

**BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL**  
**TRANSFORMER ENGINEERING DEPARTMENT**

FORM NO: TRE-2003A

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ANNEXURE TO INDENT-CUM-INQUIRY - **240614230**

DTD.:-

DESCRIPTION OF EQUIPMENT : SURGE ARRAESTERS FOR 1 No. 240 MVA,  
 400/220/33 KV, 3 PHASE AUTO TRANSFORMER.

WORK ORDER NO. : **68097-A-512-01**

CUSTOMER : M/s UPRVUNL, OBRA

**SPECIFICATION FOR SURGE ARRESTERS**

1.0	<b><u>GENERAL</u></b>
1.1	The arrester shall be outdoor, single pole, heavy-duty station class and gapless type confirming to IEC 60099-4 for effectively earthed system.
1.2	Arrester shall be hermetically sealed units, of self-supporting construction, suitable for mounting on structures.
2.0	<b><u>DUTY REQUIREMENTS</u></b>
2.1	The surge arrester shall be capable of discharging over voltage occurring during switching of unloaded transformers and reactors and spark over on severe switching and multiple strokes.
2.2	Arrester shall be fully stabilized thermally to give a life expectancy of 100 years and take care of the effect of direct solar radiation.
2.3	The reference current of the arrester shall be high enough to eliminate the influence of grading and stray capacitance on the measured reference voltage.
3.0	<b><u>CONSTRUCTIONAL FEATURES</u></b>
3.1	The features and constructional details of surge arresters shall be in accordance with requirement stipulated here under:
3.2	The non-linear blocks shall be of sintered metal oxide material. These shall be provided in such a way as to obtain robust construction, with excellent electrical and mechanical properties even after repeated operations.
3.3	The surge arresters shall be fitted with pressure relief devices and arc diverting parts suitable for preventing shattering of porcelain housing and providing path for flow of rated fault currents in the arrester failure.
3.4	The arresters shall incorporate anti-contamination feature to prevent arrester failure consequent to uneven voltage gradient across the stack in the event of contamination of the arrester porcelain.
3.5	Seals shall be provided in such a way that these are always effectively maintained even when discharging lightning current.
3.6	Outer insulator shall be porcelain. All porcelain used shall be homogenous, free from laminations, cavities and other flaws or imperfection that might affect the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture. Glazing of porcelain shall be of uniform brown colour, free from blisters, burrs and other similar defects.
3.7	Porcelain housing shall be so coordinated that external flashover will not occur due to application

REV	DATE	ALT CKD	REV-	DATE-	ALT CKD	REV 00	NAME	SIGN	DATE
						PREP	AKSHAY DAVE		26.07.11
						CKD	S.K.MAHAJAN		27.07.11

DWI/TCB/TRE/010

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	of any impulse or switching surge voltage up to the maximum design value for arrester.
3.8	The end fittings shall be made of non-magnetic and corrosion proof material.
3.9	The nameplate shall conform to the requirement of IEC incorporating the year of manufacture.
3.10	The heat treatment cycle details along with necessary quality checks used for individual blocks along with insulation layer formed across each block to be furnished. Metalised coating thickness for reduced resistance between adjacent discs to be furnished, alongwith procedure checking the same. Details of thermal stability test for uniform current distribution of current on individual disc to be furnished.
<b>4.0</b>	<b><u>FITTING &amp; ACCESSORIES</u></b>
	The arrester shall be supplied complete with the following fittings:
4.1	Insulating base, support structure and terminal connector. The height of support structure shall not be less than 2500 mm. The structure would be made of galvanised steel generally conforming to. 15:802.
4.2	Self contained discharge counter (Only for 39 kV arrester and not for 54 kV), suitable enclosed for outdoor use and requiring no auxiliary or battery supply for operation. The counter shall be visible through an inspection window from ground level. It shall be suitable for mounting on support structure
4.3	Line terminal bracket.
4.4	Line terminal connector suitable for horizontal/ vertical take off for 2" IPS Al tube.
4.5	Ground terminal bracket
4.6	Name plate bracket
4.7	Arrester nameplate
4.8	Unit nameplate
4.9	1600 mm long copper strip of size 25x3 duly electrotinned or insulated cable suitable cross-section with suitable connecting lugs for connection between ground terminal bracket and line terminal of surge monitor. If connection is made by using copper braid, crane insulator shall be supplied to avoid free hanging of braid.
4.10	Grading ring and vent port
4.11	Suitable milli-ammeter on each resistor with appropriate connections shall be supplied to measure the resistor grounding leakage current. The push buttons shall be mounted such that it can be operated from ground level. It shall be suitable for mounting on support structure.
4.12	Four sets of drawings for all items indicated above including following drawings shall be submitted along with the offer. The drawings of L1 party shall be sent to customer for approval. <ul style="list-style-type: none"> <li>a) OGA of surge arrester</li> <li>b) Drawing of surge monitor</li> <li>c) Drawing of terminal connector</li> <li>d) Rating &amp; diagram plate drawing</li> <li>e) Drawing of Zinc Oxide blocks</li> <li>f) Drawing of porcelain housing.</li> <li>g) Other relevant drawings</li> </ul>

**5.0 TECHNICAL PARAMETERS**

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			Item 1		Item 2	Item 3
1.	Quantity required	Nos.	3		3	3
2.	Rated Arrester Voltage	KV	54	39	198	390
3.	Rated system Voltage	KV	33	33	220	420
4.	Continuous operating voltage at 50 <sup>0</sup> C	kV <sub>rms</sub>	46	31	168	303
5.	System frequency	Hz	50			
6.	Nominal discharge current of 8/20 microseconds wave	kA	10			
7.	Type of Arrester		Station class, heavy duty gapless type			
	No. of poles		1	1	1	1
8.	Long duration discharge class		3	3	3	3
9.	High current short duration test value (4/10 μ sec wave)	kAp	100	100	100	100
10.	Minimum discharge capability	kJ/kV	--	--	5	8
11.						
12.	Maximum residual voltage for 8/20 micro sec. impulse					
	5 kA	kVp	144	104	510	-
	10 kA	kVp	152	110	550	900
	20 kA	kVp	170	112	610	975
13.	Maximum switching impulse residual voltage 50/100 μ sec. at 1000 Amps.	kVp	130	112	500	780
14.	Lightning impulse withstand voltage with 1.2/50 microseconds wave	kVp	±325	±185	±1050	±1425
15.	Switching impulse withstand voltage	kVp	--	--	--	±1050
16.	Power frequency w/s (Dry & wet)	kV <sub>rms</sub>	140	76	460	630
17.	Max. RIV	μ V	<500 at 92 kV <sub>rms</sub>	<500 at 92 kV <sub>rms</sub>	<500 at 156kV <sub>rms</sub>	<500 at 266kV <sub>rms</sub>
18.	Max. partial discharge at 1.05 COV	pC	<50	<50	<50	<50
19.	Pressure Relief class		A	A	A	A
20.	Current for pressure relief test	kA <sub>rms</sub>	40	40	40	40
21.	Total creepage distance of porcelain housing	mm	1800	1100	6125	10500
22.	Cantilever strength of Arrester	Kgm	500	500	625	1250
23.	Seismic Acceleration withstand		0.30 g Horizontal			
24.	Wind load withstand capability	Kg/m <sup>2</sup>	195	195	195	195
25.	Reference ambient temperature	<sup>0</sup> C	50			
26.	Minimum creepage distance	mm/kV	25			
27.	Installation/ mounting	Outdoor +	Mounted on 39 kV arrester	Tubular GI pipe or Latticed steel structure	Latticed steel structure mounted	
28.	Terminal connector		Universal take off 2" IPS Al tube		Expansion type	Expansion type 4" IPS horizontal take-off

**6.0 SURFACE TREATMENT AND PAINTING:**

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The internal and external surfaces including oil filled chambers and structural steel work to be painted shall be shot or sand blasted to remove all rust and scale of foreign adhering matter or grease. All steel surfaces interior or exterior, exposed to weather shall be given a primary coat of zinc chromate, second coat of oil and weather resistant paint of a colour distinct from primary and final two coats of glassy oil and whether resisting light gray paint in accordance with shade no. 631 of IS: 5. However, final shade shall be confirmed at the time of order. The minimum thickness of outside painting of tank shall be 20 microns per coat and the total thickness shall be within 70 to 100 microns.

**7.0 TEST REOUIREMENTS:**

- a) The surge arresters shall conform to type tests as per IEC 60099-4 (1991) & Reports of the same shall be submitted for approval.
- b) All applicable routine & acceptance tests as per IEC 60099-4 (1991) shall be conducted on S.A. in presence of Customer representative.
- c) T. C. for all routine, acceptance and type tests on porcelain housing as per IS:5621 shall be submitted.
- d) T.C. on insulating base, surge monitor and terminal connectors shall also be submitted.
- e) Actual observed dimensional details of SA shall also be furnished alongwith TC.
- f) Surge Arrester shall be subjected to following additional acceptance test also.
  - i) Constructional check (Visual check)
  - ii) Measurement of insulation resistance by 1 kV megger.

**8.0 TESTING AND DISPATCH**

8.1 The SAs shall be inspected by Customer/BHEL/BHEL authorized agency.

8.2 The supplier shall furnish a list of all fittings and components in the dispatch details giving description of each packing and quantity. All items shall be packed in wooden boxes/gunny bags so as to avoid scratches/damage in transit.

8.3 QAP shall be prepared & got approved by the supplier before execution of the order. All CIP & MICC must be got cleared by supplier before dispatch of SAs.

8.4 Technical data as per Annexure-1 to be filled in & furnished by the bidder.

**9.0 Check List – Bidder to furnish the checklist as per sheet 5 of 5. If not furnished, bid will be likely to rejected.**

**Annexure -I to PI 240614230**

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**Enquiry No. - .....**

**Compliance Check List (To be filled by Bidder)**

Sl. No.	Clause	Whether Confirmed	Deviation, If any
1.	All Technical Particulars according to the specification are confirmed.	YES/NO	
2.	All Technical Parameters according to point 5 of this specification are confirmed.	YES/NO	
3.	Drawings and document of offered equipments furnished alongwith technical offer	YES/NO	
4.	Bidder to confirm the testing requirement of clause 7.0.	YES/NO	
5.	Only acceptance to above points 1,2,3 & 4 shall be considered for technical acceptability of bid. Bidder to note that no other documents /datasheets shall be considered, if furnished by bidder.	YES/NO	
6.	Type test reports of identical equipment already tested shall be submitted along with offer	YES/NO	
7.	If type test report not furnished, then confirmation for conducting the type tests	YES/NO	
8.	Erection, Commissioning, Operation and Instruction and Training Manual shall be supplied with equipment.	YES/NO	
9.	Separate Price Bid in sealed cover (Marked as PRICE BID Enquiry No. ....)	YES/NO	
10.	Waranty for 18 months from commissioning or 24 months after supply, whichever is later.	YES/NO	

**Notes –**

1. The offer shall be as per two part bid system.
2. All surge arresters shall be procured from single party.
3. L1 party shall be decided on total L1 basis.

(Sign & Seal of bidder)