



BHARAT HEAVY ELECTRICALS LIMITED
INSULATOR PLANT, JAGDISHPUR
Fax No: 05361-270140,270110, 270109

TENDER DOCUMENT FOR

Thermal Mechanical Testing Equipment for insulators with Chamber Size (Internal Dimensions): 1000 mm – Width; 600 mm Depth; 5000 mm – Length. Max. Tensile Load: 50 MT. Temperature Range: +100 Deg.C to - 70 Deg.C.

Tender Enquiry No: BHEL/IP/MM/CAP/OT-4/2007

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Material Description	Unit	Quantity	Tender submission Last Date & time	Tender opening date & time
Thermal Mechanical Testing Equipment for insulators	No.	01	12-07-2007, 2.30 PM	12-07-2007 3.00 PM

BHARAT HEAVY ELECTRICALS LIMITED

Insulator plant
Industrial Area, Jagdishpur 227817
Dist. Sultanpur (U.P.)

SPECIFICATION FOR THERMAL MECHANICAL TEST EQUIPMENT – HORIZONTAL TYPE

APPLICATION : For carrying out Thermal Mechanical Performance test on Disc (Cap & Pin) & Solid core insulators.

1. GENERAL SPECIFICATION:

Thermal mechanical test equipment shall be used for the testing of porcelain disc / solid core insulators in two strings mounted in parallel. The insulators are subjected to tensile loads of upto 50 tons and simultaneously undergo thermal cycle with temperature ranging from +100°C to – 70°C with minimum period of 8 hrs soaking at the peak temperatures. The thermal cycle test is usually carried out for 4 complete cycles with each cycle lasting 24 hrs. A typical test cycle is enclosed at Annexure – I.

2. SCOPE OF SUPPLY :

- i) Complete equipment consisting of:
 - a) Horizontal type insulated chamber with heating / cooling system. Detailed specification at Annexure-II.
 - b) Refrigeration equipment to attain temperature of –70°C from +100°C at rate of cooling specified along with accessories such as cooling water pumps & cooling tower. Air cooled system shall be preferred.
 - c) Electric Heaters to attain temperature of +100°C from –70°C at heating rate specified.
 - d) Hydraulically operated tensile loading facility. Detailed specifications at Annexure – III
 - e) Control Panel
- ii) Spares / consumables for installation & 2 years operation & maintenance - complete list of spares with unit price of each to be quoted.
- iii) Erection & commissioning – rate to be quoted separately.
- iv) Training to our personnel for operation & maintenance.

3. TECHNICAL EVALUATION CRITERIA :

The offers will be evaluated on following criteria & accordingly the bidders should furnish the following details in their offer:

- a) Guaranteed time for reaching peak temperatures (i.e., +100°C and –70°C) from minus to plus & vice versa.
- b) Power consumption per test cycle
- c) Compliance to operational requirements / specifications.
- d) Makes of bought out components. Note that all components shall be of proven make. (Preferred makes are indicated at Annexure IV). Purchaser will have choice of selecting & freezing sub-vendors make during technical evaluation stage.
- e) After sales service & support.
- f) List of supplies previously made of identical / similar equipment in past 5 years along with performance report from the users.
- g) Audited financial report (balance sheet) of the company for last 3 years.
- h) Space requirements along with sketch / drawing of layout of the equipments & accessories.

SPECIFICATION FOR THERMAL MECHANICAL TEST EQUIPMENT – HORIZONTAL TYPE**4. INFORMATION TO BE FURNISHED ALONG WITH THE TECHNICAL OFFER :**

- a) Test chamber weight, size & material of construction. A schematic drawing shall be provided in techno-commercial offer.
- b) Refrigeration equipment – Refrigerant used, compressor and control components type & make for each of the stage shall be provided. The quantity of refrigerant required for the first charge shall also be provided in techno-commercial offer.
Note: Refrigerant shall be ECO friendly and Non-CFC based.
- c) Cooling water requirements – Quality, Quantity & pressure.
- d) Hydraulic oil tank capacity and the first charge of oil required and grade of oil.
- e) Details of handling facility provided for opening / closing chamber lid – hydraulic or mechanical. Details of safety latch when the door is lifted up.
- f) Mounting details of hydraulic cylinders
- g) Power requirements
- h) Heaters – type & capacity
- i) Details of air circulating fans – type, volume, pressure & KW rating.
- j) Temperature indicator/ controller/recorder – make, specifications & data sheet.

5. Specific Techno-Commercial Requirement

- a) .Break up rates may be quoted for Chamber, Chamber lid handling facility, Refrigeration system, Mechanical loading system & Controls & instrumentation.
- b) Five Copies of Operation manual along with all necessary drawings, detail of different parts, trouble shooting, spare part list etc. shall be provided to purchaser after award of contract but not later than commissioning.
- c) The list of other items / work required to be carried out by purchaser during erection and commissioning shall be prepared and placed under heading **Exclusions**.
- e) Bought out components make to be specified in the offer. Preferred makes are given at Annexure IV.
- f) For items asked as optional its rate shall be quoted separately in the price bid, the technical details of these optional items shall be provided in techno-commercial offer.
- g) Unloading of Material at purchaser site under the guidance of bidder.
- h) Validity of Offer : 6 months
- i) Delivery : Bidder to quote best delivery as well as time required for Erection and commissioning.

6. QUALIFICATION CRITERIA

The vendor shall have supplied similar equipment operating at a minimum capacity of 40 MT and with temperature operating range of +100°C to -50°C. The equipment shall have been used for similar application for testing of insulators. The equipment supplied shall have been in satisfactory working condition for a minimum period of 3 years. The vendor shall furnish performance certificates from his customers for satisfactory performance of the equipment supplied. Failure to provide this information, the tender is liable to be rejected.

SPECIFICATION FOR THERMAL MECHANICAL TEST EQUIPMENT – HORIZONTAL TYPE

Annexure – II

**SPECIFICATIONS FOR THERMAL MECHANICAL
TEST CHAMBER OF SIZE 1000 mm W x 600mm D x 5000mm L****A- THERMAL**

1.	Chamber type	Horizontal
2.	Internal dimension of chamber	1000 mm W x 600mm D x 5000mm L
3.	External dimension of chamber	To be indicated by the vendor.
4.	Internal material	Minimum 1.6mm thick stainless steel sheet
5.	External material	Minimum 1.6mm thick MS sheet covered round the angle Iron frame work
6.	Insulation	Suitable to be provided. Material of insulation & thickness to be specified. The insulation thickness and density shall be so chosen so that the outside skin temperature shall not exceed $\pm 5^{\circ}\text{C}$ from ambient. Provision for draining the water condensation from the chamber inside shall be provided with a suitable stopcock duly covered with insulation.
7.	Door	Full size door to be provided, which provides clear opening to the chamber. Door to be provided with suitable lifting arrangement, either mechanical or hydraulic. The door sealing to be of Rubber Gasket capable of withstanding peak temperatures and sealing pressure to be provided by self-weight of the door.
8.	Temperature range	+ 100°C to –70°C
9.	Temperature control	Electronic Digital temperature Indicator Controller with suitable range to be provided to indicate and control temperature of the chamber. Alternatively Microprocessor based programmable controller to be offered but as optional item to be quoted separately in the price bid. The technical details along with detailed specification and product catalog to be provided in techno-commercial offer.
10.	Control accuracy	$\pm 1^{\circ}\text{C}$
11.	Temperature uniformity	$\pm 2^{\circ}\text{C}$
12.	Temperature recorder	3 point temperature recorder for continuous record of temperature during both cooling & heating cycle shall be provided of preferred make. The temperature recorder to have provision for data to be downloaded to a computer.
13.	Refrigeration System	Two stage refrigeration system with ECO friendly refrigerant to attain temperature from +100 to –70°C. The system to be provided with pressure gauge for suction and discharge, pressure cutout, in-built Oil Pressure cut-out and other accessories as required. Distribution evaporator cooling coil to be provided along length of the chamber. Condenser shall be air cooled (radiator type). All the refrigeration components shall be of reputed make only as per the preferred make of bought out components given in this specification.
14.	Heaters	Electric heaters of suitable rating wired in 3 phase, 415 V.

15.	Rate of Heating	Adjustable between 0.1°C. per minute to 1°C per minute.
16.	Rate of Cooling	Adjustable between 0.1°C. per minute to 0.5°C per minute.
17.	Temperature changeover cycle	Manual change over from cooling to heating and from heating to cooling. Auto change over of temperature cycle to be quoted as an optional item and rate quoted separately in price bid. The technical details along with detailed specification and product catalog to be provided in techno-commercial offer.
18.	Port Hole	Suitable port holes on either side of the chamber to be provided to insert moving hydraulic loading fixture and fixed fixtures into the chamber.
19.	Power supply	415V, 50Hz, Three Phase AC supply.
20.	Controls	Control system comprising of temperature indicator controller, load indicator controller. Programmable controller for both temperature and load should be provided as an optional item. The programmable controller to have provision for data transfer from a personal computer.

Note: Two disc insulator strings with hardware having 20 insulators per string will be loaded in parallel and tested simultaneously. Load applied may be different on each string. The max. insulator diameters, height of each insulator and maximum length of the string is indicated in the table below:

Sl. No.	Insulator Type	Max. diameter of insulator (mm)	Max. height of each insulator (mm)	Max. length of string including hardware (mm)
1	70/90 kN Disc insulator	255	145	3000 + 500
2	120 kN Disc insulator	255	145	3000 + 500
3	160 kN Disc insulator	280	170	3500 + 500
4	210 kN Disc insulator	280	170	3500 + 500
5	300 kN Disc insulator	330	190	3900 + 600
6	400 kN Disc insulator	380	205	4200 + 600
7	Solidcore insulators	280	550	3300 + 500
8	Longrod insulators upto 400 kV	250	1200	3600 + 500

SPECIFICATION FOR THERMAL MECHANICAL TEST EQUIPMENT – HORIZONTAL TYPE

Annexure - III

**SPECIFICATIONS FOR THERMAL MECHANICAL
TEST CHAMBER OF SIZE 1000mm W x 600mm D x 5000 mm L****B- MECHANICAL**

1.	Capacity of Hydraulic Loading System	50 (500 kN) Tons Capacity with capability to load TWO strings independently.
2.	Type	'C' Frame Type Horizontal
3.	Application	Insulator tensile load testing for two insulator strings
4.	Construction	Mild steel fabricated and machined
5.	Ram return	By power
6.	Ram stroke	500 mm
7.	Pull back speed	120 mm / Min $\pm 10\%$
8.	Forward speed	80 mm / Min $\pm 10\%$
9.	Hydraulic Cylinder Pull Down Capacity	1 no of capacity of 50 Tonnes (500 kN). Alternatively offer to be made for 2 hydraulic cylinders for loading two independent strings each of capacity 25 MT i.e Total of 50 MT (2 X 25MT) with necessary accessories for independent loading of the two hydraulic cylinders. The heating and cooling of both strings shall however be simultaneous. The supplier shall furnish the details of its operation when we are testing 420 kN single string by applying 30 MT load using both cylinders simultaneously. The price for this option shall be quoted separately in price bid. The technical details for both options along with detailed specification and product catalog to be provided in techno-commercial offer.
10.	Clear distance between eyeholes for mounting insulators	Min. 4300 mm in fully extended position of the hydraulic cylinder and max. 4800 mm in fully retracted position of the hydraulic cylinder.
11.	Load Indication & control	Load cells to be provided of capacity 60 tonnes to indicate and maintain the load in both strings. Load cell shall have an accuracy (repeatability) of $\pm 0.5\%$ Offer shall also include as optional 2 load cells each of capacity 30 MT in case the buyer opts for system of loading with two independent hydraulic cylinders. The price for this option shall be quoted separately in the price bid. The technical details along with detailed specification and product catalog to be provided in techno-commercial offer. The load indicator & recorder to have provision for data to be downloaded to a personal computer.
12.	Mode of Operation	Electrical Push Buttons
13.	Loading Arrangement	Loading will be done on two strings simultaneously. Provision shall be made to ensure that the load remains constant during the entire testing cycle. The strings will be fixed on one end to

		<p>the moving hydraulic cylinder and on the other end to a fixed loading fixture.</p> <p>Alternatively vendor shall offer as option system with two independent moving hydraulic cylinders at one end and two fixed fixtures at other end. Both cylinders shall be loaded to the required load one after the other and tested simultaneously. It may be noted that the loading may be different on each string. The price for this option shall be separately quoted in the price bid.</p> <p>The technical details along with detailed specification and product catalog to be provided in techno-commercial offer.</p>
14.	Mode of Ram Locking In Loaded Condition	By Accumulator, Mechanical locking under load to be provided
15.	Max. Hydraulic System Working Pressure	Vendor shall indicate the Max. working pressure in the technical offer.
16.	Max. system pressure control	A fixed pressure relief valve is to be provided
17.	Working pressure adjustment	A variable relief valve to be provided to vary load from 5 to 50 tonnes.
18.	Load Adjustment	<p>Manual by on/off operation of the hydraulic loading system during heating cycle and by reduction of pressure through pressure regulating solenoid valve during cooling cycle.</p> <p>Alternatively automatic load adjustment during the testing cycle to be offered but as optional item and price to be separately quoted in price bid.</p> <p>The technical details along with detailed specification and product catalog to be provided in techno-commercial offer.</p>
19.	Finish	The equipment to be finished with Opaline Green colour
20.	Power Supply	415 V, 50Hz, 3 Phase AC supply.

SPECIFICATION FOR THERMAL MECHANICAL TEST EQUIPMENT – HORIZONTAL TYPE

Annexure – IV

PREFERRED MAKES OF BOUGHT OUT COMPONENTS

ITEM	MAKE
1. MOTORS	CROMPTION GREAVES / SIEMENS / BHARAT BIJLEE/ABB
2. SWITCH GEAR	L&T / SIEMENS / TELEMECANIQUE
3. GEAR BOXES	ELECON / GREAVES COTTON / SHANTI
4. HYDRAVLICS	REXROTH / YUKEN / VICKERS
5. TEMPERATURE CONTROLLERS / RECORDER	EUROTHERM / FUJI / HONEYWELL / CHINO / YAKAGAWA
6. WATER PUMPS	GRUNDFOS / KSB
7. LOAD CELL	IPA / SYSCON
8. PRESSURE GAUGES	FIEBIG / WAREE / FORBES MARSHALL FOR HYDRAULICS DANFOSS / IMPERIAL FOR REFRIGERATION SYSTEM
9. VOLTMETER / AMPERE METERS	NIPPEN / MECO
10. REFRIGERATION : COMPRESSORS	MANEUROP / DANFOSS / BITZER / TECUMSEH
11. REFRIGERATION : FILTERS	DANFOSS / IMPERIAL (US)
12. EXPANSION VALVES SOLENOID VALVES PR. SWITCHES SIGHT GLASS ETC., FOR REFIRGERATION SYSTEM	DANFOSS / IMPERIAL (US)

Tender Enquiry No: BHEL/IP/MM/CAP/OT-04/2007**GENERAL TERMS AND CONDITIONS**

1. Sealed Tenders are invited for the following work from experienced parties who meet the Qualification Criteria.

Material Description	Unit	Quantity	Tender submission Last Date & time	Tender opening date & time
Thermal Mechanical Testing Equipment for insulators with Chamber Size (Internal Dimensions): 1000 mm – Width; 600 mm – Depth; 5000 mm – Length. Max. Tensile Load: 50 MT. Temperature Range: +100 Deg.C to -70 Deg.C.	No.	01	12-07-2007, 2.30 PM	12-07-2007 3.00 PM

2. Address for purchase, submission & opening of Tender

a) **Purchase and opening of tender:**

Office of the Dy. G.M. / (MM)
 Insulator Plant
 Bharat Heavy Electricals Limited
 Jagdishpur Industrial Area
 Jagdishpur
 Distt Sultanpur (UP) 227 817
 Tel : 05361 270140
 Fax : 05361 270110
 Email: babulal@bhelepd.com

Contact Person: Shri G. K. Babulal, Dy. Gen. Mgr/MM

b) **Submission of tenders:**

AA) By Post/ Courier at

BHEL IP, Jagdishpur Liaison office
 2/247A, Vikas khand, Gomti Nagar (near Mayo Hospital)
 Lucknow (U.P) – 226016
 Phone: 0522-2398130, 2398142

or

BB) By hand : In the tender box located at BHEL, Insulator Plant, Jagdishpur (U.P.)

3. BHEL takes no responsibility for any delay / loss of documents or correspondence sent by courier or post.
4. The offer is to be submitted in a sealed envelope properly marked .The tender shall be submitted in two parts. The first part shall consist of the techno-commercial offer without price schedule and marked on top of the envelope as “Part I -Techno-commercial Bid” along with tender enquiry no. and due date. The second part shall be the price schedule and marked on top of the envelope as “Part II - Price Bid” along with tender enquiry no and due date. Each part shall be in a separate sealed envelope. Both the parts shall then be put in a bigger sealed envelope. The tender enquiry no. & due date of opening must be clearly mentioned on top of the envelope.
5. Part I of the bid will be opened first and scrutinized. Successful bidders in techno-commercial bid Part – I will only be considered for opening of Price Schedule i.e. Part – II. Date of opening of Price Bid will be intimated separately to the Tenderers who qualify in the Techno-Commercial bid.
6. Offers should be strictly in accordance with the tender specifications & other terms and conditions enclosed herewith.
7. Only Tenderers who have previous experience are expected to quote for this Item. Offer from Tenderer who does not have proven and established experience in the field is liable to be rejected.
8. Details of similar equipment of above specification supplied earlier to other parties & their performance to be provided along with the offer in the techno-commercial offer.
9. Guarantee and Test Certificates are required along with the supply
10. Erection & Commissioning shall be done by supplier.
11. In the price bid cost of main equipment, E & C charges, Taxes, P & F Excise duty etc are to be quoted separately
12. Equipment will be inspected before dispatch by BHEL
13. Please quote your rates for FOR BHEL, Jagdishpur for indigeneous supply. FOB/CIF offer for import items.
14. Our payment terms are: 80% against receipt of material at site, 10% after Erection & Commissioning and balance 10% against performance bank guarantee.
15. AS delivery is the essence of the contract, BHEL’s standard LD clause is applicable.
16. Operational manual & necessary drawings shall be provided to BHEL at the time of supply.
17. Prices to be firm with validity with validity of 90 days from the date of opening.

18. Parties are requested to adhere to commercial terms of BHEL, otherwise the loading in the commercial comparative statement will be as per loading factor enclosed.
19. BHEL reserves the right to accept or reject any of the bid / all bids with or without deviation or cancel / withdraw the invitation for bid without assigning any reason whatsoever and in such case no bidder shall have any claim arising out of such action by BHEL.
20. Order shall be awarded to technically suitable L-1 bidder only
21. L-1 (lowest bidder) shall be worked out based upon the cost to BHEL.basis.
22. Price to be mentioned both in words and figures in price bid
23. Tax / Excise break ups to be given clearly
24. Guarantee /Performance Guarantee of equipment shall be given by supplier
25. Unloading of materials at BHEL shall be done under the supervision of supplier.
- 27 Right of Acceptance:- BHEL reserves the right to reject any or all tenders without assigning any reason there of.
28. Risk Factor- BHEL has the option to terminate the contract and to purchase the material at the risk & cost of the vendor if vendor fails to deliver the material within the stipulated time mentioned in the contract.
29. Party shall submit relevant documents for available VAT benefits as and when applicable.
30. Performance Bank Guarantee of 10% value of the contract value valid for 12 months from the date of commissioning shall be applicable or 18 months from the Date of Dispatch.
31. Consortium Bankers of BHEL are State Bank of India, ABN Amro Bank, Bank of Baroda, Canara Bank, HDFC Bank Ltd., Deutsche, AG, ICICI Bank Ltd., IDBI Ltd, Punjab National Bank, CITI Bank, NA, State Bank of Hyderabad, State Bank of Travancore, The Hongkong and Shanghai Banking Corporation Ltd

For & on behalf of BHEL

Dy. GM/ MM
BHEL, IP, Jagdishpur



INSULATOR PLANT, JAGDISHPUR

LOADING FACTORS SHEET

BHEL TE NO. BHEL/IP/MM/CAP/OT-1/2007

DEVIATIONS ARE LIMITED TO FOLLOWING ONLY, FURTHER DEVIATION ON ANY OF THE FOLLOWING MAY LEAD BHEL TO REJECT THE OFFER UNILATERALLY ON COMMERCIAL GROUNDS.

NOTE: THIS LOADING FACTOR INDICATED BELOW WILL BE ADDED ON QUOTED PRICE TO EVALUATE THE LOWEST QUOTE (in CASE OF DEVIATION TO BHEL'S TENDER SPECIFIED TERMS).

SL NO	COMMERCIAL TERMS	BHEL STANDARD TERM	IF YOU QUOTE	LOADING FACTOR FOR NON – COMPLIANCE OF BHEL STANDARD TERM
A.	FOR INDIGENOUS SCOPE OF SUPPLY			
1	TERMS OF PAYMENT (WHERE SCOPE INCLUDES E&C) :	80% against receipt of material 10% against Erection & Commissioning 10% against Performance Bank Guarantee Note: No advance will be paid.	80% THROUGH BANK	2% ON THE 80% OF THE BASIC MATERIAL VALUE
		- SAME AS ABOVE-	80% AGAINST EXCHANGE OF DISPATCH DOCUMENTS (I.E. PROFORMA INVOICE)	2.50% ON THE 80% OF THE BASIC MATERIAL VALUE.
B.	FOR IMPORTED SCOPE OF SUPPLY :			
1	TERMS OF PAYMENT (WHERE SCOPE INCLUDES E&C)	80% against receipt of material 10% against Erection & Commissioning 10% against Performance Bank Guarantee Note: No advance will be paid.	80% THROUGH LETTER OF CREDIT. ALL BANK CHARGES OUTSIDE INDIA INCLUDING CONFIRMATION CHARGES TO BENEFICIARY'S ACCOUNT.	2% ON THE 80% OF THE BASIC MATERIAL VALUE
		-SAME AS ABOVE-	100% THROUGH LETTER OF CREDIT AGAINST DELIVERY. ALL BANK CHARGES OUTSIDE INDIA INCLUDING CONFIRMATION CHARGES TO BENEFICIARY'S ACCOUNT Note: If E & C Involved by the vendor this payment is not acceptable	3.5% ON THE 100% OF THE BASIC MATERIAL VALUE.

SL NO	COMMERCIAL TERMS	BHEL STANDARD TERM	IF YOU QUOTE	LOADING FACTOR FOR NON – COMPLIANCE OF BHEL STANDARD TERM
		-SAME AS ABOVE-	100% WITHIN 45 DAYS OF SIGNING OF HIGH SEA SALES AGREEMENT.	3% ON THE 100% OF THE CIF VALUE.
C	PERFORMANCE BANK GUARANTEE (COMMON FOR INDIGENOUS/IMPORTED/ HSS)	PBG for 10% of the basic material cost shall be furnished in the BHEL prescribed format only.	IF NOT AGREED	10% OF THE BASIC MATERIAL VALUE.
		- SAME AS ABOVE -	IF 5% IS AGREED	5% OF THE BASIC MATERIAL VALUE.
		- SAME AS ABOVE -	OTHER THAN THE ABOVE.	(10% MINUS THE AGREED MAX. %) OF THE BASIC MATERIAL VALUE WILL BE LOADED.
D	PENALTY CLAUSE	½% Per week subject to a maximum 10% for delayed delivery	IF PENALTY CLAUSE IS NOT AGREED.	10% OF THE BASIC MATERIAL VALUE.
E	WARRANTY	24 months from the date of dispatch or 18 months from the date of commissioning whichever is earlier.	IF NOT AGREED FOR THE STIPULATED WARRANTY PERIOD IN THE ENQUIRY.	0.5% OF THE BASIC MATERIAL VALUE PER MONTH FOR THE DIFFERENCE in PERIOD.