

SECTION-III (Part-A)

TECHNICAL SPECIFICATION FOR 30 KV 10 KA HEAVY DUTY SURGE ARRESTERS (LIGHTNING ARRESTERS) AGAINST TN-2381

1.0 SCOPE:

- 1.1 This specification provides for the design, engineering, manufacture, assembly, stage testing, inspection and testing before despatch, packing, forwarding and delivery of Metal Oxide(gapless) Surge Arresters complete with accessories for 33KV system as specified hereunder:
- 1.2 It is not the intent to specify completely herein all the details of design and construction of Surge Arresters, However, Surge Arresters shall conform in all respects to the high standard of design and workmanship and be capable of performing in continuous commercial operation upto Bidder's guarantee in a manner acceptable to Purchaser, who will interpret the meanings of drawings and specifications and shall have the power to reject any work or material which in his judgement are not in accordance therewith. The Arresters offered shall be complete with all parts, necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of supply, irrespective of whether they are specifically brought out in the commercial order or not.

2.0 STANDARDS:

- 2.1 The Surge Arresters shall conform to the latest editions and amendments available at the time of supply, of the standards listed hereunder:

Sl No.	Standard Ref No.	Title
1.	IEC 99-4	Specification Part.4 for Surge Arresters without gap for AC system.
2	IS:3070 (Part-III)	Specification for Lightning Arresters for alternating current System
3	IS:2629	Recommended practice for hot dip galvanising of iron and steel.
4	IS:2633	Method for testing uniformity of coating on Zinc coated articles.
5	IS:5621	Specification for large hollow porcelain for use in electrical installation.
6	IS:2147	Degree of protection provided by enclosures for low voltage switchgear and control gear.
7.		Indian Electricity Rules.1956.

Note :

- i) For the purpose of this specification all technical terms used hereinafter shall have the meaning as per IEC specification.
 - ii) For the parameters of the Arrester which are not specified in IEC specification for Surge Arresters, the provisions of ISS 3070 (Part.III) shall be applicable.
- 2.2 Surge Arresters meeting with the requirements of other authoritative standards, which ensure equal or better quality than the standards mentioned above shall also be acceptable. Where the equipment offered by the Bidder conforms to other standards, salient points of difference between the standards adopted and the specified standards shall be clearly brought out in the offer. Four (4) copies of the reference standards in English language shall be furnished along with the offer.

3.0. CLIMATIC CONDITIONS :

3.1 The Surge Arresters and accessories shall be suitable for continuous satisfactory operation under climatic conditions listed below.

1. Maximum ambient Air Temperature in shade (deg.C).	50 DEG. C
2. Minimum Ambient Air Temperature in shade(deg.C).	(-)5 DEG.C
3. Maximum relative humidity(%)	95%
4. Minimum relative humidity	10%
5. Height above mean sea level	Less than 1000M
6. Dust Storms are liable to occur in the period	from March to July.
7. Average No.of thunder Storm days/annum.	40 days.
8. Average annual rainfall(mm)	10 to 100 cms (Depending on area)

9. Average No.of months of tropical monsoon condition p.a. 4

All the electrical devices shall be given tropical and fungicidal treatment to enable their satisfactory operation in the above climatic conditions.

4.0 PRINCIPAL PARAMETERS :

The Surge Arresters offered under this specification shall conform to the parameters given below.

S.No.	Particulars.	System Voltage (KV rms)
		----- 30 KV Station type -----
1.	Nominal system voltage (kv rms)	33
2.	Highest system voltage (kv rms)	36
3.	1.2/50 microsecond impulse voltage with stand level	
a.	Transformer and reactors (kvp)	170
b.	Other equipment and lines (kvp)	170
4.	Minimum prospective symmetrical fault current for 1 second at Arresster location(KA rms)	25
5.	Anticipated levels of temporary over voltage and its duration.	
a.	Voltage(p.u.)	1.5

catalogues or literature submitted as part of the offer shall not be considered as valid deviations unless specifically brought out in the schedule of deviations.

- 5.6.3 Any deviation which has not been specifically brought out in the schedule of deviations of the Bid Proposal Sheets, shall not be given effect to. The deviations brought out in the schedule shall be supported by authentic documents, standards and other references.
- 5.6.4. Each individual unit of Surge Arresters shall be hermetically sealed and fully protected against ingress of moisture. The hermetic seal shall be effective for the entire life time of the Arrester and under the service conditions as specified. The Bidder shall furnish sectional view of the Arrester, showing details of sealing employed.
- 5.6.5 The bidder shall furnish in the offer, a sectional view of pressure relief device employed in the Station type Surge Arresters offered.
- 5.6.6 The Surge Arresters shall be suitable for hot line washing.
- 5.7 Construction :
- 5.7.1 All the units of Arresters of same rating shall be interchangeable without adversely affecting the performance.
- 5.7.2 The Surge Arresters shall be outdoor and suitable for pedestal/ clamp type mounting.
- 5.7.3 All the necessary flanges, bolts, nuts, clamps etc., required for assembly of complete Arrester with accessories and mounting on support structure to be supplied by the Purchaser shall be included in Bidder's scope of supply.
- 5.7.4 The drilling details for mounting the Arrester on Purchaser's support shall be supplied by the Supplier.
- 5.7.5 The minimum permissible separation between the Surge Arrester and any earthed object shall be indicated by the Bidder in his offer.
- 5.8. PORCELAIN / POLYMERIC HOUSING :
- 5.8.1 The housing may be of Porcelain or Polymeric.
- 5.8.2 Where the bidders are quoting for Surge Arresters with Porcelain Housing, all porcelain housings shall be free from lamination cavities or other flaws affecting the maximum level of mechanical and electrical strengths.

5.8.3 The porcelain shall be well vitrified and nonporous.

5.8.4 The creepage distance of the Arrester housing shall be as per Annexure-A.

5.8.5 The porcelain petticoat shall be preferably of self cleaning type (Aerofoil design). The details of the porcelain housing such as height, angle of inclination, shape of petticoats, gap between the petticoats, diameter (ID and OD) etc., shall be indicated by the Bidder in his offer in the form of a detailed drawing.

5.8.6 The Arrester housing shall conform to the requirements of IEC specification.

5.9. **GALVANISATION, NICKEL PLATING ETC.:**

5.9.1. All ferrous parts exposed to atmosphere shall be hot dip galvanised as per IS:2629 as amended from time to time. Tinned copper/brass lugs shall be used for internal wiring. Screws used for electrical connections shall be either made of brass or nickel plated.

5.9.2. Ground terminal pads and name plate brackets shall be hot dip galvanised.

5.9.3 The material shall be galvanised only after completing all shop operations.

5.10. ACCESSORIES AND FITTINGS :

5.10.1 All necessary accessories and earthing connection leads shall be in the Bidder's scope of supply.

5.10.2 Terminal connector conforming to IS:5561 shall be supplied along with the arrester.

5.11. The grounding terminal shall be suitable for accommodating Purchaser's grounding connection to steel earth mat.

5.12. Name Plate :

The arrester shall be provided with non-corrosive legible name plate indelibly marked with the following information:

1. JVVNL
2. Order No.
3. Manufacturer's name, address, Phone & Fax Number, trade mark and identification no. of the Arrester being supplied.
4. Rated Voltage.

5. Maximum continuous operating voltage.
6. Type.
7. Rated Frequency.
8. Nominal discharge current.
9. Line discharge class.
10. Pressure relief current in kA rms.
11. B.I.L. of the equipment to be protected.
12. Year of manufacture.
13. Date of despatch.
14. Date of Expiry of Warranty.

6.0. **TESTS :**

- 6.1 TEST BEFORE DESPATCH: The Surge Arrester of various rating and accessories shall be subjected at maker's works before despatch, to the following tests as per relevant standards.

A) **ROUTINE TEST ON EACH UNIT AS PER RELEVANT STANDARDS :**

1. Measurement of reference voltage.
2. Residual voltage test.
3. Satisfactory absence from partial discharges and contact noises.
4. For arrester units with sealed housing leakage check shall be made on each unit.
5. Current distribution test for multi Column arrester.

6.2 **TYPE TESTS :**

The bidder must furnish type test reports from a Govt. approved / Govt. recognized / NABL Accredited laboratory / ILAC i.e. International Laboratory Accredited Laboratory (in case of foreign laboratory) of similar rating and design of tendered material/ equipment along with detailed dimensional drawing duly signed & verified by testing agency also showing size & numbers of blocks dimensions contained in the housing along with bid as per the qualification requirement of the Tender Specification. Such type test certificates should not be older than **5 (Five) years** as on the date of bid opening. For this purpose date of conducting type test will be considered. The type test certificates should be furnished either in Original or in copy duly Notary attested.

6.2.2: **TYPE TESTS SHALL BE CONDUCTED ON ONE UNIT OF EACH RATING AS PER RELEVANT STANDARD.**

1. Insulation withstand test.
2. Residual voltage test.

3. Bending test on arrester housing assembly.
4. Long duration current impulse withstand test.
5. Operating duty test.
6. Pressure relief test(Only for station type)
7. Artificial pollution test on porcelain.
8. Partial discharge test.
9. Housed arresters.
 - a) Temperature cycle test.
 - b) Porosity test.
10. Galvanising test on exposed ferrous metal parts.
11. Any other type test which are not specified above but covered as per amendment/latest edition of relevant IS/IEC.

6.3 TEST ON BOUGHT OUT ITEMS :

Tests are not required to be performed on bought out equipments/items like, Terminal connector etc. at the works of manufacturer. Furnishing Test Certificate of bought out items from the original equipment manufacturers shall be deemed to be satisfactory evidence. Inspection of the tests at Sub-contractors works will be arranged by the supplier whenever required.

6.4 ROUTINE/ACCEPTANCE TESTS :

The following tests shall be got conducted in presence of purchaser's representative, as per stipulation of the relevant standards. Acceptance tests whenever possible, shall be conducted on the complete arrester unit. No. of samples to be selected for acceptance tests shall be nearest lower whole number to the cube root of the number of arresters to be supplied.

1. Measurement of power frequency reference voltage on the complete arrester at the reference current measured at the bottom of the arrester.
2. Lightning Impulse residual voltage.
3. Partial discharge test.
4. Visual inspection & verification of dimension.
5. Special thermal stability test.
6. Galvanising test on Ferrous metal parts.
7. Any other tests as per IS.

6.5 TOLERANCE ON TEST RESULTS :

As per relevant standards/specifications.

6.6. CHECKING AT STORES (TEST AT CTL):

One out of every 50 Nos. Surge Arresters will be selected for checking at Store for visual, dimensional, weight, marking etc. as per relevant ISS/GTP/approved drawing.

"Payments shall be made only after receipt of successful test report from our Central Testing Laboratory (CTL) on the samples selected from the material received at the stores, however, the payment priority shall be maintained from the date of submission of bills along with receipted challans to the Accounts Officer (CPC), JVVNL, Jaipur."

7. INSPECTION :

All the tests (as mentioned at Clause 6.4) and Inspection shall be made at the place of manufacturer unless otherwise especially agreed upon by the bidder and purchaser at the time of purchase. The bidder shall afford the inspection officer(s) representing the purchaser all reasonable facilities without charges, to satisfy him that the material is being supplied in accordance with this specification. The purchaser has the right to have the tests carried out at his own cost by an independent agency whenever there is a dispute regarding the quality of supply.

The Inspection may be carried out by the purchaser at any stage of manufacture/before despatch as per relevant standard.

Inspection and acceptance of any material under the specification by the purchaser, shall not relieve the bidder of his obligation of furnishing material in accordance with the specification and shall not prevent subsequent rejection if the material is found to be defective. The Bidder shall keep the purchaser informed in advance, about manufacturing programme so that arrangements can be made for inspection.

The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items.

The bidder shall give 15 days (for local supplies/30 days (in case of foreign bidder) advance intimation to enable the purchaser to depute his representative for witnessing the acceptance and routine tests.

8.0 **QUALITY ASSURANCE PLAN :**

8.1 The Bidder shall invariably furnish the following information alongwith his offer, failing which the offer shall be liable for rejection. Information shall be separately given for individual type of equipment offered.

- i) Statement giving list of important raw materials. Names of sub-suppliers for the raw material, list of standards according to which the raw materials are tested, list of tests normally carried out on raw material in the presence of Supplier's representative, and copies of test certificates.
- ii) Information and copies of test certificates as in (i) above in respect of bought out items.
- iii) List of manufacturing facilities available.
- iv) Level of automation achieved and list of areas where manual processing exists.
- iv) Level of areas in manufacturing process where stage inspections are normally carried out for quality control and details of such tests and inspections.
- v) Special features provided in the equipment to make it maintenance free.
- vi) List of testing equipment available with the Supplier for final testing of equipment specified and test plant limitation, if any vis-a-vis the type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in the schedule of deviations from specified test requirements.

8.2 The Supplier shall within 30 days of placement of order submit the following information to the Purchaser.

- i) List of raw material as well as bought out accessories and the name of the material as well as bought out accessories and the names of sub-suppliers selected from those furnished along with the offer.
- ii) Type test certificates of the raw material and bought out accessories.
- iii) Quality assurance plan(QAP) with hold points for Purchaser's inspection. The QAP and Purchaser's hold points shall be discussed between the Purchaser and the Supplier before the QAP is finalised.

8.3 The Supplier shall submit the routine test certificates of bought out items and raw material at the time of routine testing of the fully assembled equipment.

9.0 **DOCUMENTATION :**

9.1. All drawings shall conform to International Standard Organisation(ISO) "A" series of drawing sheets/Indian Standards specifications. All drawings shall be in ink and suitable for microfilming. All dimensions and data shall be in S.I.Units.

9.2 The Bidder shall furnish one set of following drawings along with his offer:

- i) General outline drawings of the complete Arresters with technical parameters.
- ii) Drawing showing clearance from grounded and other live objects and between adjacent poles of Surge Arresters, required at various Heights of Surge Arresters.
- iii) Drawings showing details of pressure relief devices.
- iv) Details of grading rings, if used.
- v) Mounting details of Surge Arresters.
- vi) Details of line terminal and ground terminals.
- vii) Volt-time characteristics of Surge Arresters.
- viii) Details of galvanising being provided on different ferrous parts.
- ix) The detailed dimensional drawing of housing such as ID, OD, thickness and insulator details such as height, profile of paticcoats, angle of inclination and gap between successive petticoats total creepage distance etc.

9.3 **TEST REPORTS :**

- i) One copy of acceptance test reports shall be furnished to the Purchaser.
- ii) All records of routine test reports shall be maintained by the Supplier at his works for periodic inspection by the Purchaser.
- iii) All test reports of tests conducted during manufacture shall be maintained by the Supplier. These shall be produced for verification as and when requested for by the Purchaser.

10.0 PACKING AND FORWARDING:

- 10.1 The equipment shall be packed in suitable crates so as to withstand handling stresses during transport and outdoor storage during transit. The Supplier shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting such as lifting hooks etc., shall be provided. Any material found short inside the packing cases shall be supplied by the Supplier without any extra cost.
- 10.2 Each consignment shall be accompanied by a detailed packing list containing the following information:
- a) Name of the consignee.
 - b) Details of consignment.
 - c) Destination.
 - d) Sign showing upper/lower side of the crate.
 - e) Handling and unpacking instructions.
 - g) Bill of materials indicating contents of each package.
- 10.3 The Supplier shall ensure that the packing list and bill of materials are approved by the Purchaser before despatch.
- 10.4 The material shall be transported within India to the respective destination by Road Transport as the case may be at the option of the Purchaser.

11.0 Delay in Delivery of Inspected Material at Store :

If the material are not delivered within 7 days at same station, 14 days for station within State and 20 days by the suppliers situated outside the State from the date of receipt of the Dispatch Instructions. Charges shall be recovered @ Half Percent per week or part thereof (for actual delay in receipt), maximum upto 3% of the Dispatch Instructions consignment value (Ex-works). This will be in addition to Clause No.1.24(1) of GCC.

12.0 QUANTITY : 30 KV Surge Arresters **500 Nos.**

13.0 PAYMENT IN ABSENCE OF TYPE TEST REPORTS

15% payment shall be withheld in case firm does not furnish complete valid type test reports, which will be released on production of satisfactory complete type test reports. In case of failure of any of the type test reports, the withheld 15% payment shall be forfeited for the used material and remaining unused material will be lifted back by the supplier.

However, the above provision will be applicable only for the old manufacturers who have supplied similar item to any of the State Electricity Board/ Utility and the same have been type tested as per provisions of relevant ISS.

ANNEXURE-A(I)

(Surge Arresters)

TECHNICAL REQUIREMENTS FOR METAL OXIDE(GAPLESS)
SURGE ARRESTERS AGAINST TN-2381.

S.NO. Particulars System voltage wise requirement of Parameters.

30 KV STATION TYPE

1. Rated Arrester Voltage(KV)	30
2. M.C.O.V.(KV rms)	25
3. Installation	-----Outdoor-----
4. Class.	---Station Class Heavy duty---
5. Type of construction.	Single column, single phase.
6. Nominal Discharge current corresponding to 8/20 microsec. wave shape(KA Peak)	10
7. Type of mounting	Pedestal
8. Connection(Between Phase to earth P/E)(Between phase to phase P/P).	P/E
9. Line discharge class.	2
10. Ratio of switing impulse residual voltae to rated voltage of Arrester	As per provision of IEC-99-4 (latest ammeded)

- | | |
|--|---|
| 11. Minimum prospective symmetrical fault current for pressure relief test(KA rms) | 40 |
| 12.a) Terminal connector suitable for ACSR Conductor size. | Single dog |
| b) Take off | ---For both vertical & Horizontal--- |
| 13.Voltage(corona extinction)(Kv rms) | ----Rated voltage of the Arrester- |
| 14.Partial discharge | As per provision of IEC 99-4 (latest amended) |
| 15.Whether insulating base and discharge counter with milli-ammeter are required | No |
| 16.Minimum creepage distance of Arrester housing(mm) | 900 |