2 X 660 MW TALCHER STPP

TECHNICAL SPECIFICATION
FOR
LV BUSDUCT

SPECIFICATION No. **PE-TS-497-506-E003**
ISSUE NO. 01
REV NO. 00

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

INDEX

BHEL	TECHNICAL SPECIFICATION LV BUSDUCT 2 X 660MW TALCHER STPP	PE-TS-497-506-E003 Issue No: 01 Rev. No. 00 Date : 16.12.24

PROJECT INFORMATION

SL.NO	DESCRIPTION	DETAILS
1	**METEOROLOGICAL DATA**	
1.1	MAXIMUM TEMPERATURE	47.2°C
1.2	MINIMUM TEMPERATURE	3.5°C
1.3	MAXIMUM RELATIVE HUMIDITY	87
1.4	MINIMUM RELATIVE HUMIDITY	35
1.5	AVERAGE ANNUAL RAINFALL	131.2mm
1.6	SEISMIC ZONE (AS PER IS 1893)	ZONE III
1.7	HEIGHT ABOVE MSL	71.5m
1.8	WIND SPEED	50m/ Sec (As per IS 875)
1.9	SOIL BEARING CAPACITY	7 T/ m^2
2	**ELECTRICAL DATA**	
2.1	AMBIENT TEMPERATURE FOR DESIGN OF ELECTRICAL EQUIPMENT	50°C
2.2	RATED FREQUENCY	50 Hz
2.3	FREQUENCY VARIATION	+3/-5%
2.4	AC VOLTAGE	415V, 230V, 230V (UPS), 110V
2.5	AC VOLTAGE VARIATION	+/- 10% for 415V
2.6	DC VOLTAGE	220V, 48V, 24V
2.7	DC VOLTAGE VARIATION	+10% to -15% for 220V
2.8	FAULT LEVEL (KA/SEC)	i) 50KA for 1 sec for 415V system ii) 20KA for 1 sec for 220V DC iii) 20KA for 1 sec for 48V DC

SCOPE

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT
1	Supply Including Design, Manufacturing, Assembly, testing and inspection at Vendor's/ Sub-vendor's works of LV BUSDUCT	YES
a)	Main Supply	YES
b)	Commissioning Spares	NO
2	Painting	YES
3	Inspection & Testing	YES
4	Packing	YES
5	Transportation & Delivery To Site	YES
6	Erection & Commissioning	NO
7	Supervision of Erection & Commissioning	NO
8	Mandatory Spares	NO
9	O & M Service	NO

	GENERAL TECHNICAL REQUIREMENT
1.00	It is not the intent to specify herein all the details of design and manufacturing. Bidder shall ensure that the offered equipment confirms in all respects to high standards of design, engineering and workmanship.
2.00	Bidder shall also ensure that the offered equipment shall comply with all applicable statutory and regulatory requirements.
3.00	In the event of any conflict between the requirements of two clauses of this specification, documents or requirements of different codes and standards specified, the more stringent requirement as per the interpretation of the owner shall apply.
4.00	Drawing/document submission shall be through web based Document Management System(DMS) of BHEL. Bidder would be provided access to the DMS for drawing/document submission. Bidder to ensure internet connectivity of min speed of 2Mbps at their end.
5.00	Drawings/ documents submitted by vendor at any stage shall be complete in all respects. Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor. For any clarification/ discussion required to complete the drawings, the bidder shall depute his personnel to BHEL / Customer's Office as per the requirement for across the table submission/ finalizations of drawings.
6.00	Latest codes and standards shall be complied with as on date of techno-commercial bid opening.
7.00	Nameplates shall be manufactured from stainless steel or aluminium with a matte or satin finish, and engraved with black lettering of a minimum 6 mm height or as per equipment standard whichever is higher
8.00	Mandatory Spares : Wherever the quantities have been indicated for each type, size, thickness, material, radius, range etc., these shall cover all the items supplied and installed and the breakup for these shall be furnished in the bid. In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the mandatory spare list.
9.00	Equipment must be safe, reliable and easy to maintain at all operating condition
10.00	METAL ENCLOSED NON SEGREGATED PHASE BUSDUCT(AIR INSULATED)
10.01	Three phase and neutral metal enclosed non segregated phase busduct assemblies shall be supplied for incoming connections from the transformers to the switch boards and inter connecting sections between switch boards, wherever applicable.
10.02	The enclosure shall be made of minimum 3 mm thick Aluminium alloy. The section of the busduct shall be rectangular. The design of the busduct enclosures shall be of sturdy construction such that it will withstand the internal or external forces resulting from the various operating conditions.

10.03	The entire busduct shall be designed for dust, vermin and weather proof construction. A suitable Aluminium sheet flange-protection hood shall be provided to cover all outdoor busduct enclosure joints to facilitate additional protection against rain water ingress. All horizontal runs of busducts shall have a suitable sloped enclosure top to prevent retention of water for outdoor portion of busducts. Busduct enclosure shall have a degree of protection of IP-55.
10.04	The inside of the bus enclosure may be treated with black paint to enable efficient heat dissipation. The matt paint used shall be suitable for temperature experienced during continuous loading of the bus conductor. The busduct exterior paint shade shall be RAL 5012.
10.05	Flexible expansion joints for the enclosure shall be provided wherever deemed necessary by the Vendor. Necessary bonding shall be provided at the expansion joints if made of insulating materials.
10.06	Enclosures shall be provided with flanged ends with drilling dimensions to suit the flanges at the switchgear and transformer terminals. Any adapter boxes required for this purpose are in the Vendor's scope of supply. The flanges shall be provided with gaskets, nuts, bolts, etc. Details of the flanges provided on transformer ends will be furnished to the successful Vendor.
10.07	All nuts and bolts shall be zinc passivated and shall be Grade 8.8 as per DIN 933 standards.
10.08	Suitable Inspection covers shall be provided for periodic inspection of insulators. Handle shall be provided on each inspection cover to facilitate easy lifting.
10.09	Steel Reinforced EPDM /PU Foam gaskets shall be provided so as to satisfy the operating conditions imposed by temperature, weathering, durability etc. Flange gaskets shall be provided at the equipment terminal connections.
10.10	Necessary earthing arrangement as applicable shall be provided with clamps to receive station earthing bus. All accessories and hardware required for the earthing arrangement shall be provided by the Vendor. Earthing shall be envisaged through 65 X 8 Galvanised MS flat, continuously running along the full length of the busduct and shall be earthed at both ends. Busduct enclosures shall be bolted type.
10.11	The material of the conductor shall be Aluminium. The minimum clearance in air between phase to phase, phase to neutral and phase to earth for the entire run of busduct shall be 25 mm The bus bars shall be rated in accordance with the service conditions and the rated continuous and short time current ratings calculated for specific application / specified elsewhere.
10.12	All steel structures required for busduct support shall be hot dip galvanized. The support shall be suitably designed for static & dynamic forces of busduct at continuous & short circuit condition.
10.13	In case of bottom support structure foundation design shall be in vendor's scope. However, civil foundation material is excluded from Vendor's scope of supply.
10.14	Space heaters shall be provided in the busduct at every 5m for preventing harmful moisture condensation.
10.15	The space heaters shall be suitable for continuous operation on 240 V AC, 50 Hz single phase supply and shall be automatically controlled by thermostats. Necessary wiring upto junction boxes mounted on busduct and from junction boxes to switch boards shall be provided by the Vendor.

10.16	Typical drawing for tapped busduct connection for 3 X 50% transformer configuration for PMCCs is enclosed for reference in section-"compliance drawings-sl.no.II" of the specification. Vendor to suitably consider the same during busduct length calculation.
11.00	TEMPERATURE RISE
	The temperature rise of the horizontal and vertical busbars and main bus links including all power draw-out contacts when carrying 90% of the rated current along the full run shall in no case exceed 55°C with silver plated joints and 40°C with all other types of joints over an outside ambient temperature of 50°C. The temperature rise of the accessible parts/external enclosures expected to be touched in normal operation shall not exceed 20°C. The temperature rise of manual operating means shall not exceed 10°C for metallic & 15°C for insulating material. Temperature rise for the busbars shall be carried out at 90% of the rated current. The above temperature rise limits are applicable for busducts also without any current derating.
12.00	QUALITY ASSURANCE, TESTING & INSPECTION
12.01	All equipments supplied shall be of type tested quality.
12.02	All material, component & equipment covered under this specification shall be procured, manufactured, inspected & tested as per the BHEL/customer approved quality plan.
12.03	Successful Bidder shall submit Quality Plan (NTPC RQP: 0000-999-QVE-P-178) on compliance route for BHEL/ End customer's approval during contract stage. Sub-vendor list (if any) of Vendor shall also be submitted as Annexure to Quality plan for BHEL / customer approval.
12.04	Inspection / testing shall be witnessed as per the quality plan apart from review of various test certificates/ Inspection records etc. There shall be no techno-commercial implication to BHEL on account of Quality plan approval.
12.05	After award of contract, vendor shall furnish test certificates of all type tests (including those listed at sl. no.12.05) already carried out **(within last ten years from the date of techno-commercial bid opening i.e. 06.06.2022)**. These reports should be for the type test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.
12.06	Type test as applicable for each rating of busduct shall be as follows: a) Short circuit test b) Heat run/ Temperature rise test c) DOP on enclosure & M. Box
12.07	However if the Vendor is not able to submit report of the type test(s) conducted within last ten years from the date of techno-commercial bid opening i.e. 06.06.2022, or in the case of type test certificates are not found to be meeting the relevant standard requirements, vendor shall conduct all such tests according to relevant standards free of cost to purchaser and reports shall be submitted to purchaser for approval.
12.08	Inspection shall be carried out as per the BHEL /Customer approved Quality Plan. Stage inspection is applicable for checking of welding correctness.

12.09	All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.
12.10	Routine and type test certificates shall be furnished for all bought out items if applicable.
12.11	In case, the bidder is sourcing the item/any component from outside India, the third party inspection shall be arranged by bidder at their cost and shall be deemed to be considered by the bidder in their offer.
13.00	PACKING & DELIVERY
	Vendor shall arrange proper outdoor packing i.e the packing should witstand the project climatic conditions and transportation of all Equipment from the point of manufacture to the project site.Plywood packing of minimum thickness 6mm shall be provided. Further packing shall be in line with section-"compliance drawings-sl.no.III" of the specification
14.00	O & M MANUAL
	O&M manual for installation, operation and maintenance shall be furnished before dispatch of the equipment. Draft O & M Manual shall be submitted for purchaser's approval within two weeks of inspection. Manual shall contain minimum following details:
a)	Description of the equipment
b)	Salient construction features
c)	Packing details
d)	Instructions to be followed on receipt at site for storage
e)	Erection procedure & checks
f)	Tests to be conducted at site
g)	Commissioning procedure
h)	Maintenance instructions
i)	List of spares
j)	Approved GA drawing
k)	Approved Data Sheets
l)	Technical leaflets of all important components

TECHNICAL DATA - PART - A			
BUSDUCT (NON-SEGREGATED, AIR INSULATED TYPE)			
SL.NO	**DESCRIPTION**	**DETAIL**	
1.0	**GENERAL**		
1.1	Rating	1600/ 2500A/ 3000A/ 4000A	
1.2	Service	Outdoor/ Indoor	
1.3	Cooling System	Natural Air Cooled	
1.4	Type	Non Segregated Phase Bus-duct	
1.5	System Voltage		
(a)	Nominal Voltage	415V	
(b)	Max Voltage	1.1kV	
1.6	Reference Standard	IS/IEC 61439-1 & 6	
1.7	System	Triple Pole & Neutral	
1.8	Short Time current rating for 1sec Withstand	50kA (R.M.S)	
1.9	Dynamic Current rating	105kA (Peak)	
1.10	Temperature Rise over specified ambient temperature of 50°C for		
(a)	Busbar/ Conductor	55°C with silver plated joints	40°C with plain bolted joints
(b)	Enclosure	20°C	
(c)	Manual operating means	10°C for metallic	15°C for insulating material
1.11	Degree of Protection (Enclosure & M.Box)	IP-55	
1.12	One minute power frequency withstand	2.5kV	
2.0	**BUSBAR**		
2.1	Material	Al Alloy	
2.2	Make	As per approved sub-vendor list	
2.3	Grade	63401 WP as per IS: 5082	
2.4	Shape	Flat	
2.5	Type of joints	Rigid joint/ Expansion joint	
2.6	Busbar Joint hardware material	H.T.S Electroplated	
3.0	**ENCLOSURE**		
3.1	Material	Al Alloy	
3.2	Make	As per approved sub-vendor list	
3.3	Grade	19000 H2 as per IS: 737	
3.4	Shape		
(a)	Outdoor	Rectangular with sloping top & Al sheet flange protection hood	

(b)	Indoor	Rectangular
3.5	Thickness of Enclosure	3 mm
3.6	Type of Flange Joint	With Steel Reinforced EPDM /PU Foam gaskets
3.7	Flange joint Hardware material	MS Electro-galvanised
4.0	**ACCESS DOOR/ INSPECTION COVER**	
4.1	Material	Al Alloy
4.2	Grade	19000 H2 as per IS: 737
4.3	Size	As per requirement
4.4	Thickness	3 mm
4.5	Location/ position of access door	
(a)	Outdoor	Bottom
(b)	Indoor	Top/ bottom
4.6	Type of Flange Joint	With Steel Reinforced EPDM /PU Foam gaskets
4.7	Flange joint Hardware material	MS Electro-galvanised
5.0	**BUSBAR SUPPORT**	
5.1	Material	SMC (Polyster Glass field)
5.2	Make	As per approved sub-vendor list
5.3	Creepage Distance	25mm (min)
5.4	Type	Finger support
5.5	Thickness	10 mm (min)
5.6	Reference Standard	IS 13410
6.0	**MINIMUM AIR CLEARANCE**	
(a)	Phase to Phase	25mm (min)
(b)	Phase to Earth	25mm (min)
7.0	**GROUNDING CONDUCTOR (EARTHING JUMPER)**	
7.1	Material	65 X 8 Galvanised MS flat, continuously running along the full length
8.0	**SPACE HEATER**	
8.1	Type	Indoor
8.2	Voltage	240 V
8.3	Phase	Single
8.4	Thermostat	30-110°C
9.0	**PAINTING**	
9.1	Busbar/ Enclosure Interior	Matt black
9.2	Enclosure Exterior	PU spray paint of shade RAL 5012
NOTES:		
1.	All nuts and bolts shall be zinc passivated and shall be Grade 8.8 as per DIN 933 standards.	

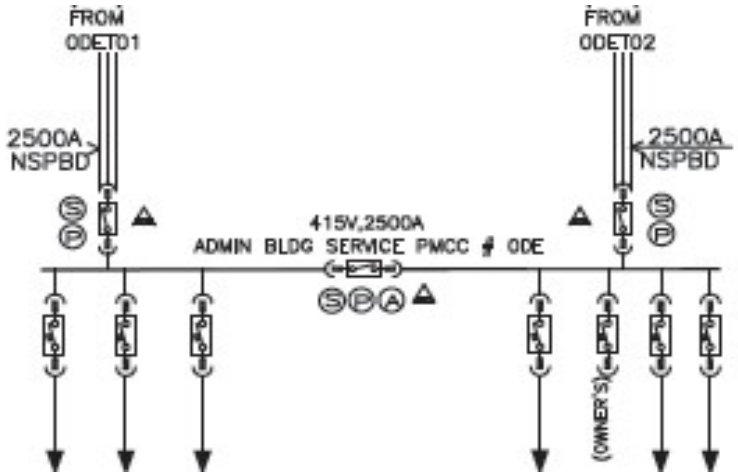
CLAUSE NO.	DATA REQUIREMENTS
19.00.00	**415 V NON SEGREGATED BUSDUCTS**
	a) Manufacturer's name & address .....
	b) Type of busduct .....
	c) Material and cross section of busbars .....
	d) Rated voltage (volts) .....
	e) Maximum voltage at which busduct can operate continuously (volts) .....
	f) Continuous current rating of busbars (Amps) .....
	g) Short circuit current ratings & duration (kA /Sec) .....
	h) Momentary current rating kA peak .....
	i) Temperature rise over the ambient temperature
	i) Busbars .....
	ii) Enclosures .....
	j) Material of support insulator .....
	k) No. and arrangement of support insulators .....
	l) Material of Gaskets .....
	m) One minute power frequency withstand voltage (kV) .....
	n) Minimum creepage distance over insulator (mm) .....
	o) Conductor treatment .....
	p) Clearance (mm) .....
	i) Phase to Phase .....
	ii) Phase to earth .....
	q) Average weight per meter of busduct (kg) .....
	r) Material and thickness of Busduct .....
	s) Shape & size of enclosure .....

COMPLIANCE DRAWING

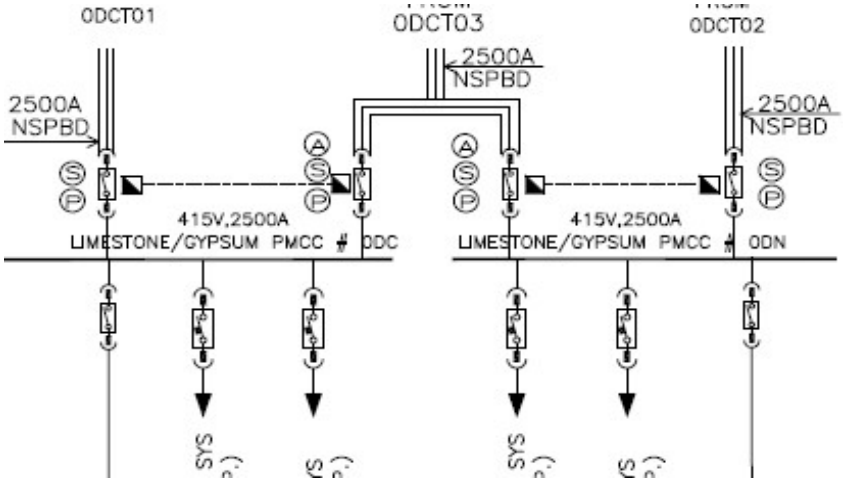
SL.NO.	DESCRIPTION	REMARKS
I	TYPICAL TRANSFORMER CONFIGURATIONS FOLLOWED IN THE PROJECT	
II	3 X 50% TAPPED BUSDUCT CONFIG (TYPICAL)	
III	PACKING SPECIFICATION/ DRAWING	

(I) TYPICAL TRANSFORMER CONFIGURATIONS FOLLOWED IN THE PROJECT

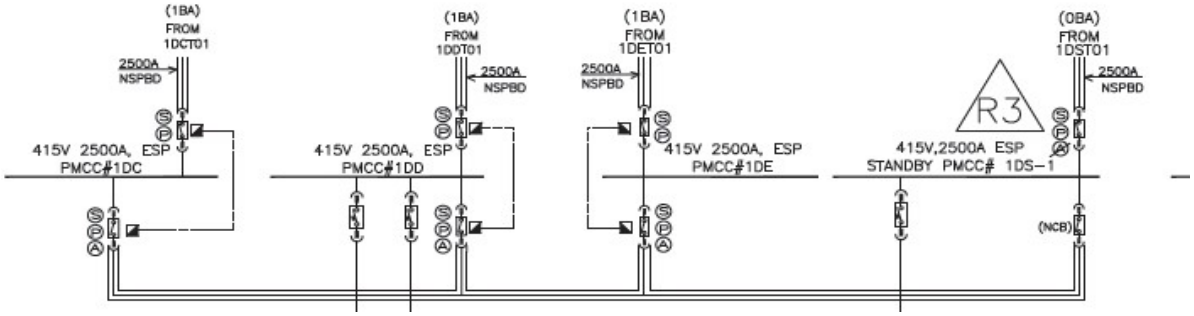
(A) 2 X 100% CONFIG- NSPBD



(B) 3 X 50% CONFIG- NSPBD



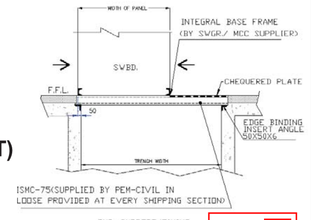
(C) ESP CONFIGURATION



2X6X200 DIA HDPE PIPE TO PT PLANT
700W X 1300H WALL CUT-OUT
1000L X 1800W X 1700D CABLE PULL PIT
4 X 600W CABLE TRAYS
400
FPD
2100WX1350D CABLE TRENCH
LDB
PTP MCC #0WC SECTION-2
PTP MCC #0WC SECTION-1
PERMANENT SLAB
3500
3600
1000
20700
2100WX1350D CABLE TRENCH
SWGR ROOM
CLEAR HEIGHT OF SWGR ROOM 4.5M
CH
DMP/SW/CLW PMCC 0DL
DMP/SW/CLW PMCC 0DJ
DCDB
2649
1977
19850
19800
3324
1051
3750
1300W X 550H WALL CUT-OUT
B.O.O EL.3.25M
945
HOLD
FB WALL HEIGHT 4.5M
0DJT01
DMP SERVICE TR
0DJT03
DMP SERVICE TR
0DJT02
DMP SERVICE TR
REMOVABLE FENCING
MANUAL GATE
3X200 DIA HDPE PIPE
2X3X200 DIA HDPE PIPE
2X4X200 DIA HDPE PIPE
1000L X 1500W X 500D CABLE PULL PIT
1000L X 1500W X 700D CABLE PULL PIT
1000L X 1700W X 700D CABLE PULL PIT
4500
7500
3701.650N
798.500E
2X3X600W CABLE TRAY ON PEDESTAL
300WX300LX200D PEDESTAL
TRESTLE
ROLLING SHUTTER 2M (WIDE) X 3M (HEIGHT)
1600W X 1100H WALL CUT-OUT
1825
1400
1750
1625
1425
1700
8000
2000
3200
2500

BILL OF QUANTITY

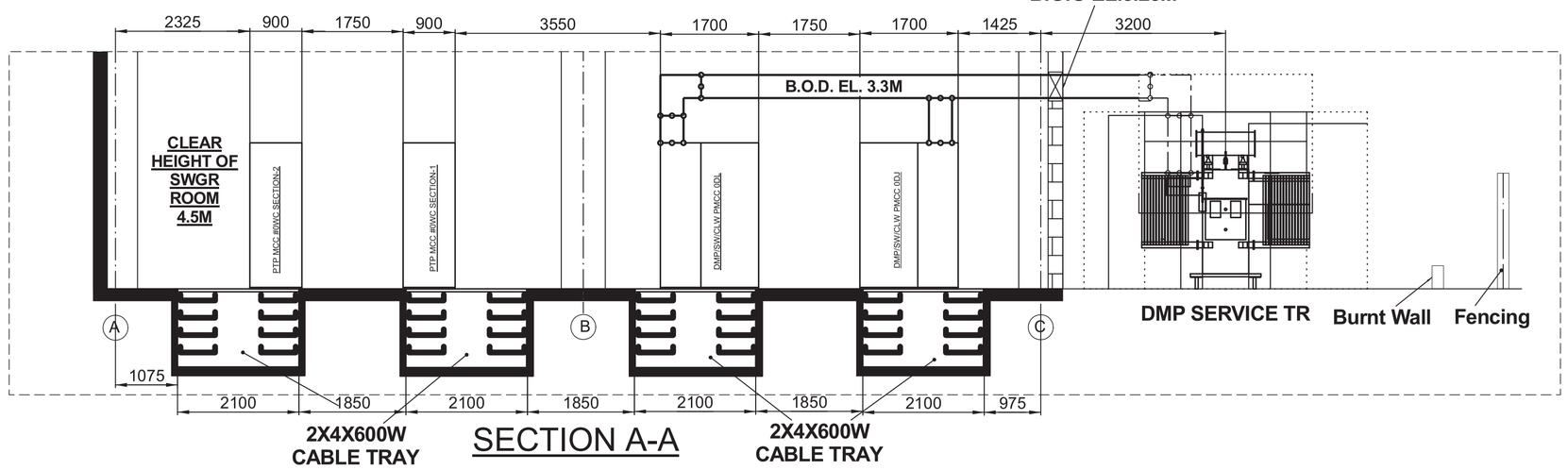
Sl No	Item code	Item Description	UOM	BOQ as per Drawing
1	507-21001-A	CABLE TRAY-LADDER TYPE 150W	MTR	5
2	507-21002-A	CABLE TRAY-LADDER TYPE 300W	MTR	75
3	507-21007-A	CABLE TRAY PERFORATED TYPE 300W	MTR	115
4	507-21021-A	LAD HOR 90DEG BEND 600 RAD 300W	NOS	1
5	507-21042-A	PER HOR 90DEG BEND 600 RAD. 300W	NOS	2
6	507-21004-A	CABLE TRAY-LADDER TYPE 600W	MTR	745
7	507-21010-A	CABLE TRAY PERFORATED TYPE 600W	MTR	255
8	507-21032-A	LAD VER 90DEG BEND 600 RAD-INSIDE 300W	NOS	2
9	507-21034-A	LAD VER 90DEG BEND 600 RAD-INSIDE 600W	NOS	9
10	507-21054-A	PER VER 90DEG BEND 600 RAD-INSIDE 600W	NOS	3
11	507-21035-A	LAD VER 90DEG BEND 600 RAD-OUTSIDE 300W	NOS	2
12	507-21037-A	LAD VER 90DEG BEND 600 RAD-OUTSIDE 600W	NOS	9
13	507-21057-A	PER VER 90DEG BEND 600 RAD-OUTSIDE 600W	NOS	3
14	507-21922-A	CROSS 600MM WIDE	NOS	6
15	507-21029-A	LAD TEES 600MM RADIUS 300W	NOS	15
16	507-21049-A	PER TEES 600 RADIUS 300W	NOS	6
17	507-21031-A	LAD TEES 600MM RADIUS 600W	NOS	48
18	507-21051-A	PER TEES 600 RADIUS 600W	NOS	16
19	507-21026-A	LAD REDUCER (150V, LHSRH)1600-300W	NOS	6
20	507-34216-A	SINGLE CHANNEL SC1	MTR	280
21	507-34021-A	TRAY FIXING CLAMP TC1	NOS	300
22	507-34010-A	CLAMP FOR SINGLE CHANNEL CC1 Cantilever arm-320mm(cable trays 300mm)	NOS	618
23	507-34023-A	Cantilever arm-750mm(cable trays 600mm)	NOS	138
24	507-34027-A		NOS	608



ISMC-75(SUPPLIED BY PEM-CIVIL IN LOOSE PROVIDED AT EVERY SHIPPING SECTION)
TYP. SUPPORT/FIXING ARRANGEMENT FOR PANELS OVER CABLE TRENCH

III. 3 X 50% TAPPED BUSDUCT CONFIG (TYPICAL)

7490
3715
220V BATTERY
SPACE FOR TOILET
2X150W CABLE TRAY RISER
1 X 3 300W CABLE TRAYS (TYP.)
600WX500H WALL CUT-OUT 300MM ABOVE FFL
1100WX1050D CABLE TRENCH
1321
800
1200
1225
1125
DCS
24V DC BATTERY
UPS BATTERY
5470
984
4000
700WX500H WALL CUT-OUT 300MM ABOVE FFL
1917
830
2X300W CABLE TRAY RISER
1100WX1050D CABLE TRENCH
24V DC CHARGER
ACDB
PANEL ROOM A/C
GLASS PARTITION
HMI ROOM A/C
1150
1215
1530
FPD
STAIR CASE
2X6X200 DIA HDPE PIPE TO DM PLANT
1000L X 1800W X 700D CABLE PULL PIT
700W X 1300H WALL CUT-OUT
1 X 3 300W CABLE TRAYS (TYP.)
4 X 600W CABLE TRAYS



SECTION A-A

LEGEND
- OPERATING FRONT OF THE PANEL
- BRICK WALL
- FIRE BARRIER WALL
- SINGLE LEAF DOOR
- SINGLE LEAF FIRE PROOF DOOR
- DOUBLE LEAF DOOR

REFERENCE DRAWINGS :

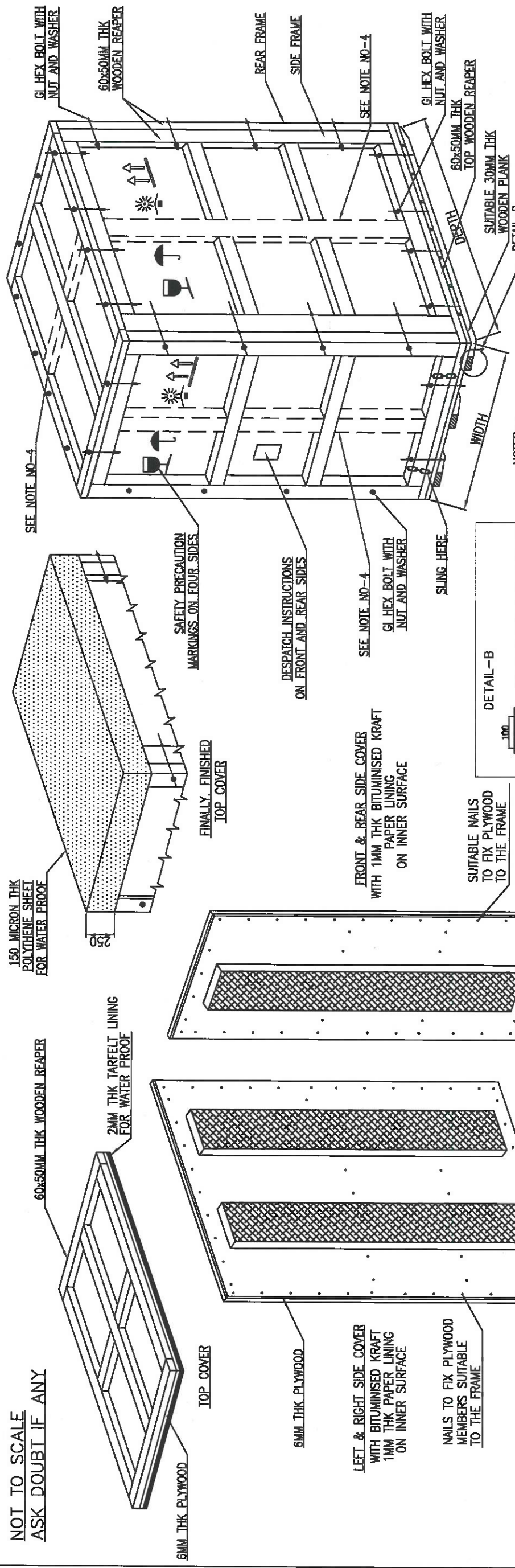
S. NO.	TITLE	DRAWING NO.	SOURCE AGENCY
1.	PLOT PLAN		
2.	ELECTRICAL SINGLE LINE		
3.	CABLE ERECTION PHILOS		
4.	TYPICAL INSTALLATION DI		
5.	DESIGN PHILOSPHY FOR		
6.	YARD PIPING & TRESTLE		

NOTES :
1. ALL ELEVATIONS ARE WITH RESPECT TO MAIN POWER HOUSE BUILDING GROUND FLOOR LEVEL AS EL.(±)0.00 M. CORRESPONDS TO RL(+)171.50M.
2. ALL DIMENSIONS ARE IN MM AND ELEVATIONS IN METRES UNLESS STATED OTHERWISE.
3. THE LT PANEL DIMENSIONS INDICATED IN DRAWING ARE TENTATIVE AND ARE SHOWN FOR DEVELOPING CONCEPTUAL LAYOUT.
4. THIS DRAWING IS TO BE REFERRED FOR DETAILS OF ELECTRICAL EQUIPMENT AND CABLING LAYOUT ONLY. LAYOUT SHOWN FOR FACILITIES SUCH AS AC & VENTILATION SYSTEM IS INDICATIVE & FOR INTERFACE PURPOSE. FOR EXACT LAYOUT OF OTHER SYSTEMS, RELEVANT DISCIPLINE DRAWINGS SHALL BE REFERRED.
5. ALL AREAS SHOWN IN THIS DRAWING ARE NON A/C UNLESS STATED OTHERWISE.
6. BOTTOM MOST/OUTERMOST TRAY OF ALL RUNS SHALL BE PERFORATED TYPE.
7. BOTH SWITCHGEAR ROOM & CABLE VAULT ROOM SHALL BE VENTILATED.
8. FIRE BARRIER WALLS WILL BE 200 MM THICK CONCRETE AS PER CIVIL DETAILING; AND WILL PROJECT MINIMUM 800 MM BEYOND THE OIL CONTAINING PART OF THE TRANSFORMER.
9. SUITABLE GRADE FLOOR MATTING FOR PREVENTION OF SHOCKS SHALL BE PROVIDED IN THE SWITCHGEAR ROOM.

TYPICAL ARRANGEMENT OF BUSDUCT CONNECTION

deemed fit by the Employer shall be

III. PACKING SPECIFICATION/ DRAWING



NOTES:-

1. MATERIAL: ALL SOLID WOOD PLANKS OR REAPERS AS PER GROUP-I OR GROUP-II OF IS:6662-1993
2. PLYWOOD SHOULD BE FIXED TO MAIN FRAME USING WIRE NAILS CONFORMING TO IS:723-1972
3. BOTTOM PALLET OF TOP SURFACE AND WOODEN CASE TOP COVER INSIDE SURFACE SHOULD BE COVERED WITH 2MM THK TARFELT LINING FOR WATER PROOF
4. 60x50MM THK WOODEN REAPER SHOULD BE GIVEN
5. IF THE WIDTH, DEPTH WOODEN CASE PACKING IS EXCEED MORE THAN 1500MM PROJECTED PARTS LIKE HANDLES, RELAYS, METERS ETC.. SHOULD BE COVERED WITH SUITABLE THK THERMOCOAL PADS AND WRAPPED WITH BUBBLE ROLE SHEET
6. PANEL SHOULD BE FULLY COVERED WITH POLYTHENE BAG AND WRAP WITH STRETCH FILM OVER IT.(MIN TWO LAYERS)
7. ALL SIDE FRAMES SHOULD BE SECURED BY ADEQUATE NUMBER AND SIZE OF GI HEX BOLTS WITH NUT AND WASHER
8. FINALLY, FINISHED PACKED WOODEN CASE SHOULD BE COVERED WITH 150 MICRON THK POLYTHENE SHEET AND SECURED WITH SUITABLE STAPLES/NAILS TO ALL SIDES DROP OF 250MM LENGTH AS SHOWN IN THE DRAWING
9. SILICA GEL SHALL BE KEPT IN EACH SHIPPING SECTON

NOT TO SCALE
ASK DOUBT IF ANY

WOODEN CASE PACKING FOR CONTROL PANEL

NO. OF SHEETS	01
SHEET. NO.	01

TITLE :

DRG. NO. EP-3-PP-001-001

FIRST ANGLE PROJECTION — ALL DIMENSIONS ARE IN MM.

FORM 66-301 A

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID	
Sl. No.	**DOCUMENT TITLE**
1	PQR CREDENTIALS
2	COMPLIANCE SHEET

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE					
Sl. No.	**BHEL dwg. No.**	**DOCUMENT TITLE**	**Vendor submission (Days)***	**Vendor submission (Days)#**	**Remarks**
I	**Primary documents**				
1	PE-V0-497-506-E601	General Notes & Typical Drawing of NSPBD	14	7	
2	PE-V0-497-506-E603	Technical Data sheet, Design calculation (for conductor size, temperature rise & heat losses figures) of NSPBD	14	7	
3	PE-V0-497-506-E903	MQP of NSPBD along with Make of Components & Equipment	14	7	
4	PE-V0-497-506-E604	Type Test Report of NSPBD	$		REFER NOTE (i)
5	PE-V0-497-506-E70X	Busduct arrangement drawing of NSPBD	10	5	REFER NOTE (d-g)
II	**Secondary documents**				
2	PE-V0-497-506-E605	O & M Manual (within two weeks of inspection)			

NOTES:

a) * 1st submission within indicated days from date of purchase order/ input.

b) # Submission (within indicated days) after incorporating all BHEL comments.

c) Primary documents shall be considered for Delay analysis

d) Busduct arrangement drawings shall be submitted within 10 days of receipt of inputs from BHEL. The following details shall be included in the drawing:

(i) Busduct Layout arrangement
(ii) Support Structure details
(iii) Switchgear end termination arrangement
(iv) Transformer end termination arrangement
(v) Bill of material

e) Every Busduct arrangement drawing shall be considered independently for drawing submission/re-submission & additional 1 day to be added in submission/re-submission days for each additional switchboard in case input drawing of more than 1 Busduct arrangement has been given on same day.

f) **Lots shall be released along with Cat-1 approved drawings/documents applicable for the lot**. In one lot, maximum 5 numbers of busduct arrangement drawings shall be cleared for manufacturing. Delivery time of the lot shall be 60 days from date of issue of applicable Cat-1 approved dwgs/docs. Delay by vendor in submission/re-submission of applicable drawing/documents shall be reduced from the given delivery period. However, delay in common drawing/ documents shall not be considered for subsequent lots (from 2nd lot onwards).

g) There shall be minimum 10 days gap between two consecutive lots.

h) PO validity shall be 2 years for supply & 3 years for site modification.

i) **$** Case 1: If Type Test Report is available and Type test conduction is not required as per technical Specification, Type test report to be submitted as below: R-0 within 14 days from date of PO & subsequent revisions within 7 days of comments received from BHEL. Case 2: If Type Test Report is not available as per technical Specification, newly conducted test report to be submitted as below: R0 within 03 months of approval of primary drawing/documents at serial no. 1, 2 & 3 above & subsequent revisions within 7 days of comments received from BHEL.
j) BHEL shall furnish comments / approval on each submission within 15 days from receipt.
k) Vendor shall submit the dates for drawing/document submission/BHEL comments/ resubmission after approval of documents.
l) Refer Annexure-C (part of Documentation Requirement) for detailed documents list to be submitted by Vendor.

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT	
Sl. No.	**DOCUMENT TITLE**
1	APPROVED DOCUMENTS
2	APPROVED QUALITY PLAN.
3	ALL TEST CERTIFICATES
4	O & M MANUAL

ANNEXURE-C

DOCUMENTS TO BE SUBMITTED

Sl No	NTPC DOCUMENT No.	BHEL DOC NO.	DOCUMENT TITLE	REMARKS
1		PE-V0-497-506-E601	GENERAL NOTES & TYPICAL DRAWING OF NSPBD	
2		PE-V0-497-506-E603	TECHNICAL DATA SHEET, DESIGN CALCULATION (FOR CONDUCTOR SIZE, TEMPERATURE RISE & HEAT LOSSES FIGURES) OF NSPBD	
3	4540-001-206-QVE-Q-019	PE-V0-497-506-E903	MQP OF NSPBD ALONG-WITH MAKE OF COMPONENT & EQUIPMENT	
4	4540-001-206-PVE-W-013	PE-V0-497-506-E604	TYPE TEST REPORT FOR - LT BUSDUCT (NSPBD)	
5	4540-001-206-PVE-B-007	PE-V0-497-506-E701	BUSDUCT ARRANGEMENT FOR UNIT#1 TURBINE PMCC-1DB	
6	4540-001-206-PVE-B-008	PE-V0-497-506-E702	BUSDUCT ARRANGEMENT FOR UNIT#2 TURBINE PMCC-2DB	
7		PE-V0-497-506-E703	BUSDUCT ARRANGEMENT FOR UNIT#1 BOILER PMCC-1DA	
8	4540-001-206-PVE-B-035	PE-V0-497-506-E704	BUSDUCT ARRANGEMENT FOR UNIT#2 BOILER PMCC-2DA	
9	4540-001-206-PVE-B-011	PE-V0-497-506-E705	BUSDUCT ARRANGEMENT FOR UNIT#1 STATION SERVICE PMCC-0DA	
10	4540-001-206-PVE-B-012	PE-V0-497-506-E706	BUSDUCT ARRANGEMENT FOR UNIT#2 STATION SERVICE PMCC-0DB	
11	4540-001-206-PVE-B-041	PE-V0-497-506-E707	BUSDUCT ARRANGEMENT FOR UNIT#1 ESP PMCC-1DC, 1DD, 1DE, 1DS-1	
12		PE-V0-497-506-E708	BUSDUCT ARRANGEMENT FOR UNIT#1 ESP PMCC-1DF, 1DH, 1DJ, 1DS-2	
13	4540-001-206-PVE-B-042	PE-V0-497-506-E709	BUSDUCT ARRANGEMENT FOR UNIT#2 ESP PMCC-2DC, 2DD, 2DE, 2DS-1	
14		PE-V0-497-506-E710	BUSDUCT ARRANGEMENT FOR UNIT#2 ESP PMCC-2DF, 2DH, 2DJ, 2DS-2	
15	4540-001-206-PVE-B-043	PE-V0-497-506-E711	BUSDUCT ARRANGEMENT FOR UNIT #1 FGD PMCC- 1DK, 1DL	
16		PE-V0-497-506-E712	BUSDUCT ARRANGEMENT FOR UNIT #2 FGD PMCC- 2DK, 2DL	
17		PE-V0-497-506-E713	BUSDUCT ARRANGEMENT FOR LIMESTONE/ GYPSUM PMCC- 0DC & 0DN	
18	4540-001-206-PVE-B-036	PE-V0-497-506-E714	BUSDUCT ARRANGEMENT FOR FW/ AUX BOILER PMCC- 0DD	
19	4540-001-206-PVE-B-037	PE-V0-497-506-E715	BUSDUCT ARRANGEMENT FOR ADMIN BLDG SERV PMCC- 0DE	
20	4540-001-206-PVE-B-013	PE-V0-497-506-E716	BUSDUCT ARRANGEMENT FOR FQA & O & M LAB PMCC- 0DF	
21		PE-V0-497-506-E717	BUSDUCT ARRANGEMENT FOR WORKSHOP PMCC- 0DH	
22	4540-001-206-PVE-B-038	PE-V0-497-506-E718	BUSDUCT ARRANGEMENT FOR DMP/SW/CLW PMCC- 0DJ & 0DL	
23	4540-001-206-PVE-B-039	PE-V0-497-506-E719	BUSDUCT ARRANGEMENT FOR RAW WATER PMCC- 0DK	
24	4540-001-206-PVE-B-040	PE-V0-497-506-E720	BUSDUCT ARRANGEMENT FOR FGD CSSP PMCC- 0DP	
25		PE-V0-497-506-E721	BUSDUCT ARRANGEMENT FOR CRUSHER HOUSE MCC- 0EA	
26		PE-V0-497-506-E722	BUSDUCT ARRANGEMENT FOR BUNKER MCC- 0EB	
27		PE-V0-497-506-E723	BUSDUCT ARRANGEMENT FOR LHP/CHP MCC- 0EC	
28		PE-V0-497-506-E724	BUSDUCT ARRANGEMENT FOR TRACK HOPPER MCC- 0EF	
29		PE-V0-497-506-E725	BUSDUCT ARRANGEMENT FOR ASH WATER/ ASH SLURRY MCC- 0EK	
30		PE-V0-497-506-E726	BUSDUCT ARRANGEMENT FOR CLASSIFIER MCC- 0EL	
31		PE-V0-497-506-E727	BUSDUCT ARRANGEMENT FOR AHP SILO MCC-0EM	
32		PE-V0-497-506-E728	BUSDUCT ARRANGEMENT FOR SWYD SERV PMCC-0DT	

QUALITY PLAN

REFERENCE QUALITY PLAN

एनटीपीसी NTPC

TO BE FILLED IN BY NTPC

ITEM / EQUIPMENT	QP NO.: BD/QC/2006	SIGN. OF MFR	QP NO: 0000-999-QVE-P-178	REVIEWED BY
LT BUSDUCT (415V)	DATE : 30-08-07 PAGE : 1 OF 5		REV. NO.: 1 DATE : 28-05-08 *VALID UPTO: 27-05-11*	A MANDAL V. TALWAR S.D. SINGH O.P. NIRANJAN

QUALITY ASSURANCE — U.R. KHOSLA — APPROVED — NTPC Limited, NOIDA

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M	QUANTUM OF CHECK C/N	REFERENCE DOCUMENT*	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY M	AGENCY C	AGENCY N	*REMARKS
1	2	3	4	5	6		7	8	9	D*	**		10	
Note	1 Makes of bought out items will be as agreed for specific package / project with NTPC QA 2 Documents identified in the QP for NTPC verification will be maintained. However, other documents i.e. QC records & supplier's TC's mentioned in the QP will also be maintained by the Manufacturer, which NTPC may verify on surveillance basis at the time of final inspection													
1	**Raw Material**													
1.1	Aluminum Sheet	1. Aluminum grade	Major	Visual	100% per lot	100% per lot	NTPC appd. Drg. & data sheet	NTPC appd. Drg. & data sheet	Mfgr's TC		V	V	V	
		2. Chemical composition	- do-	Chemical	1 sample per lot	1 sample per lot	IS 737 1986	IS 737 1986	- do -		V	V	-	
		3. Tensile strength	- do-	Mech	1 sample per lot	1 sample per lot	IS 1816 1979	IS 1816 1979	- do -		V	V	-	
		4. % of elongation	- do-	- do-	- do -	- do -	IS 1816 1979	IS 1816 1979	- do -		V	V	-	
		5. Bend test	- do-	- do-	Sample as per IS 737	Sample as per IS 737	IS 737 1986	IS 737 1986	- do -		V	V	-	
		6. Surface finish	- do-	Visual	1 sample per lot	1 sample per lot	No manufacturing defect	No manufacturing defect	QC Record		P	V	-	
		7. Dimension check	- do-	Measurement	-do-	-do-	Mnfr Standard	Mnfr Standard	- do -		P	V	-	
1.2	Aluminum Busbar (Channel / Flat)	1. Aluminum grade	Major	Visual	100% per lot	100% per lot	NTPC appd. Drg. & data sheet	NTPC appd. Drg. & data sheet	Mfgr's TC		V	V	V	
		2. Chemical composition	- do-	Chemical	1 sample per lot	1 sample per lot	IS 5082 1998	IS 5082 1998	- do -		V	V	-	
		3. Tensile strength	- do-	Mech	- do -	- do -	IS 1816 1979	IS 1816 1979	- do -		V	V	-	
		4. % of elongation	- do-	- do-	- do -	- do -	IS 1816 1979	IS 1816 1979	- do -		V	V	-	
		5. Bend test	- do-	- do-	Sample as per IS 737	Sample as per IS 737	IS 5082 1998	IS 5082 1998	- do -		V	V	-	
		6. Surface finish	- do-	Visual	1 sample per lot	1 sample per lot	No manufacturing defect	No manufacturing defect	QC Record		P	V	-	
		7. Dimension check	- do-	Measurement	- do -	- do -	NTPC appd. Drg. & data sheet	NTPC appd. Drg. & data sheet	- do -		P	V	-	
		8. Conductivity	- do -	Elect	- do -	- do -	IS 5082 1998	IS 5082 1998	QC Record / Mfgr's TC		P	V	V	
2	**Components**													
2.1	Space Heater	1. Voltage / wattage rating	Major	Visual	10%	-	NTPC appd. Drg. & data sheet	NTPC appd. Drg. & data sheet	QC Record		P	-	-	
		2. HV test at 1.5 KV for 1 min.	- do -	Elect	100%	-	IS 8623	IS 8623	- do -		P	-	-	
		3. Functional test	- do -	- do -	- do -	-	Mfd Std	Mfd Std	- do -		P	-	-	

LEGEND: * RECORDS INDENTIFIED WITH 'TICK' (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION
** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION AS APPROPRIATE. CHP: NTPC SHALL IDENTIFY IN COLUM 'N' AS 'W'

Note # NTPC Inspection Engineer to check approval date/ revision no. of reference documents at the time of Inspection

REFERENCE QUALITY PLAN

एनटीपीसी NTPC | TO BE FILLED IN BY NTPC

ITEM / EQUIPMENT	QP NO.: BD/QC/2006	SIGN. OF MFR	QP NO: 0000-999-QVE-P-178	REVIEWED BY	APPROVED BY
LT BUSDUCT (415V)	DATE : 30-08-07		REV. NO.: 1	A MANDAL V TALWAR S.D SINGH O.P NIRANJAN	DR KHOSLA
	PAGE : 2 OF 5		DATE : 28-05-08		
			VALID UPTO: 27-05-11		

QUALITY ASSURANCE — APPROVED — NTPC Limited, NOIDA — 28 MAY 2008

SL NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT*	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D*	** 10			
2.2	Thermostat	1 Rating Plate	Major-	Visual	100%	-	NTPC appd. Drg. & data sheet	NTPC appd. Drg. & data sheet	QC Record		P	-	-	
		2 Operational test	- do -	Elect.	- do -	-	Mfd Std	Mfd Std	- do -		P	-	-	
2.3	EPDM Bellow / Synthetic rubber / Neoprene gasket	1 Dimension & make	Major	Measurement	10%	10%	NTPC Spec	NTPC Spec	Mfg's TC		V	V	V	
		2 Surface finish	- do -	Visual	100%	100%	No crack & mfg defect	No crack & mfg defect	- do -		V	V	V	
		3 Shore hardness	- do -	Mech	1 sample per lot	1 sample per lot	IS 3400 (II) 1995 / IS 11149	IS 3400 (II) 1995 / IS 11149	- do -		V	V	V	
		4 Aging test	- do -	- do -	- do -	- do -	- do -	- do -	- do -		V	V	V	
		a. Tensile strength before & after ageing	- do -	- do -	- do -	- do -	- do -	- do -	- do -		V	V	V	
		b. Shore hardness before & after ageing	- do -	- do -	- do -	- do -	- do -	- do -	- do -		V	V	V	
2.4	Paint	1 Type & grade of paint	Major	Verify	100%	100%	IS 101 1964	IS 101 1964	Mfgr's TC		V	V	-	
		2 All routine test i.e flash point, viscosity etc	- do -	Chem / Visual	1Sample / lot	1Sample / lot	- do -	- do -	- do -		V	V	-	
		3 Shade & make	- do -	Verify	100%	100%	IS 5 1994 / NTPC appd Drg	IS 5 1994 / NTPC appd Drg	QC Record		P	V	-	
2.5	Busbar support insulator (FRP)	1 Tensile strength	Major	Mech	1 sample per lot	1 sample per lot	IS 10192 1982	IS 10192 1982	Mfgr's TC		V	V	V	
		2 Cross breaking strength	- do -	- do -	- do -	- do -	- do -	- do -	- do -		V	V	V	
		3 Compressive strength	- do -	- do -	- do -	- do -	- do -	- do -	- do -		V	V	V	
		4 Comparative tracking index	- do -	- do -	- do -	- do -	IS 2824 1975	IS 2824 1975	- do -		V	V	V	
		5 HV test (flatwise & edgewise)	- do -	Elect	5 sample per lot	5 sample per lot	IS 10192 1982	IS 10192 1982	- do -		V	V	V	
		6 IR test	- do -	- do -	- do -	- do -	- do -	- do -	- do -		V	V	V	
		7 Dimension	- do -	Measurement	- do -	- do -	NTPC appd Drg	NTPC appd Drg	NTPC appd Drg		P	V	V	
		8 Surface finish	- do -	Visual	- do -	- do -	No mfg defect	No mfg defect	NTPC appd Drg		P	V	V	

LEGEND: * RECORDS INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION AS APPROPRIATE. CHP: NTPC SHALL IDENTIFY IN COLUM 'N' AS 'W'

Note # NTPC Inspection Engineer to check approval date/ revision no of reference documents at the time of Inspection

REFERENCE QUALITY PLAN

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TO BE FILLED IN BY NTPC

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LT BUSDUCT (415V)	DATE : 30-08-07		REV. NO.: 1	A MANDAL V TALWAR S D SINGH O P NIRANJAN	A K KHOSLA
	PAGE : 3 OF 5		DATE : 28-05-08		
			VALID UPTO: 27-05-11		

QUALITY ASSURANCE * NTPC Limited, NOIDA * Approved 28 MAY 2008

SL NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M	QUANTUM OF CHECK C/ N	REFERENCE DOCUMENT#	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY M	AGENCY C	AGENCY N	REMARKS
1.	2.	3	4	5	6		7	8	9		** 10			
2.6	Hardware													
	a) HT bolt & nut Gr. 8.8 for busbar	1. Dimension	Major	Measurement	Random	-	IS 1363, 1364 & IS 1367	IS 1363, 1364 & IS 1367	QC Record		P	-	-	
	b) HT bolt & nut Gr. 4.6 for Structure	2. Threading	- do -	Visual	Sample	-	- do -	- do -	- do -		P	-	-	
	c) Plan / Spring washer	3. Electroplating (Galvanizing)	- do -	Chemical	Sample	-	- do -	- do -	Mfrg TC		P	-	-	
3	**In-process inspection**													
3.1	Welders Qualification	1. WPS	Critical	-	100%	100%	ASME-IX	ASME-IX	QW - 482		P	V	V	(NTPC approved WPS will be followed) (NTPC approved welders will be employed)
		2. PQR	- do -	-	- do -	- do -	- do -	- do -	QW - 483		P	V	W	
		3. Welder qualification	- do -	-	- do -	- do -	- do -	- do -	QW - 483		P	V	W	
3.2	Fabrication of Enclosure	1. Marking	Major	Measurement	100%	-	Fabrication drawings	Fabrication drawings	QC Record		P	-	-	
		2. Cutting	- do -	- do -	- do -	-	- do -	- do -	- do -		P	-	-	
		3. Bending	- do -	- do -	- do -	-	- do -	- do -	- do -		P	-	-	
		4. Tacking	- do -	- do -	- do -	-	- do -	- do -	- do -		P	-	-	
		5. Welding quality	Critical	DP test & RT test (circumferential Butt Joint)	DP 10% RT 2 %	DP 10% RT 2 %	As per GDCD 198-79	As per GDCD 198-79	- do -		P	W	W	
		6. Inside painting thickness check												
		a) Primer	Major	Measurement	100%	100%	Mfgr's std	Mfgr's std	- do -		P	-	-	
		b) Black paints & matt finish	- do -	- do -	- do -	- do -	- do -	- do -	- do -		P	-	-	
		7. Drilling & dressing	- do -	Visual	100%	100%	Fabrication drawing	Fabrication drawing	- do -		P	V	-	
3.3	Conductor & fish plate fabrication	1. Marking Dimension	Major	Measurement	100%	100%	Fabrication drawing	Fabrication drawing	QC Record		P	V	-	
		2. Cutting & preparation	- do -	- do -	- do -	- do -	- do -	- do -	- do -		P	V	-	

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REFERENCE QUALITY PLAN

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TO BE FILLED IN BY NTPC

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	PAGE : 4 OF 5		DATE : 28-05-08		
			VALID UPTO: 27-05-11		

QUALITY ASSURANCE — NTPC Limited — 28 MAY 2008

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M	QUANTUM OF CHECK C/ N	REFERENCE DOCUMENT#	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY M	AGENCY C	AGENCY N	REMARKS
1	2	3	4	5	6		7	8	9	10*	**			
		3 Bolting & overlap check	- do-	- do-	- do-	- do-	- do-	- do-	- do-		P	V	-	
3.4	Assembly & Busbar supporting arrangement	1 Support insulator "C" to "C" distance	Major	Measurement	100%	100%	Fabrication drawing	Fabrication drawing	QC Record		P	V	-	
		2. Completeness	- do -	- do -	- do -	- do -	NTPC appd. Drg.	NTPC appd. Drg.	- do -		P	V	-	
3.5	Aluminum Flexible	1. Marking lamination bunch after deburring	- do -	Counting	- do -	- do -	Fabrication drawing	Fabrication drawing	QC Record		P	V	-	NTPC approved WPS will be followed NTPC approved welders will be employed
		2 Lamination bunch bending	- do -	Visual	- do -	- do -	- do -	- do -	- do -		P	V	-	
		3. Palm plate tracking	- do -	Measurement	- do -	- do -	- do -	- do -	- do -		P	V	-	
		4 Quality of butt joint welding	- do -	NDT (DP) NDT (RT)	10% 2%	10% 2%	GDCD 198-79 GDCD 198-79	GDCD 198-79 GDCD 198-79	- do - - do -		P P	W W	W W	
4	**Final Inspection**													
	Type test	**Type test clearance from NTPC Engg. To be verified by NTPC RIO**												
4.1	Busduct section	Routine Tests												
		1 Check on assembly of Busduct w.r.t. a Busbar Location b Earth Bus Location c Manhole, Inspection window, Flange holes	Critical	Measurement	100%	One full run per offered Lot	NTPC appd. Drg.	NTPC appd. Drg.	QC Record		P	W	W	
		2. Dimension, general arrangement & marking	Critical	Measurement	100%	100%	NTPC appd. Drg.	NTPC appd. Drg.	QC Record		P	W	W	Nut tightening torque values for reference are as follows 8/10mm or 3/8" bolt recommended torque is 277 cm-kg For 19mm or ¾" recommended torque is 970 cm-kg
		3. Busbar support center line distance	- do -	- do -	- do -	- do -	- do -	- do -	- do -	√	P	W	W	
		4 Busbar flexible joint DP test	- do -	Visual	At random	At random	GDCD 198	GDCD 198	- do -	√	P	W	W	
		5. Insulator tightness by torque measure	- do -	Measurement	- do -	- do -	NTPC appd. Drg.	NTPC appd. Drg.	- do -	√	P	W	W	
		6 Ph to Ph & Ph to earth clearance	- do -	- do -	- do -	- do -	- do -	- do -	- do -	√	P	W	W	

LEGEND: * RECORDS INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION
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NTPC

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LT BUSDUCT (415V)	DATE : 30-08-07		REV. NO.: 1	A MANDAL V TALWAR S D SINGH O P NIRANJAN	D R KHOSLA
	PAGE : 5 OF 5		DATE : 28-05-08		
			VALID UPTO: 27-05-11		

QUALITY ASSURANCE
APPROVED
NTPC Limited, NOIDA
28 MAY 2008

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M	QUANTUM OF CHECK C/ N	REFERENCE DOCUMENT#	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY M	AGENCY C	AGENCY N	REMARKS
1	2	3	4	5	6		7	8	9		** 10			11
		7. Busbar joint & fish plate dim. including clearance	- do -	- do -	- do -	- do -	- do -	- do -	- do -	√	P	W	W	
		8. Paint shade, finish thickness & adhesion	- do -	- do -	- do -	- do -	- do -	- do -	- do -	√	P	W	W	
		9. Trail assembly (Few sections)	- do -	- do -	100%	100%	- do -	- do -	- do -	√	P	W	W	
		Electrical Tests												
		1. HV test on busbars	Critical	Electrical	100%	100%	IS 8623 1993	IS 8623 1993	QC Record	√	P	W	W	
		2. IR test on busbar	- do -	- do -	- do -	- do -	- do -	- do -	- do -	√	P	W	W	
		3. Continuity test of space heater / thermostat	- do -	- do -	- do -	- do -	NTPC appd. Drg.	NTPC appd. Drg.	- do -	√	P	W	W	
		4. HV test on space Heater wiring at 1.5kV for 1 min	- do -	- do -	- do -	- do -	- do -	- do -	- do -	√	P	W	W	
		5. Milli Volt drop test at 100A DC a. For flexible joint b. For rigid joint	- do -	- do -	1 sample for each rating	1 sample for each rating	IS 5561 1970	IS 5561 1970	- do -	√	P	W	W	
4.1	MS Structure (Galvanizing to be carried out from NTPC approved source)	1. Dimension	Major	Measurement	100%	100%	NTPC appd. Drg.	NTPC appd. Drg.	- do -		P	V	V	
		2. Physical properties	- do -	Test	Sample	Sample	IS 2060 1992	IS 2060 1992	- do -		P	V	V	
		3. Galvanizing												
		a. Hammer test	- do -	Mech	IS 4759 1996	IS 4759 1996	IS 4759 1996	IS 4759 1996	- do -		P	W	V	
		b. Preece test	- do -	- do -	- do -	- do -	- do -	- do -	- do -		P	W	V	
		c. Stripping	- do -	Chemical	- do -	- do -	- do -	- do -	- do -		P	W	V	
		d. Visual	- do -	Visual	- do -	- do -	- do -	- do -	- do -		P	W	V	
		e. Check for Galv thickness	- do -	Measurement	- do -	- do -	- do -	- do -	- do -		P	W	V	

LEGEND: * RECORDS INDENTIFIED WITH 'TICK' (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION AS APPROPRIATE. CHP: NTPC SHALL IDENTIFY IN COLUM 'N' AS 'W'

Note # NTPC Inspection Engineer to check approval date/ revision no. of reference documents at the time of Inspection

LT BUSDUCT															
ATTRIBUTES , CHARACTERISTICS → / ITEM, COMPONENTS, SUB SYSTEM ASSEMBLY ↓	Dimension & Surface Finish	Make, Type, Rating & TC	Electrical Properties	Mechanical Properties	Chemical Properties	Item to conform to relevant IS	WPS Approval, Welder Qualification	Weld Quality Check (DP test & x-ray	Paint Shade, Thickness, Adhesion & Finish	Tightness by Torque measurement	Electrical Clearances	Galvanizing Test as per IS 2629/ 2633/	IR – HV – IR Test	Phase Sequence Check	Degree of Protection routine test as per NTPC spec.
Aluminum Sheets / Plates / Strips / Flexibles / tubes (IS : 5082 / 737)	Y	Y		Y	Y	Y	Y	Y							
CRCA Flats / ISMC (IS 2062)	Y	Y		Y	Y	Y									
Neoprene / Synthetic Rubber Gaskets (IS 11149 / 3400)	Y	Y		Y	Y										
Rubber Bellows (IS : 3400)	Y	Y		Y	Y										
Support Insulator (BS : 2782, IEC : 660, IS : 10912)	Y	Y	Y	Y											
Galvanized Structure & GI Earthing Flat (IS : 2629 / 2633 / 4749)	Y	Y				Y						Y			
Space Heater & Thermostat		Y	Y										Y		
LT Busduct (IS : 8623 PART 2)	Y	Y				Y	Y	Y	Y	Y	Y		Y	Y	Y

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Makes of all major Bought Out Items will be subject to NTPC approval.

BOQ-CUM-UNPRICED SCHEDULE

Sr. No.	Item code	Item description	Unit	RATING	Order Quantity	UNIT PRICE (EX-WORKS) (Rs)	TOTAL PRICE (EX-WORKS) (Rs)	REMARKS
1	506-0120003-00-A	LT BUSDUCT-1600A	M	1600A	8			
2	506-0120005-00-A	LT BUSDUCT-2500A	M	2500A	988			
3	506-0120006-00-A	LT BUSDUCT-3000A	M	3000A	280			
4	506-0120008-00-A	LT BUSDUCT-4000A	M	4000A	176			
5	506-0120009-00-A	ADNL HRDWR FOR 90DEG BEND 4000A	SET	4000A	40			
6	506-0120010-00-A	ADNL HRDWR FOR 90DEG BEND 3000A	SET	3000A	71			
7	506-0120011-00-A	ADNL HRDWR FOR 90DEG BEND 2500A	SET	2500A	171			
8	506-0120012-00-A	ADNL HRDWR FOR 90DEG BEND 1600A	SET	1600A	6			
9	506-0120013-00-A	TINNED LAM CU FLEX SET 4000A	SET	4000A	12			
10	506-0120014-00-A	TINNED LAM CU FLEX SET 3000A	SET	3000A	18			
11	506-0120015-00-A	TINNED LAM CU FLEX SET 2500A	SET	2500A	36			
12	506-0120016-00-A	TINNED LAM CU FLEX SET 1600A	SET	1600A	2			
13	506-0120017-00-A	LAM AL FLEX SET 4000A	SET	4000A	12			
14	506-0120018-00-A	LAM AL FLEX SET 3000A	SET	3000A	20			
15	506-0120019-00-A	LAM AL FLEX SET 2500A	SET	2500A	64			
16	506-0120020-00-A	LAM AL FLEX SET 1600A	SET	1600A	2			
17	506-0120021-00-A	ADNL HRDWR OF ADOPTER (SWGR&TRAFO) 4000A	SET	4000A	24			
18	506-0120022-00-A	ADNL HRDWR OF ADOPTER (SWGR&TRAFO) 3000A	SET	3000A	38			
19	506-0120023-00-A	ADNL HRDWR OF ADOPTER (SWGR&TRAFO) 2500A	SET	2500A	100			
20	506-0120024-00-A	ADNL HRDWR OF ADOPTER (SWGR&TRAFO) 1600A	SET	1600A	4			
21	506-0120025-00-A	PHASE CROSS OVER -4000A	SET	4000A	2			
22	506-0120026-00-A	PHASE CROSS OVER -3000A	SET	3000A	2			
23	506-0120027-00-A	PHASE CROSS OVER -2500A	SET	2500A	7			
24	506-0120028-00-A	PHASE CROSS OVER -1600A	SET	1600A	1			
25	506-0120029-00-A	RUBBER BELLOW-4000A	NOS.	4000A	24			
26	506-0120030-00-A	RUBBER BELLOW-3000A	NOS.	3000A	38			
27	506-0120031-00-A	RUBBER BELLOW-2500A	NOS.	2500A	100			
28	506-0120032-00-A	RUBBER BELLOW-1600A	NOS.	1600A	4			
29	506-0120033-00-A	SILICAGEL GEL BREATHER ASSEMBLY	SET		180			
30	506-0120034-00-A	SPACE HEATER AND THERMOSTAT	SET		287			
31	506-0120036-00-A	WALL FRAME ASSEMBLY-3000A	SET	3000A	18			
32	506-0120037-00-A	WALL FRAME ASSEMBLY-2500A	SET	2500A	36			
33	506-0120038-00-A	WALL FRAME ASSEMBLY-1600A	SET	1600A	2			
34	506-0120039-00-A	BUSDUCT SUPPORT STRUCTURE	KG		17440			
35	506-0120040-00-A	MARSHALING BOX- NSPBD	NOS.		68			
36	506-0120041-00-A	SITE MODIFICATION	SET		1			**REFER ANNEXURE-B**

Notes

1	Prices Quoted for Bends, Flange Ends, adopter box, rubber below, wall frame assembly and Other NSPBD Accessories are only additional Fabrication.
2	Length of the busduct is considered from the center line of transformer flange to center line of panel flange.
3	Bidder has to quote for all items of BOQ including Site Modification. Charges for the site modification shall be as per Annexure-B.
4	Addition/ Deletion of quantities shall be applicable at the quoted prices. Allowable Variation in quantity and price shall be as per NIT.

ANNEXURE-B

SITE MODIFICATION CHARGES

S. No.	Item Description	Quantity	Unit Price Rs.	Total Price Rs.
1	LUMP SUM ALL INCLUSIVE CHARGES PER VISIT (EXCEPT DAILY CHARGES)	4 VISITS		
2	LUMP SUM ALL INCLUSIVE DAILY CHARGES	20 DAYS		
3	SITE MODIFICATION MATERIAL @ 1% OF TOTAL BUSDUCT COST (i.e. SUMMATION OF S.NO. 1 TO S.NO. 35 OF BOQ CUM PRICE SCHEDULE)	1 SET		

NOTES:

1	AMOUNT PAYABLE PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO. 1 ABOVE + (DAILY CHARGES AS PER SL. NO. 2 ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE)
2	AMOUNT PAYABLE FOR SITE MODIFICATION MATERIAL SHALL BE BASED ON THE ACTUAL COST OF THE MATERIALS UTILIZED. (TO BE CERTIFIED BY BHEL SITE). THE COST OF THE ACTUAL MATERIALS USED WILL BE DETERMINED USING THE UNIT RATE PROVIDED BY THE BIDDER IN MAIN PRICE SCHEDULE.

COMPLIANCE CERTIFICATE	
1	It is hereby confirm that the technical specification (sheet 1 to 29) has been read, understood. We confirm compliance to the tender specification including any clarification and amendments without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked for in NIT shall stand withdrawn.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

	PRE-QUALIFYING REQUIREMENTS OF LT BUS DUCT (NSPBD)	DOC. NO. PE-PQ-497-506-E002
		REV. 0
		DATE: 12/12/2024
	2 X 660 MW TALCHER TPS	SHEET 1 OF 1

ITEMS: LT BUS DUCT (NSPBD)

SCOPE: Supply: YES; Erection & Commissioning: NO;

1.0 Vendor should be a manufacturer of LT Bus duct (NSPBD) or LT Sandwich Bus duct or both.

2.0 I. Availability of routine test reports of tests on LT Bus duct (NSPBD) to establish in- house capability to carry out all routine tests.

II. Availability of Type tests certificate as per relevant IS/international standards witnessed by third party/ conducted at Govt. lab/ Govt. approved independent lab for NSPBD of rating 1600A & above

a. Short circuit test (50 KA for 1 Sec)

b. Heat run test/ Temperature rise test

c. Degree of protection test IP-55

3.0 Manufactured and supplied LT Bus duct (NSPBD) of minimum 1600A rating.

4.0 Manufactured and supplied at least 50 meter of LT Bus duct (NSPBD) in a single contract and 300 meter in multiple contracts.

5.0 Capacity of manufacturing minimum 200 meter of Bus duct per month.

6.0 Minimum two (2) nos. purchase orders for LT Bus duct (NSPBD) Shall be submitted which should not be more than five (5) years old from the date of techno commercial bid opening for establishing continuity in business.

General Points of PQR:

1. Cut-off date for credentials shall be considered same as date of techno-commercial bid opening.
2. **Consideration of offer shall be subject to customer's approval of bidders.**
3. 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.
4. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
5. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender.

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
Srabani Mishra 12.12.24	12.12.24	12/12/2024	12.12.24
SRABANI MISHRA (MGR.)	AYAN SAHA (DGM)	SANDEEP LODH (DGM)	DEBASISA RATH (AGM & DH ELECTRICAL)