

TECHNICAL SPECIFICATION FOR SURGE ARRESTERS

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO.LTD.

MUMBAI

SCHEDULE " A "

(28.04.2006)

TECHNICAL SPECIFICATION

FOR

36 kV SURGE ARRESTER

FOR

DISTRIBUTION NETWORK IN MAHARASHTRA

(SPECIFICATION NO.DIST/MM/I/36 kV SA2006)

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1.0 **SCOPE:**

- 1.1 This specification covers the design, manufacture, assembly testing at manufacturer's works, packing and delivery of Metal Oxide (gapless) surge arrester for 33 kV systems, complete with discharge counter, insulating base and other accessories for use in various substations in the State of Maharashtra in India.
- 1.2 It is not the intent to specify completely herein all the details of design and construction of surge arrester. However, surge arrester shall conform in all respect to the high standards of design and workmanship mentioned in Clause 5.0 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 judgment are not in accordance therewith. The arrester and discharge counter 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 supplier's supply, irrespective of whether they are specifically brought out in the specification and commercial order or not.

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2.0 QUALIFYING REQUIREMENT

2.1 The bidder shall fulfill the qualifying requirement as brought out in Annexure-I. Offers not meeting the specified qualifying requirements would be rejected.

3.0 SERVICE CONDITIONS

The surge arresters and accessories shall be suitable for continuous, satisfactory operation under climatic conditions listed below:-

1. Maximum ambient air temp. (oC)	:	50
2. Minimum ambient air temp. (oC) in shade	:	3.5
3. Humidity (%)	:	10 to 100
4. Maximum altitude above mean sea level (Meter)	:	1000
5. Maximum annual rainfall (mm)	:	1450
6. Maximum wind pressure (kg/m ²)	:	150
7. Isoceraunic level	:	50
8. Seismic level (Horizontal accln.).	:	0.3 g
9. Moderately hot and humid tropical climate, conducive to rust and fungus growth.		

4.0 SYSTEM PARTICULARS:

4.1 The equipment offered under this specification shall be suitable for the system conditions and parameters as per Annexure-II.

5.0 STANDARDS

The Surge Arresters shall conform to the latest editions available at the time of placement of order/s, of the Standards listed in Annexure-III.

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6.0 **SPECIFIC TECHNICAL REQUIREMENTS**

6.1 The surge arresters shall conform to the technical requirements as per Annexure-IV.

6.2 The energy handling capability of each rating of arrester offered, supported by calculations, shall be furnished in the offer.

6.3 The surge arresters shall be fitted with pressure relief devices and arc diverting parts and shall be tested as per the requirement of IEC 99.4 specification, as amended upto date, for minimum prospective symmetrical fault current of 40 K.A. r.m.s.

6.4 A grading ring shall be provided if necessary, on each complete arrester for proper stress distribution.

6.5 The arrester shall have single column construction for each phase.

6.6 **PROTECTIVE LEVELS**

The basic insulation levels and switching impulse withstand levels of the lines and equipments to be protected, have been specified in Annexure-II. The required protective levels of the surge arrester are specified in Annexure-IV. The protective characteristics of the arresters offered shall be clearly brought out in the schedule of guaranteed & other technical particulars, i.e.G.T.P.

7.0 **GENERAL REQUIREMENT**

7.1 Each individual unit of surge arrester shall be hermetically sealed and fully protected against ingress of

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moisture. The hermetic seal shall be effective for the entire life time of the arrester and under the specified service conditions. The bidder shall furnish in the bid, a sectional view of the arrester, showing details of sealing and pressure relief device employed.

7.2 The surge arrester shall be suitable for hot line washing.

7.3 The surge arrester shall be suitable for pedestal type mounting.

7.4 All the necessary flanges, bolts, nuts, clamps etc. required for assembly of complete arrester with accessories and mounting on purchaser's support structure shall be included in bidder's scope of supply.

7.5 The drilling details for mounting the arrester on purchaser's support shall be strictly as per the details given in drawing no.015.1269.

7.6 The minimum permissible separation between the single phase surge arresters of a three phase bank and between surge arrester and any nearby earthed object shall be furnished by the bidder, in his bid.

7.7 Metal Oxide Disc

7.7.1 The Metal Oxide Discs used for type testing of the arrester as well as bulk supply should be procured by the bidder from the same source. In case the bidder proposes to have alternative sources for Metal Oxide discs he will submit the details of the sources and technical parameters in Schedule -'F' alongwith bid.

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7.7.2. In the eventuality of using Metal Oxide discs for the supply of the Surge Arrester other than that used while type testing, type test reports for the discs used for bulk supply will have to be necessarily submitted. The said type test reports shall be for the tests carried out during preceding 5 (five) years from the original date of Notice Invitation Tender (N.I.T.) In this regard the bidder should refer clause No.9.4 of this specification. Equivalence of technical parameters and performance between the metal oxide disc used in the type tests and metal oxide discs being used for bulk supply should be substantiated with the documents.

7.7.3 The rating and Maximum Continuous Operating Voltage (M.C.O.V.) of metal oxide disc will be printed on each metal oxide disc.

7.8 Porcelain / POLYMER RUBBER Housing

7.8.1 Housing shall be free from lamination cavities or other flaws affecting the mechanical and electrical strengths.

7.8.2 The porcelain / polymer housing shall be thoroughly vitrified and non-porous.

7.8.3 The creepage distance of the arrester housing shall be as indicated in Annexure-IV.

7.8.4 Petticoats shall be preferably of self cleaning type (Aerofoil design). The details of the porcelain / polymer housing such as height, angle of inclination, shape of petticoats, gap between the petticoats,

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diameter (ID & OD) etc., shall be furnished by the bidder with the offer, in the form of detailed drawing.

- 7.8.5 The arrester housing shall conform to the requirements of IEC-99-4 specification and latest IS specification for gap-less lightning arresters.

7.9. **Galvanization, Nickel Plating Etc.**

- 7.9.1 All ferrous parts exposed to atmosphere shall be hot dip galvanized as per ISS-2629. Tinned copper/brass lugs shall be used for internal wiring of discharge counter. Screws used for electrical connections shall be either of brass or nickel plated.

- 7.9.2 Line terminal pads, ground terminal pads and name plate bracket shall be hot dip galvanized.

- 7.9.3 The material shall be galvanized only after completing shop operations.

8.0 **ACCESSORIES & FITTING :**

- 8.1 The Surge Arrester shall be provided with the terminal connector as indicated at Sr.No.12 of Annexure - IV

8.2 **Name Plate**

The arrester shall be provided with non corrosive legible name plate.

- i) Name plate material should be 2.5 mm thick metal photo anodised aluminium plate of satin finish printed photographically using the metal photo process, with image sealed below the anodized layer colours other than black may be embedded

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by resist for screen process.

ii) Any other better form of name plate if proposed to be used the same shall be got approved alongwith the sample.

iii) following information shall be engraved on Name Plate:

- 1) Maharashtra State Electricity Distribution Co.Ltd.
- 2) Order No.
- 3) Manufacturer's name or trade mark and identification of the supplied arrester.
- 4) Rated voltage.
- 5) Maximum continuous operating voltage.
- 6) Type
- 7) Rated frequency.
- 8) Nominal discharge current.
- 9) Long duration discharge class.
- 10) Pressure relief current in kA r.m.s.
- 11) Identification of the assembly position of the unit.
- 12) Year of manufacture.

9.0 **TESTS**

9.1 No surge arrester shall be dispatched without inspection and testing. The inspection may be carried out by the purchaser at any stage of manufacture. The bidder shall grant free access to the purchaser's representative at a reasonable time when the work is in progress.

9.2 Inspection and acceptance of any equipments under this specification by the purchaser, shall not relieve the

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supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

9.3 The supplier shall keep the purchaser informed in advance, about the manufacturing program so that arrangement can be made for inspection.

9.4 **Type Test**

The surge arresters offered, shall be fully type tested as per the relevant standards at laboratories which are accredited by National Accreditation Board of Testing and Calibration Laboratories (NABL). Of Govt. of India to prove that the equipment offered meets the requirements of specification .In case equipment of the type and design offered, has already been type tested in NABL accredited laboratory, the bidder shall furnish two sets of type test reports alongwith his bid. These tests must have been conducted within preceding five years from the date of original NIT. In case these type tests are conducted earlier than preceding five years all the type tests as per the relevant standards will have to be carried out by the successful bidder in the presence of Purchaser's representative at bidder's own cost before commencement of supply. For any change in the design/type already type tested and the design/type offered against this specification, the Purchaser reserves the right to demand testing without any extra

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cost. Irrespective of the above the Purchaser reserves the right to demand repetition of some or all the type tests in the presence of his representative at purchaser's cost. For this purpose the bidder should quote unit rates for carrying out each type test in the proforma enclosed as Schedule 'G'.

9.5 All routine and acceptance tests as stipulated in the specified standards shall be carried out by the supplier in presence of purchaser's representative at supplier's cost. The acceptance tests, wherever possible, shall be performed on the completed arresters. The number of samples to be subjected to acceptance tests shall be decided by the purchaser at the time of actual testing.

9.6 The special thermal stability test as per IEC specification 99-4 for metal oxide surge arresters shall be carried out as acceptance test.

9.7 The acceptance tests shall include the galvanization test on metal parts.

9.8 The functional (operation) acceptance tests shall be carried out on the surge counter by way of checking its operation at following nominal discharge currents:

- a) 100 Amps with 8/20 micro sec wave shape.
- b) 10 kA with 8/20 micro sec wave shape.

10.0 QUALITY ASSURANCE PLAN

The quality assurance plan (QAP) shall be submitted by the successful bidder for approval of purchaser before starting manufacturing. The QAP shall be discussed by

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the purchaser with the supplier before it is finalized.

11.0 **PERFORMANCE GUARANTEE**

The surge arresters shall be guaranteed for satisfactory performance for a period of 24 months from the date of receipt at site in good condition or 18 months from the date of satisfactory commissioning whichever is earlier.

12.0 **DOCUMENTATION**

12.1 All drawings shall conform to international standards organisation (ISO) "A" series of drawing sheet/Indian standards specification IS:656. All drawings shall be in ink and suitable for micro filming. All dimensions and data shall be in System International Units.

12.2 The bidder shall furnish four sets of following drawings alongwith his offer:

- i) General outline drawings of the complete arrester 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) Outline drawing of insulating base.
- v) Details of grading rings, if used.
- vi) Mounting details, installation and commissioning instructions of surge arrester.
- vii) Details of line terminal and ground terminals.
- viii) Volt-time characteristics of surge arresters.
- ix) Details of galvanizing being provided on

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different ferrous parts.

- x) The detailed dimensional drawing of porcelain housing such as ID, OD, thickness and insulator details such as height, profile of petticoats, angle of inclination and gap between successive petticoats, total creepage distance etc.
- xi) Drawing showing heat transfer method of surge arrester.
- xii) Name plate drawing and type.

12.3 The successful bidder shall, within 10 working days of placement of order, submit three sets of final versions of all the above said drawings for purchaser's approval. The purchaser shall communicate his comments/approval on the drawings to the supplier within reasonable period. The supplier shall, if necessary, modify the drawings and resubmit three copies of the modified drawings for purchaser's approval within two weeks from the date of purchaser's comments. After receipt of purchaser's approval, the supplier shall, within three weeks, submit 10 prints and two good quality reproductions of the approved drawings alongwith a set of drawings drawn in autocad latest version on floppy for purchaser's use.

12.4 The manufacturing of the equipment shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the supplier's risk.

12.5 Approval of drawings/works by purchaser shall not

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relieve the supplier of any of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the requirement of the latest revision of applicable standards, rules and codes of practices. The purchaser shall have the power to reject any work or material which in his judgement is not in accordance therewith.

13.0 **PACKING AND FORWARDING**

13.1 The equipment shall be packed in suitable crates so as to withstand handling during transport and out door 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 supplier without any extra cost.

13.2 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) Total weight of consignment.
- e) Sign showing upper/lower side of the crate.
- f) Handling and unpacking instructions.
- g) Bill of materials indicating contents of each

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package.

13.3 The supplier shall ensure that the packing list and bill of material are approved by the purchaser before dispatch.

13.4 The material shall be transported within Maharashtra to the respective destination by Road Transport/Rail Transport as the case may be at the option of purchaser.

15.0 **SCHEDULES**

15.1 The bidder shall fill in the following schedules which form part of the bid specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be rejected.

Schedule "C"- Tenderer's Experience

G.T.P. - Guaranteed Particulars of the Surge Arresters.

Schedule "F"- Schedule of Details of source of Metal oxide Disc used in Type Test.

Schedule - G Price Schedule for Type tests.

15.2 The tenderer shall submit the list of orders for similar type of equipment, executed or under execution during the last three years, with full details in the schedule of Tenderer's experience (Schedule 'C') to enable the purchaser to evaluate the tender.

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ANNEXURE : I

QUALIFYING REQUIREMENT:

- a) The bidder should have proven experience of not less than 5 years in design, manufacture, supply and testing at work for equipment/materials offered for equal or higher voltage class. The equipment/material offered by bidder should be in the successful operation at least for two years as on the date of submission of tender.
- b) The bidder not meeting the requirements at (a) above can also participate provided they have a valid on going , collaboration with a manufacturer who has at least ten years experience in the design, manufacture and testing of the equipment of the type and class offered, which have been in satisfactory service for a period of at least seven years . In such an event the bidder shall furnish alongwith his bid, documentary evidence for the same and undertaking from bidder and collaborator accepting joint and several liability for all obligation under the contract.
- c) The bidder should have adequate in house testing facilities for conducting acceptance tests in accordance with relevant IS.
- d) The bidder should have a minimum turn over of 60% of the value of the material offered in any one financial year during the previous three years.
- e) The bidder should furnish all the relevant documentary evidence to establish the fulfillment of the above requirement.
- f) The bidder who does not meet the above qualifying requirement of experience (clause a & b) may be considered for trial order subject to fulfilling the following requirements alongwith clauses c, d & e.
 - i) The bidder should have type tested the equipment offered.
 - ii) The bidder shall have the basic infrastructure for the design, manufacture and supply of the items
- g) Notwithstanding any thing stated above, the purchaser,s decision in this regard will be final.

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ANNEXURE-I I

SYSTEM PARTICULARS

The surge arrester offered under this specification shall conform to the parameters given below:

Sr. No.!	Particulars	Requirements
1.	Nominal system voltage (kV rms)	33
2.	Highest system voltage (kV rms)	36
3.	1.2/50 microsecond impulse voltage withstand level	
	a. Transformers and Reactors (kVp)	170
	b. Other equipment (kVp)	170
4.	Minimum prospective symmetrical fault current for 1 second at Arrester location (kA rms)	26.2
5.	System frequency (Hz)	50 \pm 1.5
6.	Neutral Grounding	Effectively earthed.
7.	Number of Phases	Three
8.	One minute power frequency withstand voltage kV(rms) of arrester housing	70

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ANNEXURE-III

LIST OF STANDARDS

Sr.No.	Standard Ref.No.	Title
1.	IEC-99-4	International standard for Metal Oxide Surge arresters without gap of A.C.system.
2.	ISS-3070 (Part-III)	Specification for Lightning Arresters for alternating current systems Part-III
3.	ISS-4759	Hot dip zinc-coating on structural steel and other allied products.
4.	ISS-2633	Method for testing uniformity of coating on zinc coated articles.
5.	ISS-5621	Specification for large hollow porcelain for use in electrical installation.
6.	ISS-2147	Degree of protection provided by enclosures for low voltage switch gear and control.
7.	-	Indian Electricity Rules 1956

NOTE

- i) For the purpose of this specification all technical terms used in this specification shall have the meaning as per IEC 99-4 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.

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ANNEXURE - IV

TECHNICAL REQUIREMENTS FOR METAL OXIDE (GAPLESS) SURGE ARRESTER

Sr. No.!	Particulars :	Requirements
1.	Rated Arrester : Voltage (kV rms)	30
2.	M.C.O.V. : (kV rms)	25
3.	Installation :	Outdoor
4.	Class :	-----Station Class-----
5.	Type of construction for 10 kA rated Arrester.	----Single Column, Single Phase-----
6.	Nominal discharge current corresponding to 8/20 microsec wave shape (kA rms)	-----10-----
7.	Type of mounting:	-----Pedestal-----
8.	Connection :	----- Phase to earth-----
9.	Long duration: discharge class	1
10.	Ratio of switching impulse residual voltage to rated voltage of Arrester	-----2-----

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Sr. No.!	Particulars :	Requirements
11.	Minimum prospective symmetrical fault current for pressure relief test (kA rms)	40
12.	Terminal Connector	
	i) Suitable for ACSR conductor	Single Zebra
	ii) Take off	Horizontal
13.	Corona extinction voltage (kV rms)	Rated voltage of the Arrester (30)
14.	Max. Partial discharge when energized at 1.05 times of MCOV (Pico coulomb)	50
15.	Whether insulating base and discharge counter with milli-ammeter are required.	No
16.	Minimum creepage distance of Arrester housing (mm)	900

Note: The details of conductor mentioned against item 12(i) is as below

Code	Name of A.C.S.R.	Copper equivalent area (Sq.mm.)	Overall diameter of the conductor (mm)
	Zebra	258.10	28.62

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SCHEDULE - ' C '

SCHEDULE OF TENDERER'S EXPERIENCE

Tenderer shall furnish here a list of similar orders executed / under execution by him to whom a reference may be made by Purchaser in case he considers such a reference necessary.

SR. NO.	NAME OF CLIENT & DESCRIPTION	VALUE OF ORDER	PERIOD OF SUPPLY & COMMISSIONING	NAME & ADDRESS TO WHOM REFERENCE MAY BE MADE
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NAME OF FIRM _____

NAME & SIGNATURE OF TENDERER _____

DESIGNATION _____

DATE _____

SEAL & SIGNATURE OF THE TENDERER

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SCHEDULE "F"

SCHEDULE OF DETAILS OF SOURCE OF METAL OXIDE DISCS

USED IN TYPE TEST

(A) In case of metal oxide discs used in the type test are being manufactured by the bidder, he is requested to furnish following information.

- i) Date from which discs are being manufactured.
- ii) Quality norms prescribed and adopted.
- iii) Details of the surge arresters where the above discs have been used and supplied (List to be enclosed).

(B) In case the bidder has any collaboration for manufacture of metal oxide discs, he will furnish full details of the valid ongoing collaboration along with above detail.

(C) In case the Metal Oxide disc is a bought out item the bidder shall furnish the full details of the same as above specified at (A) (i), (ii) & (iii) along with following information.

- 1) Source of Disc.
- 2) Raw material inventory
- 3) Manufacturing techniques
- 4) Inspection during manufacture
- 5) Testing technique to assure final quality
- 6) Quality control

(D) Details of metal oxide disc

- 1) Make
- 2) Size
- 3) Dia
- 4) Height
- 5) Weight
- 6) Rating
- 7) M.C.O.V.

Name of Firm _____

Signature of Bidder _____

Designation _____

Date _____

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SCHEDULE : G

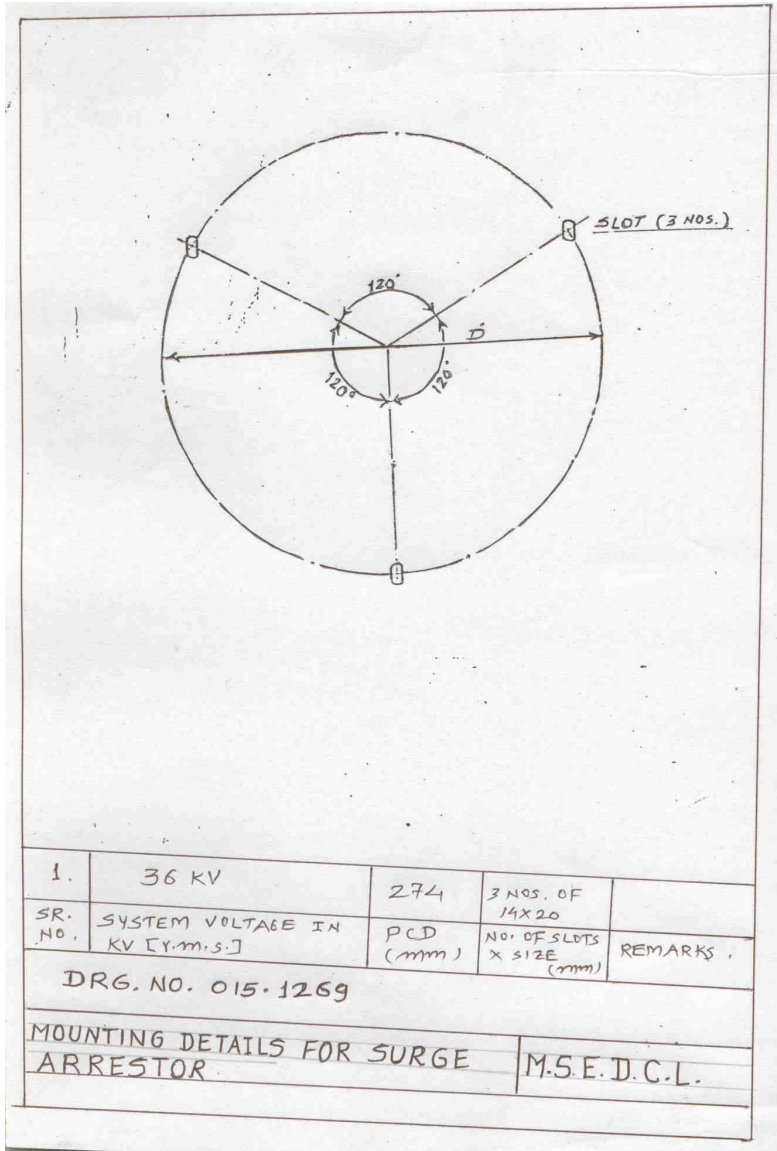
Schedule of Type test charges

Bidder's Name & Address To

Sr. Description of the * Test charges of each
NO. Type Test type & rating of equip-
ment offered.

Date : (Signature)
(Printed Name)
Place : (Designation)
(Common Seal)

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1.	36 KV	274	3 NOS. OF 14x20	
SR. NO.	SYSTEM VOLTAGE IN KV [Y.M.S.]	PCD (mm)	NO. OF SLOTS X SIZE (mm)	REMARKS.

DRG. NO. 015-1269

MOUNTING DETAILS FOR SURGE ARRESTOR.	M.S.E.D.C.L.
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