


2X660MW UDANGUDI STPP

**TECHNICAL SPECIFICATION
FOR
BONDED MINERAL (ROCK) WOOL MATTRESSES &
PIPE SECTION**

SPECIFICATION NO. PE-TS-435-169-M032



**BHARAT HEAVY ELECTRICALS LIMITED, POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA**

	TITLE:	SPECIFICATION NO. PE-TS-435-169-M032
	TECHNICAL SPECIFICATION	REV. NO.: 00
	BONDED MINERAL (ROCK)	DATE: 10.10.2022
	WOOL MATTRESSES & PIPE	SHEET 1 OF 1
	SECTION	
	2X660MW UDANGUDI STPP	


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		SECTION : I
		REV. NO. 00
		DATE: 10.10.2022
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1.00.00 GENERAL

This specification covers the requirements of manufacture, physical & chemical properties, inspection & testing and packing for supply of bonded mineral (rock) wool mattresses having metallic hexagonal wire netting as facing on one or both side, suitable for service temperatures up to 750 deg C.

2.00.00 CODES AND STANDARDS

2.01.00 INDIAN STANDARD

- 2.01.01 The manufacture, physical & chemical properties, inspection and testing of the bonded mineral rock wool mattresses shall conform to the latest editions of the following appropriate standards.
- 2.01.02 IS: 8183 Specification for bonded mineral wool.
- 2.01.03 IS: 3144 Methods of test for mineral wool thermal insulation materials.
- 2.01.04 IS: 3346 Methods for the determination of thermal conductivity of thermal insulation materials (two slab, guarded hot plate method).
- 2.02.00 In case of any conflict between the above standards and this specification, the latter shall be final.

3.00.00 MANUFACTURE


- 3.01.00 The mattresses shall be made from rock processed from a molten state into fibrous form with minimum organic thermosetting binder, and shall be machine felted, baked and metallic stitched / faced with metallic hexagonal wire netting on one or both sides (as specified in the BOM).
- 3.02.00 The metallic hexagonal wire netting shall be of Galvanized steel (made from wire conforming to IS: 280 medium coated to IS: 4826) / Stainless steel (made from wire to IS: 6528) having wire size and aperture conforming to IS: 3150, as specified in the BOM.
- 3.03.00 The mattress shall be continuously stitched / tied on to the wire netting with minimum 0.4 mm dia. galvanized steel / stainless steel wire, as specified in the BOM. The spacing between the stitching / ties shall not be more than 250 mm along the width and 150 mm along the length.

4.00.00 DIMENSIONS AND DIMENSIONAL TOLERANCES

- 4.01.00 The length and width of the mattresses shall be 1520 mm x 1220 mm or 1640 mm x 1220 mm. Nominal thickness shall be 25, 40, 50, 60, 70, 75 or 80 mm.
- 4.02.00 The method of measuring the dimensions i.e. length, width and thickness shall be as prescribed in IS: 3144. Tolerance on length and width shall be as per IS:8183. Tolerance on thickness shall be +6mm/-2mm.

5.00.00 BULK DENSITY AND TOLERANCES ON DENSITY

- 5.01.00 The bulk density of the bonded mineral (rock) wool mattresses without the facings, shall be 150 / 100 kg/m³ unless otherwise specified. Tolerances on bulk density shall be +15 % and - 5% when tested as per method prescribed in IS: 3144.

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6.00.00 MATERIAL PROPERTIES

6.01.00 SHOT CONTENT:

The method for determination of shot content shall be as prescribed in IS: 3144. The maximum shot content shall be 5% by weight.

Any shot present in the materials shall not be greater than 5 mm in any dimension.

6.02.00 THERMAL CONDUCTIVITY

The thermal conductivity (k-value) of the bonded mineral wool mattresses shall not exceed the values given in IS: 8183 Latest when determined in accordance with the method prescribed in IS: 3346.

K' Value test (for minimum three mean temperatures i.e. 100°C, 200°C & 300°C) results to be provided to BHEL for acceptance in accordance with conditions given below: -

If 'K' Value test has been conducted against any BHEL order, on sample collected within 12 months prior to the date of present inspection, the related test results may be provided. Otherwise, the test will be carried out on samples identified and sealed by customer / BHEL authorized representative and related test results to be provided. The test will be carried out at govt. approved labs or test houses (at CBRI – Roorkee, IIT – Chennai, PIBCO R & D Centre - N. Delhi, NIRMA University, Ahmedabad) recognized by reputed customers.


6.03.00 HEAT RESISTANCE

When a sample of mattress is heated to the maximum recommended temperature of use (550 °C for 100 kg/m³ density and 750 °C for 150 kg/m³ density) as per method prescribed in IS:3144 (test for maximum recommended temp), the material shall not suffer visible deterioration of the fibrous structure, any fusion of fibers and shall not show any evidence of internal self-heating. Any colour change shall not be considered as visible deterioration in fibrous structure.

6.04.00 OTHER TESTS

The following tests are to be conducted as per IS:3144/IS:8183 and the acceptance norms shall be as per IS:8183.

- a. Moisture content
- b. Moisture Absorption
- c. Incombustibility
- d. Sulphur content
- e. Recovery after Compression
- f. Alkalinity

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- g. Chloride Content
- h. Fibre Diameter
- i. Resistance to vibration
- j. Resistance to jolting

7.00.00 PACKING AND MARKING

7.01.00 Stack of mattresses shall be packed in unfolded condition and sealed in polythene bags of at least 0.2mm thickness. Then the sealed bags shall be put inside the polythene lined HDPE or HDPP Woven netting bags and sealed by machine stitching.

To account for looseness in packing (if any) due to machine stitching, the bags shall be properly stacked and tightly fastened during transportation to avoid any possible damage due to relative movements. Sharp edges of wire netting shall be bent inwards to avoid damage to packing.


7.02.00 Each bag of mattresses shall be serial numbered. Also, printed sheets indicating the nominal thickness, density and wire netting details (i.e. material and size) shall be placed below the wire netting.

7.03.00 For easy identification of mattresses as per density & wire netting material, following colour codes for the HDPE bags is to be followed:

- a) Yellow bags with marking as shown in Fig 1 (Page 5 of 5) for 150 kg/m³ with Galvanized steel wire netting
- b) White bags with marking as shown in Fig 1 (Page 5 of 5) for 100 kg/m³ with Galvanized steel wire netting
- c) Yellow bags with marking as shown in Fig 1 (Page 5 of 5) for 150 kg/m³ with SS wire netting
- d) In case of both side SS/ GS wire meshing, additional marking "BOTH SIDE MESH" is to be provided.

7.04.00 Following details shall be legibly and indelibly marked on the packages.

- a) Project Name
- b) Vendor name:
- c) Purchase Order No. and Date
- d) Sl. No. of package/Batch No:
- e) Size of mattresses (Thickness x Length x Width)
- f) Density of mattresses
- f) Wire netting material and size
- g) Weight of the package
- h) No. of mattresses in the package
- i) A caution note "Always store under covered shed and on raised platforms"

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8.00.00 INSPECTION AND TESTING

- 8.01.00 Bonded mineral wool mattresses to be supplied under this specification shall be of tested quality and workmanship. Inspection and testing of thermal insulation materials shall be as per this specification / quality plan enclosed. Manufacturer shall conduct all tests and stage inspections as per the approved quality plan to ensure that the material conforms to the requirements of this specification and of applicable standards. All shop tests shall be conducted in the presence of BHEL's / BHEL's customer's representative, on the samples identified by him / them.
- 8.02.00 The Quality Plan enclosed with this specification specifies minimum quality control requirement. During contract stage vendor shall furnish this Quality Plan duly signed & stamped for BHEL approval. Quality plan shall be approved by BHEL and customer. Inspection and testing shall be carried out as per Quality Plan by BHEL/ BHEL representative and customer (as applicable). In case inspection is by both BHEL and their customer, then the inspection can be carried out jointly or separately, which will be informed later. In case of the foreign bidder, inspection shall be carried out by reputed third party.
- 8.03.00 The charges for third party inspection (Lloyds, TUV or equivalent) for foreign bidders shall be included in the base price of the item by the bidder. This third party agency shall be approved by BHEL. Bidder to inform the same in the offer and mention the same in Quality Plan.

Note: There may be minor changes in quality plan depending on customer/consultant comments which will HAVE TO BE ACCOMMODATED BY VENDOR AT NO EXTRA COST.

9.00.00 DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT:

1. Quality plan duly signed and stamped.
2. Datasheet for Approval by BHEL/Customer.

Approval of Quality plan/ Data sheet shall be required for manufacturing clearance and the same shall be considered for delay analysis by BHEL.



**SPECIFIC TECHNICAL REQUIREMENT
FOR BONDED MINERAL (ROCK)
WOOL MATTRESSES**

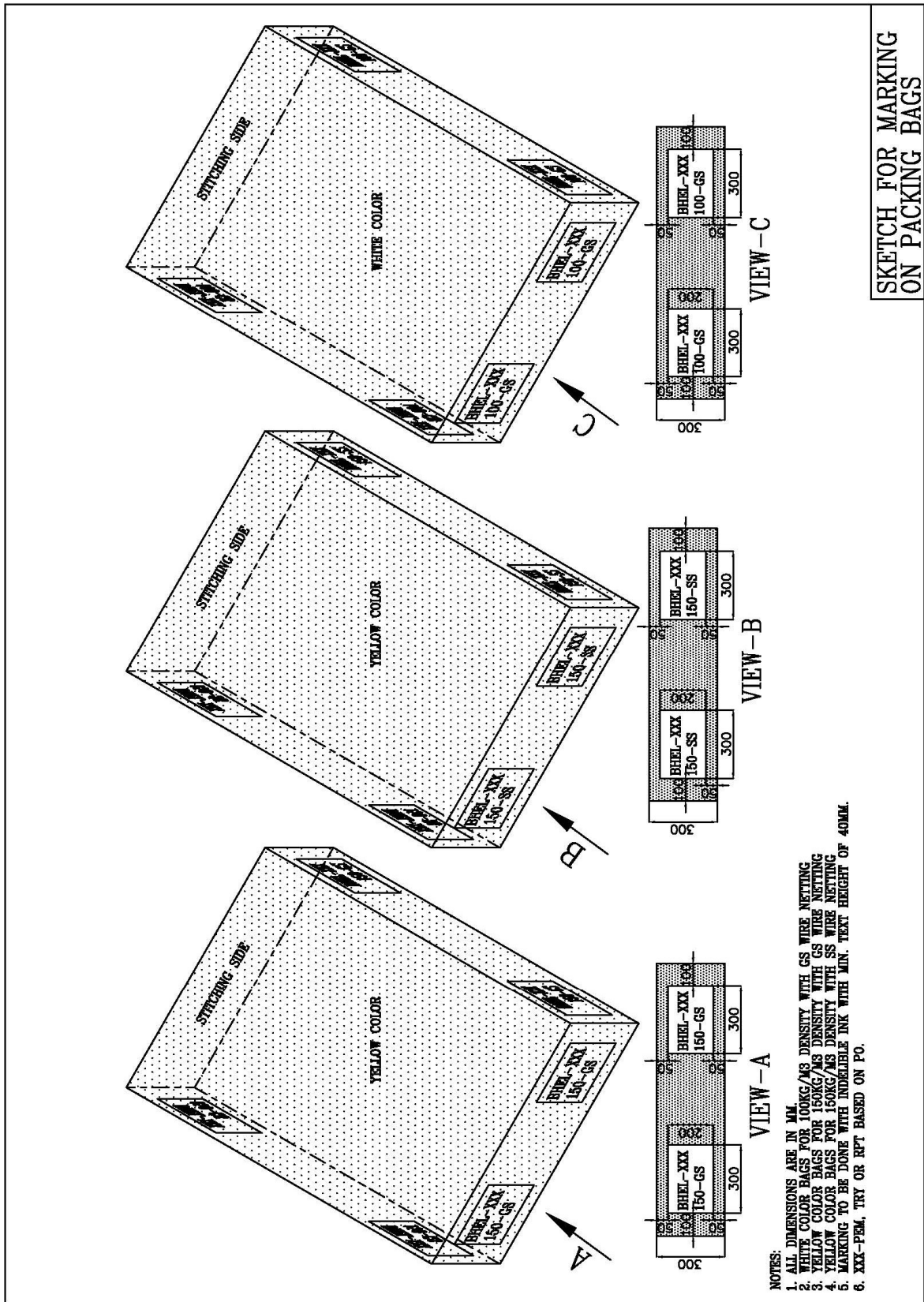
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- NOTES:
1. ALL DIMENSIONS ARE IN MM.
 2. WHITE COLOR BAGS FOR 100KG/M3 DENSITY WITH GS WIRE NETTING
 3. YELLOW COLOR BAGS FOR 150KG/M3 DENSITY WITH GS WIRE NETTING
 4. YELLOW COLOR BAGS FOR 150KG/M3 DENSITY WITH SS WIRE NETTING
 5. MARKING TO BE DONE WITH INDELIBLE INK WITH MIN. TEXT HEIGHT OF 40MM.
 6. XXX-PEM, TRY OR RPT BASED ON PO.

Fig 1: Sketch for marking on bags

STANDARD TECHNICAL DATA SHEET FOR LIGHT RESIN BONDED MINERAL (ROCK) WOOL MATTRESSES

PROJECT: 2X660MW UDANGUDI STPP


QP NO: PE-QP-435-169-M032

SPECIFICATION NO: PE-TS-435-169-M032

SL. No.	CHARACTERISITCS	ACCEPTANCE/PERMISSIBLE LIMIT		
1	MATERIAL	LRB Rock wool mattresses confirming to IS:8183/Latest.		
2	Bulk Density	100 Kg/m ³ & 150 Kg/m ³ with (+)15% & (-)5% tolerance.		
3	Mattresses Size	1640mm x 1220mm/1520mm x 1220mm		
4	Thickness	25,40,50,60,75mm (Thickness values as per BOM) Tolerance on thickness shall		
5	Service Temperature	Upto 400 ⁰ C - 100 Kg/m ³ Above 400 ⁰ C - 150 Kg/m ³		
6	Thermal Conductivity as per IS 8183/93 (Group 3/Group 4)	Mean Temp.	100 Kg/m³ (Group 3) K value in mW/cm.°C (Max)	150 Kg/m³ (Group 4) K value in mW/cm.°C (Max)
		100° C	0.52	0.52
		200° C	0.73	0.68
		300° C	0.95	0.93
7	Chloride content	0.01 % max.		
8	Shot content	Shot shall not exceed 5% maximum by weight.		
		Shot shall not be greater than 5mm in any dimension.		
9	Sulphur content	0.6% max		
10	Moisture Content (Weight gain by moisture absorption)	2 % max		
11	Incombustibility Test (loss of weight after test)	5% max		
12	Resistance to vibration	1 % max		
13	Resistance to jolting	3 % max		
14	Alkalinity	7-10 pH		
15	Recovery After Compression	90% minimum after compression to 75% of the original Thickness.		
16	Fibre Diameter	7.0 Micron max.		
17	SS wire netting (above 400 deg.C)	As per IS:6528 & 3150, Aperture 13mm & Wire Dia 0.56mm.(Wire Dia and single side/ Both sides wire netting as per BOM).		
18	SS Tieing/Stitching wire (above 400 deg.C)	Wire Dia 0.40mm As per IS:6528.		
19	GI wire netting (upto 400 deg.C)	As per IS:280 & 3150, Aperture 13mm & Dia 0.56mm.(Wire Dia and single side/ Both sides wire netting as per BOM).		
20	GI Tieing/Stitching wire (upto 400 deg.C)	Wire dia 0.40mm As per IS:280.		
21	Packing, Marking & other requirement	Stack of mattresses shall be packed in unfolded condition and sealed in polythene bags of at least 0.2mm thickness. Then the sealed bags shall be put inside the polythene lined HDPE or HDPP Woven netting bags and sealed by machine stitching. Packing to be duly marked with a caution note "Always store under covered shed and on raised platforms". For marking and other details Technical specification is to be referred.		

BIDDER/SUPPLIER

BHEL

	TITLE: STANDARD TECHNICAL SPECIFICATION FOR BONDED MINERAL (ROCK) WOOL PIPE SECTIONS	SPECIFICATION No: PE-TS-435-169-M033
		SECTION : I
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1.00.00 GENERAL

This specification covers the requirements of manufacture, physical & chemical properties, inspection, testing and packing for supply of Bonded Mineral (Rock) wool pipe sections suitable for service temperature upto 650°C.

2.00.00 CODES & STANDARDS

2.01.00 INDIAN STANDARD

2.01.01 The manufacture, physical & chemical properties, inspection and testing of Bonded Mineral (Rock) wool pipe sections shall conform to the latest edition of the following appropriate standards.

2.01.02 IS:9842 Specification for Preformed Fibrous Pipe Insulation.

2.01.03 IS:3346 Method for determination of thermal conductivity of thermal insulation materials (two slab, guarded hot-plate method).

2.01.04 IS:3144 Methods of test for mineral wool thermal insulation materials.

2.01.05 IS:5688 Methods of test for preformed block-type and pipe-covering type thermal insulation.

2.02.00 In case of any conflict between the above standards and this specification, the latter shall prevail and in case of any further conflict in the matter, the interpretation of the specification by the Purchaser's Engineer shall be final and binding.

3.00.00 MANUFACTURE

The pipe sections shall be made from rock processed from a molten state into fibrous form with minimum organic thermosetting binder, and rolled on mandrels into hollow cylinders, baked and split lengthwise on one or both sides of the cylindrical axis.

4.00.00 DIMENSIONS AND DIMENSIONAL TOLERANCES

4.01.00 Dimensions of the pipe sections shall be as follows:

Length : 1.0 M

Diameter : to fit standard pipes of O.D. upto 355.6 mm

Thickness: 25, 40, 50, 60 or 75 mm.


4.02.00 The following dimensional tolerances are applicable for the bonded mineral (Rock) wool pipe sections.

Length: : +3% and -2% of nominal/specified length.

Diameter (Internal) : -2 mm and +5 mm of nominal/specified diameter.

Thickness : +5 mm and -2 mm

5.00.00 BULK DENSITY AND TOLERANCES ON DENSITY.

	TITLE: STANDARD TECHNICAL SPECIFICATION FOR BONDED MINERAL (ROCK) WOOL PIPE SECTIONS	SPECIFICATION No: PE-TS-435-169-M033
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5.01.00 The bulk density of the bonded mineral (Rock) wool pipe sections shall be 150 Kg/m³ unless otherwise specified. The tolerance on manufacturer's declared nominal / specified density shall be +15% and -5% when tested in accordance with the method prescribed in IS: 5688.

6.00.00 MATERIAL PROPERTIES

6.01.00 SHOT CONTENT:

The method for determination of shot content shall be as prescribed in IS: 3144. The maximum shot content shall be 5% by weight.

Any shot present in the materials shall not be greater than 5 mm in any dimension.

6.02.00 THERMAL CONDUCTIVITY

The thermal conductivity (k-value) of the bonded mineral (Rock) wool pipe sections shall not exceed the values given in IS:9842 when determined in accordance with the method prescribed in IS:3346.

The thermal conductivity (k-value) test will be carried out for minimum three mean temperatures i.e. 100 °C, 200 °C & 300 °C on samples identified and sealed by customer / BHEL Inspector once in twelve (12) months. The tests will be carried out at govt. approved labs (at CBRI-Roorkee, IIT-Chennai or PIBCO R & D Centre, N. Delhi).

In the absence of special apparatus for determination of thermal conductivity of pipe section, a flat slab of bonded mineral wool having the same bulk density and fibrous structure may be used for test.


6.03.00 HEAT RESISTANCE

When a sample of pipe section is heated to the maximum recommended temperature of use i.e. 650 °C as per method prescribed in IS:3144 (test for maximum recommended temp), the material shall not suffer any fusion of fibers and visible deterioration of the fibrous structure. Any colour change shall not be considered as deterioration of fibrous structure.

6.04.00 OTHER TESTS

The following tests are to be conducted as per IS:3144 / IS:9842 and the acceptance norms shall be as per IS:9842.

- a. Moisture content
- b. Moisture Absorption
- c. Incombustibility
- d. Sulphur content
- e. Recovery after Compression
- f. Alkalinity

	TITLE: STANDARD TECHNICAL SPECIFICATION FOR BONDED MINERAL (ROCK) WOOL PIPE SECTIONS	SPECIFICATION No: PE-TS-435-169-M033
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g. Chloride Content

h. Fibre Diameter

7.00.00 PACKING AND MARKING

7.01.00 Bunch of pipe sections shall be packed in Polythene all around and sealed to prevent moisture absorption during transit and storage, and further shall be packed in bituminised cardboard boxes and sealed.

7.02.00 Each package of pipe sections shall be serial numbered. Also, printed sheets indicating the nominal thickness, density and BHEL's serial no. (given in bill of materials) shall be placed inside the Polythene cover.


7.03.00 Following details shall be legibly written on the packages.

- a) Project Name
- b) Vendor name
- c) Purchase Order No. and date
- d) Sl. No. of package/batch no.
- e) BHEL's BOM Sl. no. for pipe section
- f) Nominal thickness
- g) Pipe size for which it is suitable and Length
- h) Density
- i) Weight of the package

8.00.00 INSPECTION AND TESTING

8.01.00 Bonded mineral wool pipe sections to be supplied under this specification shall be of tested quality and workmanship. Inspection and testing of thermal insulation materials shall be as per this specification / quality plan enclosed. Manufacturer shall conduct all tests and stage inspections as per the approved quality plan to ensure that the materials conform to the requirements of this specification and of applicable standards. All shop tests shall be conducted in the presence of BHEL's / BHEL's Customers representative, on the samples identified by him / them.

8.02.00 The Quality Plan enclosed with this specification specifies minimum quality control requirement. During contract stage vendor shall furnish this Quality Plan duly signed & stamped for BHEL approval. Quality plan shall be approved by BHEL and customer. Inspection and testing shall be carried out as per Quality Plan by BHEL/ BHEL representative and customer (as applicable). In case inspection is by both BHEL and their customer, then the inspection can be carried out jointly or separately, which will be informed later. In case of the foreign bidder, inspection shall be carried out by reputed third party.

	TITLE: STANDARD TECHNICAL SPECIFICATION FOR BONDED MINERAL (ROCK) WOOL PIPE SECTIONS	SPECIFICATION No: PE-TS-435-169-M033
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8.03.00 The charges for third party inspection (Lloyds, TUV or equivalent) for foreign bidders shall be included in the base price of the item by the bidder. This third party agency shall be approved by BHEL. Bidder to inform the same in the offer and mention the same in Quality Plan.

Note: There may be minor changes in quality plan depending on customer/consultant comments which will HAVE TO BE ACCOMMODATED BY VENDOR AT NO EXTRA COST.

9.00.00 DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT:

1. Quality plan duly signed and stamped.
2. Datasheet for Approval by BHEL/Customer.

APPROVAL OF QUALITY PLAN/ DATA SHEET SHALL BE REQUIRED FOR MANUFACTURING CLEARANCE AND THE SAME SHALL BE CONSIDERED FOR DELAY ANALYSIS BY BHEL.


STANDARD TECHNICAL DATA SHEET FOR BONDED MINERAL (ROCK) WOOL PIPE SECTIONS

PROJECT: 2X660MW UDANGUDI STPP

QP NO: PE-QP-435-169-M033


SPECIFICATION NO: PE-TS-435-169-M033

SL. No.	CHARACTERISITCS	ACCEPTANCE/PERMISSIBLE LIMIT	
1	MATERIAL	LRB Rock wool Pipe sections confirming to IS:9842/Latest.	
2	Bulk Density	150 Kg/m ³ with (+)15% & (-)5% tolerance.	
3	Mattresses Size	Length = 1.0M , Diameter: To fit standard pipes of OD upto 355.6mm	
4	Thickness	25,40,50,60,75mm (Thickness values as per BOM) Tolerance on thickness shall be +5mm/-2mm.	
5	Service Temperature	Upto 650 ⁰ C	
6	Thermal Conductivity as per IS 9842 (Group 3)	Mean Temp.	150 Kg/m³ (Group 3) K value in mW/cm.°C (Max)
		100° C	0.52
		200° C	0.70
		300° C	1.00
7	Chloride content	0.01 % max.	
8	Shot content	Shot shall not exceed 5% maximum by weight.	
		Shot shall not be greater than 5mm in any dimension.	
9	Sulphur content	0.6% max	
10	Moisture Content (Weight gain by moisture absorption)	2 % max	
11	Incombustibility Test (loss of weight after test)	5% max	
12	Alkalinity	7-10 pH	
13	Recovery After Compression	90% minimum after compression to 75% of the original Thickness.	
14	Fibre Diameter	7.0 Micron max.	
15	Packing, Marking & other requirement	Bunch of pipe sections shall be packed in Polythene all around and sealed to prevent moisture absorption during transit and storage, and further shall be packed in bituminised cardboard boxes and sealed. Each package of pipe sections shall be serial numbered. Also, printed sheets indicating the nominal thickness, density and BHEL's serial no. (given in bill of materials) shall be placed inside the Polythene cover.	
BIDDER/SUPPLIER		BHEL	

	TITLE:	BILL OF MATERIAL 2X660MW UDANGUDI STPP BONDED MINERAL (R) WOOL PIPE SECTION & MATTRESSES		SPECIFICATION NO. PE-TS-435-169-M032	
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DATA SHEET-A

S.No.	MATERIAL DESCRIPTION	SPECIFICATION	DENSITY	QUANTITY (MTR.)
	BONDED MINERAL WOOL PREFORMED PIPE INSULATION SI. No. OF PIPING # PIPE O.D IN MM # INSULATION THICKNESS IN MM (These to be marked properly with stencils on each package of pipe section)	PE-SS-999-169-M033	150 Kg/Cub.M	
1	59,77,230 #355.6# 75			92
2	312 #355.6# 60			39
3	61,65,115,308 #355.6# 50			202
4	113,114,313 #355.6# 40			78
5	157,241,242 #355.6# 25			100
6	112,307 #323.9# 75			72
7	20,22,84,85,292 #323.9# 50			28
8	167,168,211 #323.9# 40			122
9	98,102,129 #323.9# 25			23
10	60,108,227,232,236,238 #273# 75			60
11	63,111,288,314 #273# 60			264
12	109,110,286,291,293,299,309 #273# 50			230
13	169,170,171,172,315 #273# 40			227
14	96,124,125,128,240 #273# 25			154
15	9,10,71,74,79,107,214,219,219,221,222,225,233,237,239,285 #219.1# 75			340
16	262,64,104,105,106 #219.1# 60			54
17	101,134,135,136,300,310 #219.1# 50			15
18	92,103,138,210 #219.1# 40			98
19	120,121,122,123,126,130,131,262,263,264,265,273 #219.1# 25			243
20	91 #168.3# 75			51
21	27,76,94,99,231 #168.3# 60			37
22	93 #168.3# 50			19
23	137,194,212,213,304 #168.3# 40			417
24	40,88,89,90,117,118,119,127,147,148,158 #168.3# 25			303
25	160 #114.3# 75			132
26	78,223,228,229,287 #114.3# 60			11
27	100 #114.3# 50			1
28	26,159,220,224,294 #114.3# 40			54
29	41,42,144,145,146 #114.3# 25			167
30	7 #88.9# 75			25

	TITLE: BILL OF MATERIAL 2X660MW UDANGUDI STPP BONDED MINERAL (R) WOOL PIPE SECTION & MATTRESSES	SPECIFICATION NO. PE-TS-435-169-M032	
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DATA SHEET-A

31	70,234 #88.9# 60			253
32	192,193,302 #88.9# 40			57
33	132 #88.9# 25			47
34	5,8,11,14,18,21,23,31,32,33,141,142,143,149,217,244,251,278,280,281,282,303 #60.3# 75			2071
35	268 #60.3# 60			57
36	6,218,267 #60.3# 50			204
37	195 #60.3# 40			195
38	133,275,276,277,279,283,284 #60.3# 25			42
39	235,245,246 #48.3# 50			194
40	290 #48.3# 40			3
41	12,13,39,43,44,261,289,301 #33.4# 75			455
42	24,25,68,86,87,252,253,255,256,257,258,259,260,269,270,271,272,295,311 #33.4# 60			825
43	80,81,82,83,150,151,199,247,248,249,250,254,296 #33.4# 50			537
44	152,196,197,198,200,201,202,203 #33.4# 40			741
45	45,46,153,154,155,156,163,165,243,266 #33.4# 25			635

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DATA SHEET-A

R-MATTRESS B.O.M.

S.No	MATERIAL	DENSITY(Kg/m3)	THK(mm)	Quantity for One Unit(m2)
1	Bonded mineral (Rock) wool mattresses with one side GS wire netting of 13 mm x 0.56 mm size stitched with 0.4 mm GS wire	150	25	1250
			40	2250
			50	4700
			60	6350
			75	4000
2	Bonded mineral (Rock) wool mattresses with one side SS wire netting of 13mm X 0.56 mm size stitched with 0.4mm SS wire	150	75	2900
3	Bonded mineral (Rock) wool mattresses with one side GS wire netting of 13 mm x 0.56 mm size stitched with 0.4 mm GS wire.	100	25	300
			40	400
			50	950
			60	300
			75	300

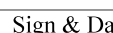
NOTE:

- 1) ABOVE B.O.M IS FOR ONE UNIT ONLY AND ORDER / SUPPLY SHALL BE FOR 2 UNITS.
- 2) Quantity tolerance shall be (+)0/ (-)15 m² for each density/thickness mattress.


	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS BHEL/Customer Approved Suppliers		QUALITY PLAN					SPEC. NO : PE-TS-435-169-M032	DATE: 26.09.2022			
			CUSTOMER : M/s TANGEDO					QP NO.: PE-QP-435-169-M031	DATE: 26.09.2022			
			PROJECT: 2X660MW UDANGUDI STPP					PO NO.:	DATE:			
			ITEM: THERMAL INSULATION – RESIN BONDED MINERAL (ROCK) WOOL MATTRESSES					SECTION: II	SHEET 1 OF 3			
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	*	**		10
					M C/N			D	M	C	N	

1.0 MATERIAL														
1.1	CHEMICAL COMPOSITION (RAW MATERIAL)	CHEMICAL PROPERTIES	MA	CHEMICAL	ONE SAMPLE PER LOT	ONE SAMPLE PER LOT	MANUFACTURER STANDARD	MANUFACTURER STANDARD	TC	√	P	V	V	
1.2	GS WIRE	1.DIMENSIONS	MA	MEASUREMENT	IS 3150 Appendix A	IS 3150 Appendix A	IS 3150	IS 3150/ BHEL/CUSTOMER APPROVED DATA SHEET	IR	√	P	W #	V	#Witness shall be carried out at the stage of Clause 3.1.
		2.GAUGE DIAMETER	MA	MEASUREMENT			IS 280	IS 280/ BHEL/CUSTOMER APPROVED DATA SHEET	IR	√	P	W #	V	
		3. CHEMICAL	MA	LAB. TEST			IS 280	IS 7887	TC	√	P	V	V	
		4. COATING TEST	MA	LAB. TEST			IS 280	IS 4826	TC	√	P	V	V	
		5. TENSILE TEST	MA	LAB. TEST			IS 280	IS 280	TC	√	P	V	V	
		6. WRAPPING TEST	MA	LAB. TEST			IS 280	IS 280	TC	√	P	V	V	
		7. BEND TEST	MA	LAB. TEST			IS 280	IS 280	TC	√	P	V	V	
1.3	SS WIRE	1.DIMENSIONS	MA	MEASUREMENT	IS 6528	IS6528	IS 3150	IS 3150/ BHEL/CUSTOMER APPROVED DATA SHEET	IR	√	P	W #	V	#Witness shall be carried out at the stage of Clause 3.1.
		2.GAUGE DIAMETER	MA	MEASUREMENT	IS 3150	IS 3150	IS 6528	IS 6528/ BHEL/CUSTOMER APPROVED DATA SHEET	IR	√	P	W #	V	
		3.CHEMICAL ANALYSIS	MA	LAB. TEST	IS 6528	IS 6528	IS 6528	IS 6528	TC	√	P	V	V	
		4.TENSILE TEST	MA	LAB. TEST	IS 6528	IS6528	IS 6528	IS 6528	TC	√	P	V	V	
		5. REVERSE BEND TEST	MA	LAB. TEST	IS 6528	IS6528	IS 6528	IS 6528	TC	√	P	V	V	
		6. WRAPPING TEST	MA	LAB. TEST	IS 6528	IS6528	IS 6528	IS 6528	TC	√	P	V	V	
		7. TORSION TEST	MA	LAB. TEST	IS 6528	IS6528	IS 6528	IS 6528	TC	√	P	V	V	
2.0 IN-PROCESS INSPECTION														
2.1	FINISHED MATTRESS	DIMENSION & TOLERANCE	MA	MEASUREMENT	IS 8183	IS 8183	IS 3144	IS 8183/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	V	V	

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	 28.09.22	Lakhan Pal	Checked by:	Ashish Panigrahi	Ashish Panigrahi
Reviewed by:	SANJAY KUMAR	Sanjay Kumar	Reviewed by:	HARISH KUMAR	Harish Kumar

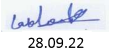



FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-169-M032	DATE: 26.09.2022					
	BHEL/Customer Approved Suppliers		CUSTOMER : M/s TANGEDO					QP NO.: PE-QP-435-169-M031	DATE: 26.09.2022					
			PROJECT: 2X660MW UDANGUDI STPP					PO NO.:	DATE:					
			ITEM: THERMAL INSULATION – RESIN BONDED MINERAL (ROCK) WOOL MATTRESSES					SECTION: II	SHEET 2 OF 3					
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY	REMARKS		
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	


3.0 FINAL INSPECTION

3.1	BONDED MINERAL (ROCK) WOOL MATTRESSES (FINISHED PRODUCT)	1. DIMENSIONS	MA	MEASUREMENT	IS 8183	IS 8183	IS 3144	IS 8183/ BHEL/CUSTOMER APPROVED DATA SHEET	IR	√	P	W	V	
		2. APPEARANCE	MA	VISUAL	IS 8183	IS 8183	IS 3144	SHALL BE FREE FROM VOIDS, CRACKS	IR					
		3. BULK DENSITY	MA	LAB. TEST	IS 8183	IS 8183	IS 3144	IS 8183/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	W	V	Routine tests
		4. SHOT CONTENT	MA	LAB. TEST	IS 8183	IS 8183	IS 3144		TC	√	P	W	V	
		5. SULPHUR CONTENT	MA	LAB. TEST	IS 8183	IS 8183	IS 3144		TC	√	P	W	V	
		6. ALKALINITY	MA	LAB. TEST	IS 8183	IS 8183	IS 8183		TC	√	P	W	V	
		7. CHLORIDE CONTENT	MA	LAB. TEST	IS 8183	IS 8183	IS 3144		TC	√	P	W	V	
		8. MOISTURE CONTENT	MA	LAB. TEST	IS 8183	IS 8183	IS 3144		TC	√	P	W	V	
		9. THERMAL CONDUCTIVITY (K VALUE)	CR	LAB. TEST	IS 8183	IS 8183	IS 3346	IS 8183/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	W	V	Type test REFER NOTES 4 & 5
		10. HEAT RESISTANCE	MA	LAB. TEST	IS 8183	IS 8183	IS 3144	IS 8183/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	W	V	Type tests REFER NOTE 6
		11. MOISTURE ABSORPTION	MA	LAB. TEST	IS 8183	IS 8183	IS 3144		TC	√	P	W	V	
		12. RECOVERY AFTER COMPRESSION	MA	LAB. TEST	IS 8183	IS 8183	IS 8183		TC	√	P	W	V	
		13. INCOMBUSTIBILITY	MA	LAB. TEST	IS 8183	IS 8183	IS 3144		TC	√	P	W	V	
		14. RESISTANCE TO VIBRATION	MA	LAB. TEST	IS 8183	IS 8183	IS 3144		TC	√	P	W	V	
		15. RESISTANCE TO JOLTING	MA	LAB. TEST	IS 8183	IS 8183	IS 3144		TC	√	P	W	V	
		16. FIBRE DIAMETER	MA	LAB. TEST	One for each density	One for each density	IS 3144	TC	√	P	W	V		
3.2	PACKING & MARKING	PACKING TYPE AND IDENTIFICATION MARKING	MA	VISUAL	RANDOM	RANDOM	BHEL/CUSTOMER APPROVED DATA SHEET/PACKING PROCEDURE	BHEL/CUSTOMER APPROVED DATA SHEET/ PACKING PROCEDURE	SOFT COPY OF PHOTO GRAPH	√	P	W	-	REFER NOTE 2

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	 28.09.22	Lakhan Pal	Checked by:	 Ashish Panigrahi	Ashish Panigrahi
Reviewed by:	 SANJAY KUMAR	Sanjay Kumar	Reviewed by:	 HARISH KUMAR	Harish Kumar

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS BHEL/Customer Approved Suppliers		QUALITY PLAN					SPEC. NO : PE-TS-435-169-M032 DATE: 26.09.2022		
			CUSTOMER : M/s TANGEDO					QP NO.: PE-QP-435-169-M031 DATE: 26.09.2022		
			PROJECT: 2X660MW UDANGUDI STPP					PO NO.: DATE:		
			ITEM: THERMAL INSULATION – RESIN BONDED MINERAL (ROCK) WOOL MATTRESSES					SECTION: II SHEET 3 OF 3		
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	*	**
					M C/N			D	M C N	10

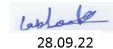



NOTES:

- In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
- Following to be noted for packing:
 - Material shall be packed suitably in order to avoid damage during transit and also during storage at site in tropical climate conditions for a period of 15-18 months.
 - Photographs of the packing (with LR No.) as per approved packing procedure (if applicable) just before dispatch.
- BHEL reserves the right for conducting repeat test, if required.
- If 'K' Value test has been conducted against any BHEL order, on samples collected within twelve (12) months prior to the date of present inspection, the related test results may be provided. Otherwise, the tests will be carried out on samples identified and sealed by Customer/BHEL authorized representative and related test results to be provided. The tests will be carried out at govt. approved labs or test houses (at CBRI - Roorkee, IIT - Chennai or PIBCO R & D Centre, N. Delhi, NIRMA University, Ahmedabad) recognized by reputed customers. 'K' Value test will be carried out for at least three mean temperatures i.e. 100 °C, 200 °C & 300 °C for each density.
- Thermal conductivity type test reports shall be submitted to BHEL Engineering for review and approval.
- Type tests (except thermal conductivity) shall be done once in 3 months in the presence of BHEL/BHEL AIA.
- The latest revisions/year of issue of all the IS indicated in the QP shall be referred.


LEGENDS:

*D: Records, identified with "Tick"(√) shall be essentially included by supplier in QA Documentation.
 ** M: Supplier/ Manufacturer/ Sub-Supplier C: Main Supplier/BHEL/ Third Party Inspection agency N: Customer
 P: Perform W: Witness V: Verification
 MA: Major Characteristic MI: Minor Characteristic CR: Critical Characteristic
 IR: Inspection Report TC: Test Certificate

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	 28.09.22	Lakhan Pal	Checked by:	Ashish Panigrahi 	Ashish Panigrahi
Reviewed by:	SANJAY KUMAR 	Sanjay Kumar	Reviewed by:	HARISH KUMAR 	Harish Kumar

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			


	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS BHEL/Customer Approved Suppliers		QUALITY PLAN					SPEC. NO : PE-TS-020-169-M033		DATE: 26.09.2022			
			CUSTOMER : M/s TANGEDCO					QP NO.: PE-QP-435-169-M033		DATE: 26.09.2022			
			PROJECT: 2X660MW UDANGUDI STPP					PO NO.:		DATE:			
			ITEM: THERMAL INSULATION – BONDED MINERAL (ROCK) WOOL PIPE SECTIONS					SECTION:		SHEET 1 OF 2			
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY	REMARKS	
1	2	3	4	5	6		7	8	9	*	**		10
					M	C/N			D	M	C	N	

1.0 MATERIAL													
1.1	CHEMICAL COMPOSITION (RAW MATERIAL)	CHEMICAL PROPERTIES	MA	CHEMICAL	ONE SAMPLE PER LOT	ONE SAMPLE PER LOT	MANUFACTURER STANDARD	MANUFACTURER STANDARD	TC	√	P	V	V


2.0 IN-PROCESS INSPECTION													
2.1	FINISHED MATTRESS	DIMENSION & TOLERANCE	MA	MEASUREME NT	IS 9842	IS 9842	IS 3144	IS 9842/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	V	V

3.0 FINAL INSPECTION															
3.1	BONDED MINERAL (ROCK) WOOL PIPE SECTIONS	1. DIMENSIONS	MA	PHYSICAL	IS 9842	IS 9842	IS 5688 & SPEC.	IS 9842/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	W	V		
		2. APPEARENCE	MA	VISUAL	IS 9842	IS 9842	IS 3144 & SPEC	SHALL BE FREE FROM VOIDS, CRACKS	IR						
		3. BULK DENSITY	MA	LAB. TEST	IS 9842	IS 9842	IS 5688 & SPEC.	IS 9842/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	W	V	Routine tests	
		4.SHOT CONTENT	MA	LAB. TEST	IS 9842	IS 9842	IS 3144 & SPEC		TC	√	P	W	V		
		5. SULPHUR CONTENT	MA	CHEMICAL	IS 9842	IS 9842	IS 3144 & SPEC		TC	√	P	W	V		
		6. ALKALINITY	MA	CHEMICAL	IS 9842	IS 9842	IS 9842 & SPEC		TC	√	P	W	V		
		7. CHLORIDE CONTENT	MA	CHEMICAL	IS 9842	IS 9842	IS 3144 & SPEC		TC	√	P	W	V		
		8. MOISTURE CONTENT	MA	PHYSICAL	IS 9842	IS 9842	IS 3144 & SPEC		TC	√	P	W	V		
		9.THERMAL CONDUCTIVITY	MA	LAB. TEST	IS 9842	IS 9842	IS 3346 & SPEC		TC	√	P	W	V		Type test REFER NOTES 4 & 5
		10. HEAT RESISTANCE	MA	PHYSICAL	IS 9842	IS 9842	IS 3144 & SPEC		TC	√	P	W	V		Type tests REFER NOTE 6
		11.MOISTURE ABSORPTION	MA	PHYSICAL	IS 9842	IS 9842	IS 3144 & SPEC		TC	√	P	W	V		
		12. RECOVERY AFTER COMPRESSION	MA	PHYSICAL	IS 9842	IS 9842	IS 9842 & SPEC		TC	√	P	W	V		
		13. INCOMBUSTIBILITY	MA	PHYSICAL	IS 9842	IS 9842	IS 3144 & SPEC	TC	√	P	W	V			

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	 28.09.22	Lakhan Pal	Checked by:	Ashish Panigrahi	Ashish Panigrahi
Reviewed by:	SANJAY KUMAR	Sanjay Kumar	Reviewed by:	HARISH KUMAR	Harish Kumar

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS BHEL/Customer Approved Suppliers		QUALITY PLAN					SPEC. NO : PE-TS-020-169-M033	DATE: 26.09.2022					
			CUSTOMER : M/s TANGEDCO					QP NO.: PE-QP-435-169-M033	DATE: 26.09.2022					
			PROJECT: 2X660MW UDANGUDI STPP					PO NO.:	DATE:					
			ITEM: THERMAL INSULATION – BONDED MINERAL (ROCK) WOOL PIPE SECTIONS					SECTION:	SHEET 2 OF 2					
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS		
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	
		14. FIBRE DIAMETER	MA	PHYSICAL	IS 3144	IS 3144	IS 3144 & SPEC		TC	√	P	W	V	
3.2	PACKING & MARKING	PACKING TYPE AND IDENTIFICATION MARKING	MA	VISUAL	RANDOM	RANDOM	BHEL/CUSTOMER APPROVED DATA SHEET/PACKING PROCEDURE	BHEL/CUSTOMER APPROVED DATA SHEET/PACKING PROCEDURE	SOFT COPY OF PHOTO GRAPH	√	P	W	-	REFER NOTE 2


NOTES:

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- *D: Records, identified with "Tick"(√) shall be essentially included by supplier in QA Documentation.
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BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	 28.09.22	Lakhan Pal	Checked by:	Ashish Panigrahi	Ashish Panigrahi
Reviewed by:	SANJAY KUMAR	Sanjay Kumar	Reviewed by:	HARISH KUMAR	Harish Kumar

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	COMPLIANCE SHEET BONDED MINERAL (ROCK) WOOL MATTRESSES & PIPE SECTION 2X660MW UDANGUDI STPP	SPECIFICATION NO. PE-TS-435-169-M032
		SECTION: II
		REV. NO.:00
		DATE: 10.10.2022
		SHEET 1 OF 1

I hereby comply/not comply (*) to all the requirements of this technical specification in totality.

* In case the bidder does not comply to the technical specification, the deviations shall be explicitly listed in the technical deviation sheet of GCC. Deviations listed in technical deviation sheet shall only be considered.

Name of Bidder / Authorized Representative :- -----

Designation :- -----

Signature :- -----

Company Seal :- -----

Date :- -----

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	
				COMPANY SEAL



Bharat Heavy Electricals Limited

(A Govt. Of India Undertaking)

PROJECT ENGINEERING MANAGEMENT

THERMAL INSUALTION-LRB (ROCKWOOL) MATTRESS/PIPESECTION for 2X660MW UDANGUDI STPP

Price Variation Clause:

Ex-works prices shall be variable as per PVC formula given below:

$$\text{Current Price} = \text{Order Price} * (0.15 + 0.4 * M1/M0 + 0.15 * F1/F0 + 0.05 * S1/S0 + 0.25 * L1/L0)$$

Where

M0 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.3.13.2 (REFRACTORY PRODUCTS) FOR MONTH OF ORDERING.

M1 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.3.13.2 (REFRACTORY PRODUCTS) FOR 1 MONTH PRIOR TO DESPATCH.

F0 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.2 (FUEL & POWER) FOR MONTH OF ORDERING.

F1 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.2 (FUEL & POWER) FOR 1 MONTH PRIOR TO DESPATCH

S0 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.3.14.4 – (MILD STEEL-LONG PRODUCTS) FOR MONTH OF ORDERING.

S1 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.3.14.4 – (MILD STEEL-LONG PRODUCTS) FOR 1 MONTH PRIOR TO DESPATCH

L0 = INDICES AS PER RBI BULLETIN TABLE 19 (CONSUMER PRICE INDEX FOR INDUSTRIAL WORKERS) FOR MONTH OF ORDERING.

L1 = INDICES AS PER RBI BULLETIN TABLE 19 (CONSUMER PRICE INDEX FOR INDUSTRIAL WORKERS) FOR 1 MONTH PRIOR TO DESPATCH

Total PVC shall be limited to ± 10% of Ex-Works Value.

Note: RBI Indices considered for refractory, Fuel & Power, Mild steel are as per base year 2011-12 and for Industrial worker as per base year 2016 of RBI Bulletin. The above PV Clause is subject to change based on latest RBI Bulletin.



PRE - QUALIFYING REQUIREMENTS

DOCUMENT NO: PE-TS-435-000-M053

REVISION NO: 00, DATE: 10.10.2022

SHEET: 1 of 3

Standard document No.: PE-TS-999-000-M053

Enquiry No. (To be filled by PG):

Project: 2X660 MW UDANGUDI STPP

Package: Thermal Insulation - Bonded Mineral (Rock) Wool Mattresses & Pipe Sections

CRITERIA FOR EVALUATION (TECHNICAL / FINANCIAL):

1. Technical Pre-Qualifying Requirements:

1.1 The bidder (including cases as defined in clause no. 2.1 below) should have designed, in-house manufactured, tested, inspected and supplied thermal insulation - Bonded mineral (rock) wool mattresses/Pipe Section for use in a power plant or for similar application.

Supply of material through requisite tie-up with specified manufacturing unit(s) shall also be acceptable. In such cases, tied up manufacturing unit(s) shall be binding for the contract and bidder shall meet PQR pertaining to all manufacturing units individually. Manufacturing units quoting through such tie-up shall not be eligible to quote separately or through any other tie-up.

Bidder to provide authorization letter from manufacturing units along with scope matrix in support of such Tie-up.

Manufacturing units, which have tie-up with parties quoting to BHEL, shall not be qualified for separately quoting to BHEL.

1.2 The item(s) mentioned in point 1.1 should have performed successfully in similar installations for atleast one year. To establish meeting this requirement, the bidder shall conform to any one of the following clauses:

- (i) Execution of two purchase orders for different End-users with the item(s) performing successfully for one (1) year from date of commissioning to the date of bid submission as defined by BHEL-PEM in NIT. Different projects of a customer shall be considered as different End-users.
- (ii) Minimum one (1) repeat contract from two (2) different Purchasers (i.e. 2 Nos of Purchase orders from each purchaser). A contract shall be considered as repeat, when the second contract is given by the same purchaser after lapse of minimum one (1) year from supply completion of first contract.
- (iii) Execution of one (1) purchase order as per sl. no. (i) above from one End-user and one (1) repeat contract from another Purchaser as per sl. No. (ii) above.
- (iv) Three (3) contracts from one (1) Purchaser. Second and third contract shall be after lapse of minimum one (1) & two (2) years respectively from supply completion of first contract.

PREPARED BY:

Lakhan Pal

Digitally signed by Lakhan Pal
DN: cn=Lakhan Pal, o, ou,
email=lakhan.pal@bhel.in, c=IN
Date: 2022.10.12 14:02:02
+05'30'

NAME: LAKHAN PAL
DESIGNATION: Dy. MGR.
DEPT.: PS-PEM/ MPL

REVIEWED BY:

SANJAY
KUMAR

Digitally signed by SANJAY
KUMAR
DN: cn=SANJAY KUMAR,
o=BHEL, ou=PEM,
email=sanjaykumar@bhel.in,
c=IN
Date: 2022.10.12 14:04:40
+05'30'

NAME: SANJAY KUMAR
DESIGNATION: SDGM
DEPT.: PS-PEM/ MPL

APPROVED BY:

Bimal Kumar
Agarwal

Digitally signed by Bimal Kumar
Agarwal
Date: 2022.10.12 14:35:56 +05'30'

NAME: B.K. AGARWAL
DESIGNATION: DH
DEPT.: PS-PEM/ MPL



PRE - QUALIFYING REQUIREMENTS

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1.3 The bidder to furnish the following documents, as applicable, in support of the above:

- a) For point 1.2(i): Performance certificates from End-user (duly signed & dated) specifying that the product is performing successfully for one (1) year from date of commissioning along with correlated purchase order(s).
- b) For point 1.2 (ii) & (iv): Purchase order(s), Material dispatch clearance certificate (MDCC)/ Material receipt certificate (MRC)/Lorry receipt (LR)/ Supply invoice.

1.4 In addition to above, bidder or its tied up manufacturing units should have the following facilities:

- a) In-house capability of manufacturing thermal insulation - Bonded mineral (rock) wool mattresses/Pipe Section of minimum 250 MT per month.
- b) In-house testing facilities for carrying out tests as per relevant standards & Quality plan. In case, the in-house testing facilities are not available, then bidder shall furnish undertaking that test(s) will be carried out from govt. approved lab or test house recognized by reputed customers.

Bidder to submit supporting documents (Certificate indicating capacity and details/ undertaking of manufacturing & testing facilities) for point (a) & (b) above.

1.5 To establish business continuity, bidder to submit minimum two (2) Purchase order for item(s) as specified in points 1.1 in last 3 (three) years prior to the date of bid submission defined by BHEL-PEM.

2.0 Bidder to also comply with general points mentioned below.

2.1 Offers of the JV companies/ Joint Bidders/ bidders having collaboration/ licensing agreement/ MOU/ Indian subsidiaries shall be evaluated as follows:

- a) If bidder happens to be an Indian subsidiaries of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR.
- b) If bidder happens to be the Joint Venture Company, then the credentials of any of JV partners can be also considered for meeting PQR.
- c) If bidder happens to be the having valid collaboration agreement/ MOU/ licensing agreement with some other company, then the credentials of collaborator/ MOU partner/ licensing company can also be considered for meeting PQR.

Note: If bidder(s) qualifies on the basis of credentials of his principal/ JV partner/ Collaborator/ joint bidder etc., then the principal/ JV partner/ Collaborator/ MOU partner/ joint bidder shall

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PRE - QUALIFYING REQUIREMENTS

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be responsible for overall design vetting and warranty/ guarantee of the package. The scope matrix clearly defining their respective roles including design vetting, manufacturing of critical component, E&C etc. and warranty/ guarantee shall be submitted along with the offer.

2.2 Bidder to note that the arrangement of bidding (joint bid partners/ collaborator/ MOU partner/licensing company etc.) once offered to BHEL as a part of bidding documents cannot be changed till the execution of contract(s).

2.3 Consideration of offer shall be subject to customer's approval of bidders, if applicable.

2.4 Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.

2.5 Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.

2.6 After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

2.7 Bidder to ensure that Third Party/customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/ certificate issuing authority such as name & designation of issuing authority and its organization contact number and email-id etc. In case the same found not available, purchaser has right to reject such document from evaluation.

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INTEGRITY PACT**Between**

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____

_____ (hereinafter referred to as "Contract"). The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint panel of Independent External Monitor(s) (IEMs), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles: -
 - 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. The Bidder(s)/ Contractor(s) commits himself to observe the following principles during participation in the tender process and during the contract execution.



- 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and shall await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process, terminate the contract, if already awarded, exclude from future business dealings and/ or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder (s) from the tender process before award / order acceptance according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal is entitled to terminate the Contract according to Section 3, or terminates the Contract in application of Section 3 above, the Bidder(s)/ Contractor (s) transgression through a violation of Section 2 above shall be construed breach of contract and the Principal shall be entitled to demand and recover from the Contractor an amount equal to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher, as damages, in addition to and without prejudice to its right to demand and recover compensation for any other loss or damages specified elsewhere in the contract.



Section 5 - Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 (three) years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason or action can be taken as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 6 - Equal treatment of all Bidder (s)/ Contractor (s) / Sub-contractor (s)

- 6.1 The Principal will enter into Integrity Pacts with identical conditions as this Integrity Pact with all Bidders and Contractors.
- 6.2 In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor(s) and ensure that all Sub-contractors also sign the Integrity Pact.
- 6.3 The Principal will disqualify from the tender process all Bidders who do not sign this Integrity Pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 -Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible panel of Independent External Monitor (s) (IEMs) for this Integrity Pact. The task of the IEMs is to review independently and objectively, whether and to what extent the parties comply with the obligations under this Integrity Pact.
- 8.2 The IEMs are not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The IEMs shall be provided access to all documents/ records pertaining to the Contract, for which a complaint or issue is raised before them as and when warranted. However, the documents/records/information having National Security implications and those documents which have been classified as Secret/Top Secret are not to be disclosed.
- 8.4 The Principal will provide to the IEMs sufficient information about all meetings among the parties related to the Contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the IEMs the option to participate in such meetings.



- 8.5 The advisory role of IEMs is envisaged as that of a friend, philosopher and guide. The advice of IEMs would not be legally binding and it is restricted to resolving issues raised by a Bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some Bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.
- 8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process or during execution of Contract, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.
- 8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to the CMD, BHEL at the earliest. They may also send their report directly to the CVO, in case of suspicion of serious irregularities requiring legal/ administrative action. Only in case of very serious issue having a specific, verifiable Vigilance angle, the matter should be reported directly to the Commission. IEMs will tender their advice on the complaints within 30 days.
- 8.8 The CMD, BHEL shall decide the compensation to be paid to the IEMs and its terms and conditions.
- 8.9 IEMs should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the Principal should be looked into by the CVO of the Principal.
- 8.10 If the IEMs have reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code / Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the IEMs may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.11 After award of work, the IEMs shall look into any issue relating to execution of Contract, if specifically raised before them. As an illustrative example, if a Contractor who has been awarded the Contract, during the execution of Contract, raises issue of delayed payment etc. before the IEMs, the same shall be examined by the panel of IEMs. Issues like warranty/ guarantee etc. shall be outside the purview of IEMs.
- 8.12 However, the IEMs may suggest systemic improvements to the management of the Principal, if considered necessary, to bring about transparency, equity and fairness in the system of procurement.
- 8.13 The word 'Monitor' would include both singular and plural.

Section 9 - Pact Duration

- 9.1 This Integrity Pact shall be operative from the date this Integrity Pact is signed by both the parties till the final completion of contract for successful Bidder, and for all other Bidders 6 months after the Contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.
- 9.2 If any claim is made/ lodged during currency of this Integrity Pact, the same shall be binding and continue to be valid despite the lapse of this Pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Noted

Section 10 - Other Provisions

- 10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.
- 10.2 Changes and supplements as well as termination notices need to be made in writing.
- 10.3 If the Bidder(s)/ Contractor(s) is a partnership or a consortium or a joint venture, this Integrity Pact shall be signed by all partners of the partnership or joint venture or all consortium members.
- 10.4 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 10.5 Only those bidders / contractors who have entered into this Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact would be a preliminary qualification.
- 10.6 In the event of any dispute between the Principal and Bidder(s)/ Contractor(s) relating to the Contract, in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms & conditions of the Contract. The fees/expenses on dispute resolution through mediation shall be shared by both the parties. Further, the mediation proceedings shall be confidential in nature and the parties shall keep confidential all matters relating to the mediation proceedings including any settlement agreement arrived at between the parties as outcome of mediation. Any views expressed, suggestions, admissions or proposals etc. made by either party in the course of mediation shall not be relied upon or introduced as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the dispute that is the subject of mediation proceedings. Neither of the parties shall present IEMs as witness in any Alternative Dispute Resolution or judicial proceedings in respect of the dispute that was subject of mediation.

Netral

For & On behalf of the Principal
(Office Seal)

नेत्रपाल सिंह / Netrapal Singh
Place: भारत में अभियंता (पी.जी.-1) / Sr. Engineer (PG-1)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd.
Date: पावर सेक्टर-परियोजना अभियंता प्रबंधन
Power Sector-Project Engineering Management
पीपीईईआई भवन, एच.आर.डी.आई. एण्ड ईएसआई कॉम्प्लेक्स
PPEI Bldg, H.R.D.I. & ESI Complex,
प्लॉट नं. 25, सेक्टर 16 ए, नोएडा -201301
Plot No. 25, Sec. 16 A, Noida - 201301

Witness: _____
(Name & Address) _____

For & On behalf of the Bidder/ Contractor
(Office Seal)

Witness: _____
(Name & Address) _____