

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-GEN-4015

Specification Name : Technical Specification for Discharge Rod

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1. SCOPE

This specification covers technical requirements of supply, design, constructional features, inspection, testing & transportation of Discharge Rod up to 33kV voltage grade for efficient and trouble free operations at TPCODL/TPNODL/TPSODL/TPWODL stores/site.

2. APPLICABLE STANDARDS

‘Discharge Rod’ covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest revisions of relevant Indian Standards /IEC/ International Standards and shall conform to the regulations of local statutory authorities.

IS 2071: Part I	High-voltage Test Techniques Part 1 General Definitions and Test Requirements
IS 16622:2019	Live working-insulating hollow tubes for electrical purpose
IS: 11731(Part-II) - 1986	Methods of Test for Determination of Flammability of Solid Electrical Insulating Materials When Exposed to An Igniting Source - Part 2 : Vertical Specimen Method
IEC 61230	Live working – Portable equipment for earthing or earthing and short circuiting
IEC 61138	Cables for portable earthing and short-circuiting equipment
IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
IEC 61235	Live working - Insulating hollow tubes for electrical purposes

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

SL. NO.	CONDITONS	VALUES
1	Max. altitude above sea level	1200m
2	Max. Ambient Temperature	50 °C
3	Max. Daily average ambient temp	35 °C
4	Min Ambient Temp	0 °C
5	Maximum temperature attainable by an object exposed to sun	60 °C
6	Maximum Humidity	95%
7	Minimum Humidity	10%
8	Average No. of thunderstorm days per annum	70
9	Average Annual Rainfall	150 cm
10	Average No. of rainy days per annum	120
11	Thermal Resistivity of soil	150 Deg. Ccm/W

12	Wind Pressure	126 kg/sq. m up to an elevation of 10 meter.
14	Earthquakes of intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
15	Earthquakes of intensity in vertical direction	equivalent to seismic acceleration of 0.15g
16	Wind velocity	300 km/hr.

TPCODL/TPNODL/TPSODL/TPCODL/TPWODL/TPWODL/TPSODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed up to 300 Km ph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS:

S.No.	Description	Requirement
1.	System voltage	Upto 33 KV
2.	Class of insulation of insulated Rod & extension handles	'F' class. Pultruded fiber glass with antistatic coating and the insulated pole should be free from scratches or mechanical damages.
3.	Total length of Discharge rod	7 mtr. (in 6 folds) Height/ length of the collapsible section - 4 ft
4.	Triangular Type Insulation rod	<ul style="list-style-type: none"> Telescopic Triangle Type Fibre Glass Hot stick suitable to operate Neon Tester. Fibre Glass Hot stick should have a Triangle design to have a unidirectional locking system for user-friendly operation. Triangle design helps better grip and hold a position in field operation without having any tilt issues. Telescopic Hot stick shall be following dimensions Top section - 25MM Bottom Section - 55MM Each piece should have 1.2 Mtr No. of Sections – 6 nos.
5.	Main discharge head	<ol style="list-style-type: none"> MS Hard chrome plated with link clamp. This is fitted on the main insulated pole of discharge rod. It should be non-removable type and riveted on the rod like a cap on rod. Top surface shall have provision for fixing either discharge register or discharge clamp one at a time necessary threading arrangement to be provided. The top head shall be provided with a bolt for fixing of discharge cable lug on top surface when direct link clamp used for discharge. The head shall have minimum 40mm side

		extended link clamp on head.
6.	Attachment of extension handles	<p>1. The main rod and extension handles are provided with snap pins with spring to easily connect and remove extension handle.</p> <p>2. The snap pins and its spring shall be made up of stainless steel to maintain its spring action for long time with two locking heads in 180° opposite.</p>
7.	Discharge Clamp	Clamp material shall be Tin plated copper of electrical grade. The clamp is heat treated to retain its shape for long time. The clamp shall be removable.
8.	Discharge resistor	Nonlinear carbon film discharge resistor (heavy duty) for controlled discharging of equipment like transformers, reactors, cables, high capacity machines and transmission lines. The resistor can be detached by unscrewing. the discharge resistor must have inverse temperature characteristics which facilitates controlled discharging resistance value: approx. 7 to 10k ohms
9.	Earthing cable	The earthing lead shall have Lug at both ends. Lug shall be pressure crimped & brazed on both ends. Heat shrinkable sheath to be provided at the joints to protect moisture from penetrating into lead.
9.1	Cable Conductor	Flexible copper (electrical grade)
9.2	Conductor size	25 sqmm
9.3	Conductor resistance	To be provided by bidder
9.4	Diameter of conductor	To be provided by bidder
9.5	Insulation material of conductor	PVC (as per IEC 61230)
9.6	Thickness of PVC insulation of	1.2 mm
9.7	Color of PVC insulation of conductor	Transparent
9.8	Overall diameter	Must be provided by bidder
9.9	Length of cable	12 meter
10.	Earth end clamp	<p>Made from high strength special aluminium alloy.</p> <p>maximum opening : 25mm</p> <p>maximum clamping depth : 2"</p> <p>Size and dimension shall be as per type tested design during short circuit test.</p>
11.	Duty	Whole system is designed to withstand high fault currents up to min. 8KA for 1 sec or min.11.3 KA for 0.5 sec (as per IEC 61230).
12.	Anti-tracking system	The insulated rod is provided with 2 coats of anti- tracking compounds. saline treated epoxy glass, 'f' class form the main insulation
13.	Surface finish and texture	The surface finish of the insulated stick must be highly glossy & fine so that minimum dust or moisture may deposit on it.

14.	Interchangeability	Insulated rods have interchange-ability among themselves. The coupling arrangement shall be such that any extension rod can be fitted in any main rod, Without any sequence.
15.	Carrying cases	Nylon Carrying cases to be provided for carrying & storage of 1. discharge rods and extensions 2. earthing cable and accessories.
16.	BDV of the discharge rod material	8-12 kV /mm
17.	Dielectric strength	The insulated rod of discharge rod must conform to minimum dielectric withstand strength of minimum 100kV/feet.
18.	Safety rain guard/safety stopper for	Must be provided on main rod.
19.	Rubber Grip for Holding FRP	Minimum 2 nos. at bottom side

5. GENERAL CONSTRUCTIONS:

Earthing Discharge Rods is an insulated rod, usually made of fiberglass with extension handle. Discharge Rod complete with accessories suitable for 11KV and 33KV system voltage for discharging dead conductors /busbars.

- The discharge rod shall be made from Fibre Glass Epoxy insulation manufactured through Pultrusion process.
- The Insulating Rod shall be light in weight and has high mechanical strength and good electrical properties.
- The main rod and extension handles are provided with snap pin with spring to easily connect and remove the extension handles. The snap pins and spring shall be made from high grade stainless steel to maintain its spring action for long time.
- The main insulated rod shall be provided with safety rain guard/safety stopper for protection. The Safety stopper must be flexible type to avoid breakage in case of the insulated rod is dropped.
- Rod design should be triangle shape to have adequate gripping and unidirectional push button locking system for user friendly operation.
- The surface finish of the insulated rod must be highly glossy and fine so that minimum dust or moisture may deposit on it.

6. MARKING:

Following details shall be embossed/marked on Discharge Rod:

- Manufacturer's name
- month and Year of manufacturing (MM/YYYY)
- RO/PO No.
- Property of TPCODL/TPNODL/TPSODL/TPWODL
- Logo of TPCODL/TPNODL/TPSODL/TPWODL with high visibility on every section of the rod

7. TESTS:

Routine, Acceptance & Type tests shall be carried out in accordance with the relevant IS/IEC/ International standard. Acceptance tests shall be witnessed by TPCODL/TPNODL/TPSODL/ TPWODL's authorized representative. Following tests shall be necessarily conducted on the discharge rod in additions to others specified in IS/IEC/ANSI standards. Type tests shall be conducted from CPRI/ERDA/Any Govt. Lab.

*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.

7.1 TYPE TESTS

Sl. No.	Tests	Clause no.	Reference Standard
1	Visual Inspection	Clause 8.1 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993
2	Dimension Check	Clause 8.2 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993
3	Calibration test report		As per technical specification
4	Dry Power Frequency Voltage Withstand Test at 100kV AC rms	Clause 9.1 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993
5	Dielectric wet test	Clause 9.2 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993
6	Mechanical test	Clause 10 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993
6.a	Bending Test	Clause 10.1 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993
6.b	Torsion Test	Clause 10.2 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993
6.c	Crushing Test	Clause 10.3 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993
7	Impulse Voltage Withstand Test at 170KV	IS 2071	IS 2071
8	Short Circuit Withstand Test for high fault levels for cable with earthing clamps	IEC 61230	IEC 61230
9	Dielectric test before and after exposure to humidity	Clause 9.1 of IS 16622	IS 16622 : 2019 IEC 61235 : 1993

7.2 ROUTINE AND ACCEPTANCE TESTS

All acceptance tests mentioned below shall be witnessed by TPCODL/TPNODL/TPSODL/TPWODL's representative during inspection stage.

- a) Visual inspection
- b) Dimensions check
- c) Dielectric test – On each section of operating rod subject to 100kV AC RMS, with leakage current less than 50micro Amp
- d) Fitment and interchangeability check for extension rods.
- e) Fitment of capsule, hook, earthing cable and connection clamps

8. TYPE TEST CERTIFICATES:

Bidder shall furnish the type test report of discharge rod for the tests as mentioned in Clause no. 7 of this specification and as per reference standards.

Test Laboratories: Complete set of Type Tests shall be conducted at certified test laboratories, which are CPRI / ERDA/Any Govt. Lab.

Type test report shall be submitted for the discharge rod mentioned in the bid/ OR for any size higher (than required) of similar type and similar or higher voltage grade. Type test should have been conducted in certified test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCODL/TPNODL/TPSODL/TPWODL.

9. PRE DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPCODL/TPNODL/TPSODL/TPWODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPCODL/TPNODL/TPSODL/TPWODL's representatives at all times when the work is in progress. Inspection by the TPCODL/TPNODL/TPSODL/TPWODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL/TPNODL/TPSODL/TPWODL.

Following documents shall be sent along with material.

- a) Test reports
- b) MDCC issued by TPCODL/TPNODL/TPSODL/TPWODL
- c) Invoice in duplicate
- d) Packing list

- e) Delivery Challan
- f) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORES:

The material received at TPCODL/TPNODL/TPSODL/TPWODL Odisha store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department.

11. GUARANTEE:

Bidder shall confirm for guarantee towards design, material, workmanship & quality of process/ manufacturing for integrated product delivered under the contract. In the event any defect is found by TPCODL/TPNODL/TPSODL/TPWODL, up to a period of at least 12 months from the date of commissioning or 18 months from the date of last supplies made under the contract whichever is earlier, bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of TPCODL/TPNODL/TPSODL/TPWODL failing which TPCODL/TPNODL/TPSODL/TPWODL will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the TPCODL/TPNODL/TPSODL/TPWODL's own charges (@ 20% of expenses incurred), from the Bidder or from 'Security cum Performance Deposit' as the case may be.

12. PACKING:

Rail/ Road transportation: The bidder shall ensure that the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit. Packaging shall be as per climate change perspective. TPCODL/TPNODL/TPSODL/TPWODL encourages to use environment friendly packaging.

Note: Single use plastic not to be used for packing of the material.

13. TENDER SAMPLE:

NA.

However, the bidder shall arrange to submit one sample on returnable basis OR provide an onsite demonstration of the product at TPCODL/TPNODL/TPSODL/TPWODL premises before mass production

14. QUALITY CONTROL:

The bidder shall submit with the offer Quality Assurance Plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall

have free access to the manufacturer's/sub-supplier's works to carry out inspections. The bidder shall ensure that the material supplied is as per the Guaranteed Technical Particulars as specified in the specifications.

15. TESTING FACILITIES:

Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. MANUFACTURING ACTIVITIES:

CAT-B/CAT-A approval is mandatory to start manufacturing works

17. SPARES, ACCESSORIES AND TOOLS

NA

18. DRAWINGS AND DOCUMENTS

A. Following documents shall be submitted along with the bid:

1. Completely filled-in clause wise compliance of the specification.
2. Type test Certificates for each specified test
3. Drawing of Discharge Rod with earthing clamps

B. Following documents shall be submitted after the placement of RC/PO:

1. Completely filled-in clause wise compliance of the specification.
2. Type test Certificates for each specified test if not submit during technical evaluation
3. Drawing of Discharge Rod with earthing clamps
4. Compliances of undertaking submitted during Technical Evaluation

All the Documents and Drawings shall be in English Language.

19. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS

Bidder to submit completely clause wise compliance of this specification.

20. SCHEDULE "B" DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

SL. No	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation