due to faulty design and defective materials and on such information to the supplier of boots shall have to be replaced free of cost by the supplier.

**Annexure A**  
**GUARANTEED TECHNICAL PARTICULARS**

Sr. No	GTP for Vertical Cable Boot			
	Descriptions	Testing Standard	Unit	As per Firm's Offer
1	Name of Manufacturer	----		As per Tech Data
2	Nominal system voltage		kV	11
3	Maximum system voltage		kV	11
4	Name and type/grade of material			EPDM
5	Average / Minimum wall thickness		Mm	4.5 ± 0.5 mm
8	Operating temperature		Deg.C	-10 to + 110
9	Low Temp. Flexibility		-	No Cracking
10	Applicable standards			Tested as per IEC: 60060 - 1 - 2010
11	Dielectric strength	ASTM D149	kV/mm	12 kV/mm (min)
12	AC High voltage power frequency	IEC: 60060 - 1 - 2010	kV	70 kV for 1 min
13	Impulse with stand 1.2 / 50 peak	IEC: 60060 - 1 - 2010	kV	125 kvp
14	Volume Resistivity	ASTM D257	Ohm - cm	1 x 10 <sup>14</sup> (Min)
15	Tensile strength			10 N/mm <sup>2</sup> (Min)
16	Ultimate Elongation			200% (Min)
17	Temperature in °C (Max/Min/Year Average)			50/0/40
18	UV Protection			yes
19	Colour			Reddish brown
20	Flame retardant			No burning
15	Each Boot Set shall contain			1. Straight Cable Boot - 3 Nos. ((Having Grommet with water holes on border side and additional minor 2 holes required to proper drainage of water, Rain shade - 3 Nos., Cap - 3 Nos., Silicone Grease - 1 Bottle (30 ml aprx.)) 2. ERP Tape- 3M make, 25 mm width, 2 meter long 3. Installation Instruction Manual Packed in corrugated box.

Ref Standard: Tensile Strength - ASTM D412, Dielectric Strength: ASTM D149, Volume Resistivity – ASTM D257