



BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT, NOIDA

Date-29-Oct-20

CORRIGENDUM- 14

PROJECTs	:	4 X 210 MW NTPC Kahalgaon- R&M (ESP)
PACKAGE	:	HVAC SYSTEM FOR R&M PROJECTS
ENQUIRY NO	:	PE/PG/NTK/E-6475/2020 Dated 16.07.2020
SUBJECT	:	TECHNICAL AMENDMENT + DUE DATE EXTENSION

Type of Corrigendum			
Technical Corrigendum -	☒	Commercial Corrigendum -	☒

Bidders are requested to go through the following changes

1. Refer attached Technical Amendment-03 and revision in BOQ.
2. Bidding form in abc - eProcurement system has been revised hence bidders are requested to re-submit their offer.
3. Due date for bid submission has extended from 29-Oct-20 to 19-Nov-20 till 10:00 AM. Bid opening shall be done at 02:00 PM on the due date.

All the other terms and conditions of the tender enquiry remain unchanged. All the bidders are requested to quote accordingly.

Yours faithfully,

For and on behalf of BHEL

Upendra Chaudhary
Manager/BOP

	HVAC SYSTEM 4X210 MW KAHALGAON R&M PROJECT	SPECIFICATION NO. PE-TS-455- 571-13000A-A001
		AMMENDMENT-3
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AMENDMENT#3 TO EXISTING CLAUSES OF TECHNICAL SPECIFICATION

Sl. No.	Clause	Existing description	To be read as (Amendment)
1.	Clause 02.01.01 Page 8 of 277	Two (2 nos.) Air cooled Package AC (1W+1SB) of 15 TR Capacity, along with indoor and outdoor units, piping, insulation, cabling, etc. for the AC area.	Two (2 nos.) Air cooled Ductable Split AC(1W+1SB) of 5 TR Capacity(Actual) , along with indoor and outdoor units, piping, insulation, cabling, etc. for the AC area.
2.	Clause 02.01.02 Page 8 of 277	Necessary heating and humidification should be provided.	Clause deleted.
3.	Section-1, sub section-C 1, Page 10 of 277	Additional Information	Ductable Split Ac shall be located at below false ceiling of ESP Control Room or AHU Room depending upon layout condition
4.	Clause 5 Page 10 Of 277	Air cooled Package Air Conditioner Air cooled Package A/C units shall be provided for all the Control Panel Areas/ AC Areas marked in the drawings. All the package A/C units shall be provided with dedicated condenser unit (Outdoor unit). The Bidder shall submit necessary layout drawings for all the systems showing equipment's marked. The bidder shall also submit schematic/P&ID and overall layout drawings for all the systems. Air cooled Package Air Conditioning units consisting of: - Hermetic Sealed Compressor with Air cooled condenser - Evaporator Cooling coil, blower unit and refrigerant circuit - Refrigerant pipeline with insulation - Drain pipeline - Power and control cables - Suitable capacity stabilizer - MCB/PDB - Handheld remote with remote holder The Package A/C unit shall have one condenser (outdoor) unit and one Evaporator (indoor) unit to suit the control rooms. The capacity (TR) of the indoor unit shall be the actual capacity (100%) as the package units are intended to be used. Outdoor units shall comprise of compressor, cooling fan, condenser. Indoor unit comprising of blower, filter, cooling coil shall be mounted in attractive, corrosion resistant enclosures. The compressor shall be of hermetic scroll / rotary type. The contractor shall indicate the safety measures provided for the compressor and motor. The condenser shall be air cooled copper coil with Aluminium fins type with ample condensing surface. The cooling coil shall be of direct expansion type with copper tubes and mechanically bonded aluminium fins; it shall be sufficiently deep for effective cooling. The refrigerant circuit between (outdoor) Condenser unit and (indoor) Evaporator unit shall be carried out as per site conditions. The circuit shall include	Air cooled Ductable Split Air Conditioner Air cooled Ductable Split A/C units shall be planned for all the Control Panel Areas/ AC Areas marked in the drawings. All the split A/C units shall be provided with dedicated condenser unit (Outdoor unit). The Bidder shall submit necessary layout drawings for all the systems showing equipment's marked. The bidder shall also submit schematic/P&ID and overall layout drawings for all the systems. Air cooled Ductable Split Air Conditioning units consisting of: -Hermetic Compressor with Air cooled condenser - Evaporator Cooling coil, blower unit and refrigerant circuit - Refrigerant

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thermostatic expansion valve/ linear expansion valve, filter drier and liquid line shut off valve. It shall be protected by Hi-Lo pressure start. Fan shall be provided to handle the conditioned air. The fan shall be dynamically balanced and its operation shall be smooth and quiet. It shall be complete with direct drive motor. The bearings shall be self-lubricating type.

pipeline with insulation

- Drain pipeline
- Power and control cables
- Suitable capacity stabilizer
- MCB/PDB
- Handheld remote with remote holder

The Ductable split A/C unit shall have one condenser (outdoor) unit and one Evaporator (indoor) unit to suit the control rooms. The capacity (TR) of the indoor unit shall be the actual capacity (100%) as the split units are intended to be used. Outdoor units shall comprise of compressor, cooling fan, condenser. Indoor unit comprising of blower, filter, cooling coil shall be mounted in attractive, corrosion resistant enclosures. The compressor shall be of hermetic scroll / rotary type. The contractor shall indicate the safety measures provided for the compressor and motor. The condenser shall be air cooled copper coil with Aluminium fins type with ample condensing surface. The cooling coil shall be of direct expansion type with copper tubes and mechanically bonded aluminium fins; it shall be sufficiently deep for effective cooling. The refrigerant circuit between (outdoor) Condenser unit and (indoor) Evaporator unit shall be carried out

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		HVAC SYSTEM 4X210 MW KAHALGAON R&M PROJECT		SPECIFICATION NO. PE-TS-455- 571-13000A-A001									
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					as per site conditions. The circuit shall include thermostatic expansion valve/ linear expansion valve, filter drier and liquid line shut off valve. It shall be protected by Hi-Lo pressure start. Fan shall be provided to handle the conditioned air. The fan shall be dynamically balanced and its operation shall be smooth and quiet. It shall be complete with direct drive motor. The bearings shall be self-lubricating type.								
5.	Clause 5.2.14 Page 13 of 277	Dismantling of existing AHUs, accessories etc. in existing ESP Control Room shall be bidders scope of work. Dismantle material shall be hand over to owner at identify location.			Clause deleted.								
6.	Clause 5.2.15 Page 13 of 277	EXCLUSIONS Items of works listed below are excluded from scope of the HVAC system supplier. a) False ceiling, drop ceiling, foundation for Package AC.			EXCLUSIONS Items of works listed below are excluded from scope of the HVAC system supplier. a) False ceiling, drop ceiling.								
7.	Section-1, Sub-section C-3 of Electrical Specification, Clause no. 2c of Electrical Scope Sheet, Page No. 152 of 277	<table><tr><th>Details</th><th>Scope Supply</th><th>Scope E&C</th><th>Remarks</th></tr><tr><td>Local starter panel (for heaters, pan humidifiers)</td><td>Vendor</td><td>Vendor</td><td>This panel is required to house the contactors which are required to control the heaters and pan-humidifier. These shall be wall/skid mounted near to the heater/humidifier.</td></tr></table>			Details	Scope Supply	Scope E&C	Remarks	Local starter panel (for heaters, pan humidifiers)	Vendor	Vendor	This panel is required to house the contactors which are required to control the heaters and pan-humidifier. These shall be wall/skid mounted near to the heater/humidifier.	Clause deleted.
Details	Scope Supply	Scope E&C	Remarks										
Local starter panel (for heaters, pan humidifiers)	Vendor	Vendor	This panel is required to house the contactors which are required to control the heaters and pan-humidifier. These shall be wall/skid mounted near to the heater/humidifier.										
8.	Section-II, sub section-7, c Page no. 277 of 277	Scheme of Air Conditioning System PE-DG-455-571-15000A-A001			Refer revised scheme of Air conditioning as per drawing no. PE-DG-455-571-15000A-A001 Rev. 01 (attached).								
9	Section I, Sub-Section A Clause 1.1 Page 3 of 277	The specification covers design (i.e. preparation and submission of drawings/documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable) fill of lubricants & consumables, spares for erection, start-up and commissioning as required, forwarding, proper packing, shipment and delivery at site,			The specification covers design (i.e. preparation and submission of drawings/documents including "As Built" drawings and O&M								

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		handling, in-site transportation, assembly, erection & commissioning, commissioning spares, minor civil work, trial run at site and carrying out Demonstration tests at site (As applicable), training of customer/ client and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order for HVAC System of KAHALGAON STPS STAGE-I (4x210MW) (R&M OF ESP PACKAGE).	manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable) fill of lubricants & consumables, spares for erection, start-up and commissioning as required, forwarding, proper packing, shipment and delivery at site, handling, in-site transportation, assembly, erection & commissioning, and Comprehensive AMC of Ductable/Non Ductable Split ACs till the handing over to customer, commissioning spares, minor civil work, trial run at site and carrying out Demonstration tests at site (As applicable), training of customer/ client and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order for HVAC System of KAHALGAON STPS STAGE-I (4x210MW) (R&M OF ESP PACKAGE).
10.	Section-I, Sub Section-C, Sub section-C3; Technical	3.1 Electrical scope between BHEL & vendor. 3.2 Technical specification of motors, lt swgr, cables, cabling (NTPC) 3.3 BHEL standard specification for LT motors 3.4 Datasheets – C for motors	3.1 Electrical scope between BHEL & vendor. 3.2 Technical

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		HVAC SYSTEM 4X210 MW KAHALGAON R&M PROJECT			SPECIFICATION NO. PE-TS-455- 571-13000A-A001 AMMENDMENT-3 DATE: 26.10.2020 Page 5 of 7	
	specification (Electrical Portion) Page 35 of 277	3.5 Quality Assurance/Plan for motors, lt swgr, cables, cabling.			specification of motors, cables (NTPC) 3.3 Technical specification of AC fuse DBs 3.4 BHEL standard specification for LT motors 3.5 Datasheets – C for motors 3.6 Quality Plan for motors, cables, DBs.	
11	Section-I, Sub Section-C, Sub section-C3; Technical specification (Electrical Portion)	Additional information			Annexure-E1 is added which includes technical specification for Fuse DB	
12.	Section-I, Sub Section-C, Sub section-C3; Technical specification (Electrical Portion)	Sub section-II-E-05 (LT SWITCHGEAR) Page 68 of 277 to page 113 of 277.			This clause is deleted.	
13.	Section-I, Sub Section-C, Sub section-C3; Technical specification (Electrical Portion) Clause no.1 of Electrical scope sheet, Page 152 of 277	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS	This clause stands deleted.
		415V ACDB	Vendor	Vendor	Feeders for all the electrical equipment in scope of bidder shall be provided in the 415V ACDB. ACDB shall be suitable for 2 incoming supplies (125A) with suitable electrical interlock between the incomers for automatic changeover. The logical interlocks shall be built in the ACDB itself. Incoming supply to ACDB is in BHEL scope. Further distribution from ACDB to loads is in bidder's scope.	
14.	Section-I, Sub Section-C, Sub section-C3; Technical specification (Electrical Portion) Electrical scope	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS	This clause is added in the Electrical scope sheet.
		AC FUSE DB	Vendor	Vendor	Feeders for all the electrical equipment in scope of bidder shall be provided in the AC fuse DB. Minimum 8 nos. Fuse	

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HVAC SYSTEM
4X210 MW KAHALGAON R&M PROJECT

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	sheet, Page 152 of 277				DBs (total) shall be provided to cater to the load requirements of the HVAC plant. Incoming supply cable upto AC fuse DB is in BHEL scope.	
	Amendment w.r.t Technical Amendment#1					
15.	Sr. No. 1	List of Makes				Refer revised Annexure-1
16.	Sr. No. 2	PAC placed in AHU room, however outdoor unit shall be placed in above the AHU Room. Please refer tentative/proposed layout of PAC Room attached as Annexure-A, Bidder is suggested to visit site before quoting inline specification clause no. 1.12 of intent of specification.				Outdoor unit shall be placed on outdoor wall near to the AHU Room or Roof of Existing AHU Room depending upon layout. Also proposed layout(Annexure-A) of PAC room stand deleted. Bidder is suggested to visit site before quoting inline specification clause no. 1.12 of intent of specification.
17.	Sr. No. 4	Outdoor units shall comprise of cooling fan, condenser. Indoor unit comprising of compressor, blower, filter, cooling coil shall be mounted in attractive, corrosion resistant enclosures.				Outdoor units shall comprise of compressor, cooling fan, condenser. Indoor unit comprising of blower, filter, cooling coil shall be mounted in attractive, corrosion resistant enclosures.
18.	Sr. No. 5	3 nos. of AHU(STR) for each ESP control room shall be dismantled. Exiting ducting (from AHU discharge till plenum) inside AHU room along with electrical/ control panel. Cable, piping/valve etc. shall also be dismantled by the bidders				Clause deleted.
19.	Sr. No. 6	a) False ceiling, drop ceiling, underdeck insulation, foundation for Package AC indoor / outdoor unit and Local Control Panel. Foundation of existing AHU shall be used for PAC Indoor unit, Further any angle , channel frame support required, the same shall be provided by bidder				a) False ceiling, drop ceiling, underdeck insulation. Further any angle , channel frame support required for HVAC equipments, the same shall be provided by bidder.
20.	Sr. No. 7	Floor mounted Air cooled PAC shall be applicable. i.e Compressor shall be in indoor unit.				Clause deleted.
21.	Clause 9 Page 2 of 2	Wherever AHU mentioned in the specification, The same shall be read as PAC.				Wherever AHU mentioned in the specification, The same

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HVAC SYSTEM
4X210 MW KAHALGAON R&M PROJECT

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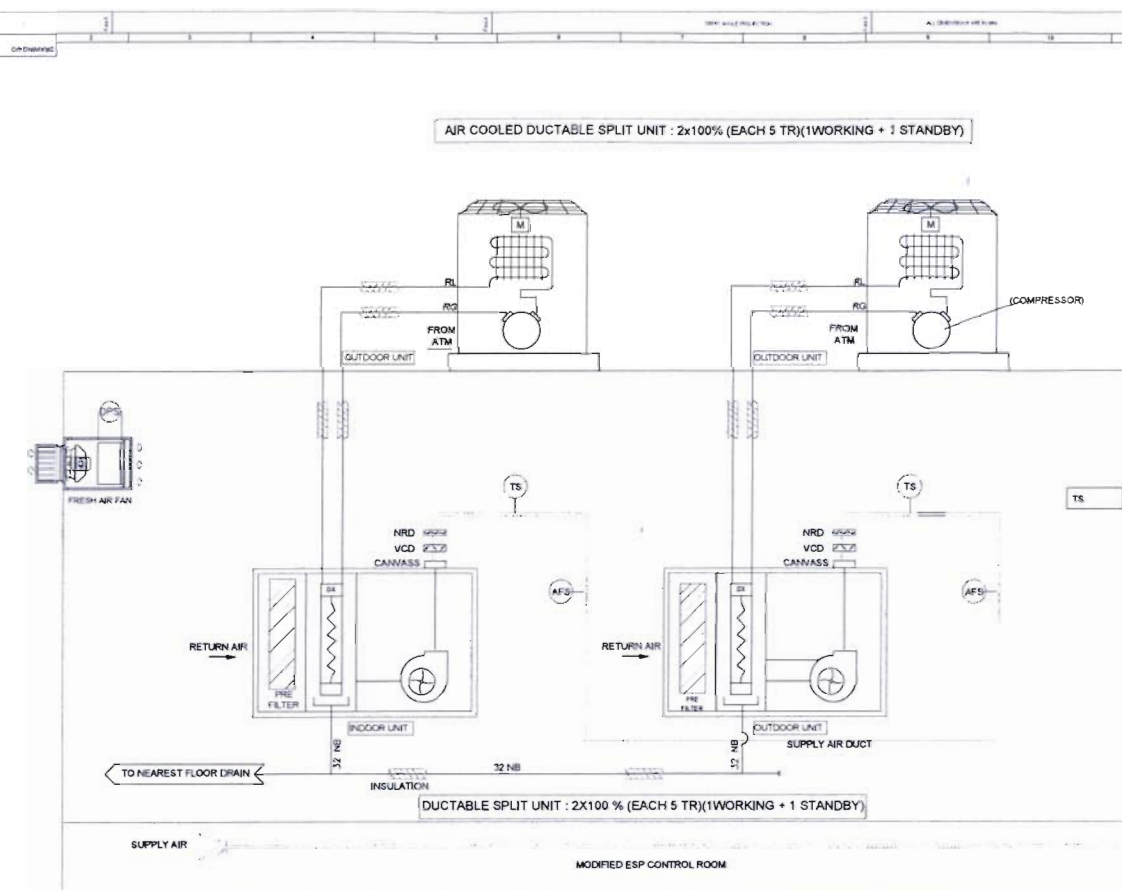
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			shall be read as Ductable Split AC.
	Amendment w.r.t Technical Amendment#2		
22.	Sr. No. 1	The Package A/C unit shall have one or multiple condenser (outdoor) unit and one Evaporator (indoor) unit to suit the control rooms. The capacity (TR) of the indoor unit shall be the actual capacity (100%) as the package units are intended to be used.	Clause deleted.
	Amendment w.r.t Corrigendum-07(Pre-bid query)		
23.	Sr. No. I	Kindly note that GIU is a Graphical user Interface with field equipment's. It is a small microprocessor based system & shall be used to control various HVAC equipment like Package AC, Heaters, humidifier, Fresh Air Fan and other items/instruments as per process scheme. This shall be as per manufacturer's standard practice	Kindly note that GIU is a Graphical user Interface with field equipment's. It is a small microprocessor based system & shall be used to control various HVAC equipment like Ductable Split AC, Fresh Air Fan and other items/instruments as per scheme. This shall be as per manufacturer's standard practice
24.	Sr. No. II	Capacity of PAC mentioned in Tender Specification / Price format is 15TR and 5TR actual capacity. Bidder to ensure that nominal capacity of PAC selected by them is adequate to meet minimum requirement of 15TR and 5TR PAC. Compressor shall be indoor unit for Air cooled Package AC as already mentioned in the Amendment No.-1.	Clause deleted, however please refer Sr. No. 1 above.
	Amendment w.r.t BOQ/ Price Schedule		
25.		BOQ/Price Schedule	Please refer revised Price Schedule

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LEGEND	
	REFRIGERANT TUBE AS SHOWN
	THERMOSTATIC EXPANSION VALVE AT REFRIGERANT LIQUID TUBE
	PRESSURE SWITCH AT SUPPLY AIR DUCT
	DIFFERENTIAL PRESSURE SWITCH AT FINE FILTER
	TEMP. SENSOR AS SHOWN
	INSULATION AS SHOWN
	SUPPLY DUCT AS SHOWN
	RETURN DUCT AS SHOWN
	TEMP. SENSOR AS SHOWN
	FRESH AIR FAN AS SHOWN
	PRE-FILTER AT AHU INLET
	FINE FILTER AT SUPPLY AIR DUCT
	CANVAS CONNECTION AS SHOWN
	VOLUME CONTROL DAMPER AS SHOWN
	MOTORIZED FIRE DAMPER AT WALL
	NON RETURN DAMPER AS SHOWN
	SUPPLY AIR AS SHOWN
	RETURN AIR AS SHOWN
	AIR FLOW SWITCH AS SHOWN

- NOTES:
1. FOR LEGENDS & SYMBOLS REFER BELOW GIVEN LEGEND LIST.
 2. SUPPLY AIR DUCTS SHALL BE INSULATED AS PER SPECIFICATION.
 3. INSULATION SHALL BE FINISHED AS PER SPECIFICATION.
 4. DRAINS TO BE ROUTED UP TO THE NEAREST DRAIN POINT.
 5. PARTS/ITEMS MENTIONED IN THE DRAWING ARE INDICATIVE MINIMUM.

SCHEME FOR AIR COOLED DUCTABLE SPLIT UNIT FOR MODIFIED ESP CONTROL ROOM BUILDING UNIT-1 (TYPICAL)

FOR TENDER PURPOSE ONLY

SCHEDULE OF INSTRUMENTS	
DESCRIPTION	QTY (EACH UNIT)
DIFFERENTIAL PRESSURE SWITCH FOR AIR	01 NOS.
AIR FLOW SWITCH	02 NOS.
TEMPERATURE - R. H. SENSOR	03 NOS.

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26-10-2020

01	
Rev.	
DATE	
BY	
CHECKED	
APPROVED	
TITLE SCHEME FOR AIR CONDITIONING SYSTEM	



**KAHALGAON STPS (R&M) STAGE-1
(4X210)**

HVAC SYSTEM

**SPECIFICATION No.: PE-TS-455-571-
15000A-A001**

SECTION : I

SUB-SECTION : E (ANNEXURE-I)

REV 01

SR. NO.	ITEM	SUB SUPPLIER
1	AIR COOLED DUCTABLE SPLIT AC	VOLTAS / BLUE STAR / CARRIER / HITACHI / LG
2	AXIAL FLOW FANS/RE UNITS	HYDERABAD POLLUTION/ SK SYSTEM / ADVANCE VENTILATION / KRUGER / NICOTRA / MARATHON / FLAKT / CB DOCTOR/ PATEL AIR/SITAL/ ICEBERG(AXIAL FAN)
3	AIR FILTER	PUROLATOR / FMI / ANFILCO / TENACITY / JOHN FOWLER / SPECTRUM / AIR TECH / PUROMATIC
4	GI SHEET FOR DUCTING	TISCO / INDIAN IRON & STEEL CO LTD. / RASHITRYA ISPAT NIGAM LTD. / ESSAR / ISPAT INDUSTRIES / JSW STEEL / LLOYDS STEEL / BHUSHAN / TATA / SAIL / JINDAL
5	GRILL/ DIFFUSER/ VOLUME CONTROL DAMPER	AIR FLOW/ TSC / AIR MASTER/ CARYAIRE/RAVI STAR (SYSTEM AIR)
6	FIRE DAMPER	TSC / CARYAIRE / RAVISTAR (SYSTEM AIR)
7	INSULTATION MATERIAL	BEARDSHELL / K-FLEX / PARAMONT/ ARMAFLEX / SUPREME / LLOYDS / UP TWIGA
9	THERMOSTATS	HONEYWELL / RANCO / PENN / DANFOSS / INDOSS / JHONSON CONTROL / RANUTROL
10	HUMID STAT	JHONSON CONTROL / HONEYWELL / PENN
11	PRESSURE SWITCH / DP SWITCHES	BELLS / DANFOSS / DK INSTRUMENTS/ DRESSER / SOR INC / VASU / SWITZER / INDOSS / TRAFAG / GIC / ASHCROFT/ KASTURBA UDYOG/ BARKSDALE/ PRECISION MASS PRODUCTS/ MITTAL REFRIGERATION
12	FLOW SWITCH	SWITZER / LEVCON / DK INSTRUMENT / SBEM / V. AUTOMATE/ SIEMENS
13	RH SENSOR/TEMP SENSOR	HONEY WELL / JOHNSON / SIEMENS / GENERAL INSTRUMENTS

NOTE:

1. THE SUB VENDOR LIST ABOVE IS INDICATIVE ONLY AND IS SUBJECT TO BHEL AND CUSTOMER APPROVAL DURING DETAILED ENGINEERING STAGE WITHOUT ANY COMMERCIAL & DELIVERY IMPLICATION TO BHEL. BIDDER TO PROPOSE SUB VENDOR WITHIN 4 WEEKS OF PLACEMENT OF LOI. THEREAFTER NO REQUEST FOR ADDITIONAL SUB-VENDOR SHALL BE ENTERTAINED.
2. THE INSPECTION CATEGORY WILL BE INTIMATED AFTER AWARD OF CONTRACT BY BHEL/CUSTOMER. HOWEVER THE SAME WILL BE ADHERED BY THE BIDDER WITHOUT ANY COMMERCIAL AND DELIVERY IMPLICATION TO BHEL/ CUSTOMER.
3. PLEASE ALSO REFER RESPECTIVE SUB-SECTION C-3, C-4 FOR ELECTRICAL AND C&I RELATED EQUIPMENT LIST OF MAKE.

Chakrabarti
26-10-2020

ANNEXURE-E1

TECHNICAL SPECIFICATION OF AC FUSE DB

AC fuse boards shall be supplied including the cable glands and lugs for termination of incoming and outgoing cables. Incoming power cable size shall be 3.5C x 50 sq. mm AL conductor and outgoing cable sizes shall be finalized during detailed engineering.

- 1) All fuse boards shall be metal enclosed, fixed type, non-compartmentalized construction, suitable for indoor/ outdoor mounting on wall or steel structure.
- 2) The fuse board frame shall be fabricated using suitable mild steel structures or pressed and shaped cold rolled sheet steel of thickness not less than 2.0 mm. The frames shall be enclosed by cold rolled sheet steel of thickness not less than 1.6 mm.
- 3) The fuse boards shall be provided with doors on the front. The doors shall preferably be in two halves with hinges at the extreme ends and locking facility at the centre.
- 4) Suitable EPDM/Neoprene gaskets shall be provided to make fuse boards completely dust and vermin-proof with a degree of protection of IP-52 for indoor and IP-54 for outdoor application, as per IS: 13947.
- 5) Each AC fuse board shall comprise of the following:
 - (a.) 1 no. 63A TPN switch as incomer.
 - (b.) 100 A, 3-phase, 4-wire, fully insulated (PVC sleeved or epoxy coated) busbars.
 - (c.) 2 nos. 16 A single phase switch fuse units, 2 nos. 32 A TPN switch fuse Units, 6 nos. 16 A TPN switch fuse units as outgoing feeders or alternatively 32/16 amps MCCB can be provided.
 - (d.) 3 nos. indicating lamps with resistors and coloured lenses (R, Y, B) for incoming supply monitoring.(Minimum 8 nos. AC fuse board shall be provided in total)
- 7) The fuses shall be mounted in an insulating fuse carrier and it shall be possible to replace the outgoing feeder fuses without disturbing the other feeders. The handle of incoming switch shall be mounted on the door of the fuse board, with padlocking facility in both 'ON' and 'OFF' positions. The outgoing feeder switches shall preferably be of rotary type.
- 8) Cable entry facilities shall be provided at top / bottom with removable gland plates of suitable thickness. All incoming and outgoing cables shall be terminated on suitable terminal blocks.

Specification for other electrical items is included separately in the technical specification.

Quelup
26-10-2020

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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	
1	DBs	a) Overall Dimensions	MA	Meas.	100%	One Panel/ Type/lot	NTPC/Main supplier Appd. Drg / data sheet	NTPC/Main supplier Appd. Drg / data sheet	Inspt. Report	P	W	W
		b) Thickness of sheet	MA	Meas.	100%	--DO--	--DO--	--DO--	--DO--	P	W	W
		c) Paint shade	MA	Visual	100%	--DO--	--DO--	--DO--	--DO--	P	W	W
		d) Thickness of paint	MA	Meas	100% of items	Min. 5 points/ Panel	--DO--	--DO--	--DO--	P	W	W
		e) Surface finish	MA	Visual	100%	--DO--	Smooth, without lump	Smooth, without lump	--DO--	P	W	W
		f) Adhesion Test	MA	Mech.	One sample/ lot/size	One sample lot	Should not peel off	Should not peel off	--DO--	P	W	W
		g) Name Plate	MA	Visual	100%	10% of each type	NTPC/Main supplier Appd drg/ data sheet	NTPC/Main supplier Appd drg/ data sheet	--DO--	P	W	W
		h) Tightness of bus bar bolts	MA	Mech	100%	One Panel/ Type/lot	Manufacturer Std.	Manufacturer Std.	--DO--	P	W	W
		i) Bus Bar Clearance	MA	Meas.	100%	--DO--	NTPC/Main supplier Appd drg /data sheet	NTPC/Main supplier Appd drg /data sheet	--DO--	P	W	W

LEGEND: RECORDS IDENTIFIED IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY THE CONTRACTOR IN QA DOCUMENTATION

**M: MANUFACTURER/SUB-SUPPLIER, C: CONTRACTOR/NOMINATED INSPECTION AGENCY (SUBJECT TO PRIOR APPROVAL OF NTPC), N: NTPC, INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE

"CHP" BY NTPC SHALL BE IDENTIFIED IN COLUMN "N" AS "W".

FORMAT - QS-01-QAI-P-10/F2-R0

ENGINEERING DIV./QA&I

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-1 26/10/2020

SL. NO.		COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REVIEWED BY	APPROVED BY
						M	C/N			M C N		
1		2	3	4	5	6	7	8	9	10	11	12
		j) GA& Bill of material	CR	Phy.	100%	10% of each type	--DO--	--DO--	--DO--	P W W		
		k) Identification of Component lay out	MA	Visual	100%	One Panel type/lot	--DO--	--DO--	--DO--	P W W		
		l) Completeness of										
		i) Wiring	MA	Elect.	100%	--DO--	--DO--	--DO--	--DO--	P W W		
		ii) Ferruling	MA	Visual	100%	--DO--	--DO--	--DO--	--DO--	P W W		
		m) Size of wires	MA	Meas.	100%	--DO--	--DO--	--DO--	--DO--	P W W		
		n) Colour coding of bus bar	MA	Visual	100%	--DO--	--DO--	--DO--	--DO--	P W W		
		o) Spare terminals	MA	Meas.	100%	--DO--	--DO--	--DO--	--DO--	P W W		
		p) Shrouding of live parts	MA	Visual	100%	--DO--	--DO--	--DO--	--DO--	P W W		
		q) Door earthing	MA	Megger	100%	--DO--	--DO--	--DO--	--DO--	P W W		
		r) Functional Tests including HV, IR & continuity	CR	Elec.	100%	10%	--DO--	--DO--	--DO--	P W W		
		s) Degree of protection (Paper insertion method)	CR	Phy.	100%	One Panel	NTPC/Main supplier Appd drg./data sheet	NTPC/Main supplier Appd drg./data sheet	--DO--	P W W		

LEGEND: RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY THE CONTRACTOR IN QA DOCUMENTATION

**M: MANUFACTURER/SUB-SUPPLIER, C: CONTRACTOR/NOMINATED INSPECTION AGENCY (SUBJECT TO PRIOR APPROVAL OF NTPC), N: NTPC. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE

"CHP" BY NTPC SHALL BE IDENTIFIED IN COLUMN "N" AS "W".

FORMAT -QS-01-QAI-P-10/F2-R0

Quelha
26/10/2020

SUGGESTED PRICE FORMAT		Doc No:	PF-PE-455-571-15000A-A001				
		Rev No:	1				
		Date of issue	26.06.2020				
NAME OF PROJECT:		4X210 MW ESP CONTROL ROOM - R&M-NTPC KAHALGAON- Stage-I, For Unit-1, Unit-2, Unit-3 and Unit-4					
NAME OF PACKAGE:		HVAC SYSTEM					
TECHNICAL SPECIFICATION No:		PE-TS-455-571-15000A-A001					
S. No.	DESCRIPTION	UNIT	QTY	HSN/SAC CODE	AMOUNT (Ex-Works)		
1	Total lump sum firm price inclusive of all prevailing taxes, duties and other levies for Supply part, Services part and Mandatory spares comprising of design (i.e.preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable) fill of lubricants & consumables alongwith erection, startup and commissioning spares as required, forwarding, proper packing, shipment and delivery at site, unloading, handling, transportation to stores area & storage, transporation to site (from stores area) & in-site transportation, assembly, erection & commissioning and comprehensive AMC of Ductable/Non Ductable of Split AC till the handing over to coustomer, final painting at site, minor civil work, trial run at site and carrying out Performance guarantee / Functional / Demonstration tests at site (As applicable), training of customer/client O&M staff and handover in flawless condition of the package to the end customer complete with all accessories after handing over, for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order.	Lot	1				
2	MAJOR BREAK-UP OF PRICES GIVEN IN 1.0 ABOVE.						
2.1	Total lump sum firm price inclusive of all prevailing taxes, duties and other levies for Supply part comprising of design (i.e.preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable), fill of lubricants & consumables alongwith erection, startup and commissioning spares as required, forwarding, proper packing, shipment and delivery at site for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order. (Break-up as per Annexure-I)	Lot	1				
2.2	Total lumpsum firm prices inclusive of all prevailing taxes, duties and other levies for Services part comprising for unloading, handling, transportation to stores area & storage, transporation to site (from stores area) & in-site transportation, assembly, erection & commissioning,and comprehensive AMC of Ductable/Non Ductable of Split AC till the handing over to coustomer, final painting at site, minor civil work, trial run at site and carrying out Performance guarantee / Functional / Demonstration tests at site (As applicable), training of customer/client O&M staff and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order. (Break-up as per Annexure-I)	Lot	1				
2.3	Total lumpsum firm price inclusive of all prevailing taxes, duties and other levies for Mandatory Spares comprising of manufacture, fabrication, assembly, inspection / testing (as applicable) at vendor's & sub-vendor's works, painting, forwarding, proper packing, shipment, delivery at site & guarantee as per tender technical specification above, amendment & agreements till placement of order. (Price break up of mandatory spares is to be furnished as per Annexure- II)	Lot	1				

Note:

1.) BOP to consider and suitably incorporate taxes, duties and other commercial aspects.

2.) Bidder to quote the Prices in 'figures' along with corresponding 'words'.

Particulars of bidder / authorised representative						
	Name	Designation	Signature	Date		Company Seal

SUGGESTED PRICE FORMAT ANNEXURE - I PRICE BREAKUP (FOR ESP CONTROL - R&M for Unit-1, Unit-2, Unit-3 & Unit-4)						Doc No:		PF-PE-455-571-15000A-A001	
						Rev No:		1	
						Date of issue		26.10.2020	
NAME OF PROJECT:					4X210 MW ESP CONTROL ROOM - R&M-NTPC KAHALGAON- For Unit-1, Unit-2, Unit-3 and Unit-4				
NAME OF PACKAGE:					HVAC SYSTEM				
TECHNICAL SPECIFICATION No:					PE-TS-455-571-15000A-A001				
SL NO	DESCRIPTION	Qty	UNIT	SUPPLY		ERECTION AND COMMISSIONING			
				Unit Ex- works duly packed (INR)	Total Ex-works duly packed (INR)	Unit E & C (INR)	Total E&C (INR)		
A	VENTILATION SYSTEM								
1	Axial flow supply fans with pre and fine filter (wall mounted) complete with casing, TEFC sq cage induction motors & mounting frame, MS rain protection cowl, bird screen and all other accessories (suitable for 415V/3-phase supply). Following fan shall have 30 mmwc static pressure.								
1.1*	Capacity 7,500 CMH with Motor rating 1.5 KW	16	NO*						
2	Axial flow exhaust fans (Wall mounted) complete with casing, TEFC sq cage induction motor & mounting frame, MS rain protection cowl, bird screen and all other accessories epoxy painted (suitable for 415V/3-phase supply) as specified. Following fan shall have 10 mmwc static pressure.								
2.1*	Capacity 6,000 CMH with Motor rating 0.55 KW	4	NO*						
3	Exhaust fan (propeller type) completes with induction motor & mounting frame MS rain protection cowl, bird screen and all other accessories as specified (suitable for 240V/ 1 phase). Following fan shall have 10 mmwc static pressure.								
3.1*	Capacity 1200 CMH with Motor rating 100 watts	8	NO*						
B	AIR CONDITIONING SYSTEM								
1.1	AIR COOLED DUCTABLE SPLIT AC UNITS consisting of outdoor unit and indoor unit, interconnecting refrigerant piping as per site requirement & fitting with insulation, electrical power cord etc.								
1.1.1*	5 TR actual capacity (ductable type, 415 V, 3 phase with isolation switch).	8	NO*						
1.2	FRESH AIR FANS (axial flow type), complete with motor, inlet cone, air filters (pre and fine), dampers, etc for all the AC Areas	4	LOT						
1.3	ACOUSTIC INSULATION of the first 5m of ducting from Ductable Split AC outlets with material and finish as per specifications.	4	LOT						
1.4*	2.0 TR capacity (non-ductable Split type, 240 V, 1 phase isolation switch) i.e MCB of suitable rating as specified. (Maximum star rating available as per BEE Standard)	1	NO*						
1.5*	GSS zinc coating 275 gms/ m ² finished ducting complete with hangers/ supports etc.								
1.5.1*	18G.	50	SQM*						
1.5.2*	20G.	50	SQM*						
1.5.3*	22G.	80	SQM*						
1.5.4*	24G.	80	SQM*						
1.5.5*	Thermal insulation of duct with finish as specified (for Air conditioning System)	52	SQM*						
1.6	Fire damper								
1.6.1*	Fire damper with auto resetting, limit switches, indication lamps etc.	4	SQM*						
1.6.2*	Motorized actuator with single phase power supply for the above fire damper.	4	NO*						
1.7*	MANUAL VOLUME CONTROL DAMPERS in GI construction as per specifications for supply / return ducts complete with fixing arrangement.	4	SQM*						
1.8	Grills / Diffusers								
1.8.1*	SUPPLY AIR DIFFUSERS / GRILLS with VCD (Extruded Aluminium powder coated) complete with fixing frames, nuts, bolts, gaskets, washers etc	8	SQM*						
1.8.2*	RETURN AIR DIFFUSERS / GRILLS without VCD (Extruded Aluminium powder coated) complete with fixing frames, nuts, bolts, gaskets, washers etc	8	SQM*						
1.9	GIU based control System as per specified in specification	4	LOT						
1.10*	40NB GI medium class INSULATED DRAIN WATER PIPING from various equipment like PACs etc upto nearest available drain point with necessary fittings like tees, reducers, expanders, elbows, flanges, valves with flanges, U trap etc as per specifications.	40	Rmt*						
1.11	FIELD INSTRUMENTS like gauges, switches for measuring of air flow, pressure, level & humidity sensor, Temperature sensor etc. and other instrument required for local monitoring & control etc for HVAC System	4	LOT						
C	Common items for all Air conditioning & Ventilation System for all Units								
1	415V ACDB, LPBS, LT power cables, LT control cables, screen control cables, LMS, Local starter, conduits etc. for completeness of HVAC system- :								
1.1	415V AC FUSE DB	4	NO						
1.2	Local Push Button Station(LPBS)	1	LOT						
1.3	Local Motor Starter	1	LOT						
1.4	Local starter panel (for contactors)	1	LOT						
1.5	LT Power Cables	1	LOT						
1.6	LT Control Cables	1	LOT						
1.7	Instrumentation Cables	1	LOT						
1.8	Cable tray/Conduits	1	LOT						
2	Structure Support for Duct, Fan Fixing and other equipments etc.	1	LOT						
3	Total lumpsum price for special tools & tackles for maintenance inclusive of packing forwarding, transportation up to site, etc. (Bidder shall submit item-wise price break-up).	1	LOT			NA			
4	Total lumpsum price for commissioning spares inclusive of packing forwarding, transportation up to site, etc. (Bidder shall submit item-wise price break-up).	1	LOT			NA			
NOTE									
1	The bidder shall furnish unit rates for variable item (marked *) for necessary adjustment (plus or minus) variation during detailed engg. stage. The unit rates quoted above shall be considered for adjustment. Unit rates shall be valid throughout the contract. Final qty. shall be paid as per actual erected qty. at site for all the variable items.								
2	Price format shall not be changed by the bidder as the bidder may get disqualified by doing so.								
3	The BOQ mentioned above shall be read in conjunction with technical specification requirement. Any item required as per technical specification but not specifically indicated in above BOQ, shall deemed to be included in total prices quoted by bidder. No additional price shall be payable against such items.								
Partic									
	Name	Designation					Company Seal		

SUGGESTED PRICE FORMAT APPENDIX-A Special tools & tackles for maintenance	Doc No:	PF-PE-455-571-15000A-A001
	Rev No:	0
	Date of issue	02.06.2020

NAME OF PROJECT:	4X210 MW ESP CONTROL ROOM - R&M-NTPC KAHALGAON- For Unit-1, Unit-2, Unit-3 and Unit-4
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NAME OF PACKAGE:	HVAC SYSTEM
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TECHNICAL SPECIFICATION No:	PE-TS-455-571-15000A-A001
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SL NO	DESCRIPTION	UNIT	Qty	AMOUNT (Ex-Works)	
1	FLAT D WRENCH - 6 MM TO 32 MM (12 Pcs)	SET	1		
2	BOX WRENCHES - 6 MM TO 22 MM (14 Pcs)	SET	1		
3	COMPLETE SETS OF RING SPANNER - 6 MM TO 32 MM (12 Pcs)	SET	1		
4	ALLEN KEYS - 2 MM TO 10 MM	SET	1		
5	CRESCENT SCREW SPANNER	NO.	1		
6	ADJUSTABLE SPANNER	NO.	1		
7	COMPLETE SET OF SCREW DRIVER	SET	1		
8	OFFSET SCREW DRIVER	NO.	1		
9	INSULATED PLIER	NO.	1		
10	GREASE GUN	NO.	1		
11	OIL GUN	NO.	1		
12	LINE TESTER	NO.	1		
13	TORCH LIGHT FOR 2 CELL	NO.	1		
14	HAMMER 1 LB	NO.	1		
15	OIL CAN	NO.	1		
16	POCKET THERMOMETER - 0 TO 50 DEG. C)	NO.	1		
17	INSULATION TAPE ROLL	NO.	1		
18	STEEL FOOT RULE - 12"	NO.	1		
19	FEELER GAUGE 9 BLADES	NO.	1		
20	PIPE WRENCH	NO.	1		
21	FLARE NUT (1/4")	NOS.	6		
22	FLARING TOOL	NO.	1		
23	TUBE CUTTER	NO.	1		
24	GAS CHARGING PIPE	NO.	1		
25	NITROGEN CHARGING ADAPTER	NO.	1		
26	FREON PRESSURE GAUGE (2 1/2" DIA DIAL)) 0 - 300 MM PSI	NO.	1		
27	FREON PRESSURE GAUGE (2 1/2" DIA DIAL)) 30 - 150 MM PSI	NO.	1		
28	PSYCHRO METER	NO.	1		
29	LOCK WITH KEY FOR TOOL BOX	NO.	1		
30	RATCHET 1/4"	NO.	1		
31	MS TOOL BOX	NO.	1		

NOTES					
1	ABOVE IS THE MINIMUM LIST. ANY OTHER TOOL / TACKLE REQUIRED FOR THE SYSTEM SHALL ALSO BE PROVIDED BY THE VENDOR WITHOUT ANY COST IMPLICATION.				

Particulars of bidder / authorised representative					
	Name	Designation	Signature	Date	Company Seal

SUGGESTED PRICE FORMAT
APPENDIX-B
Commissioning spares

Doc No:	PF-PE-455-571-15000A-A001
Rev No:	1
Date of issue	26.10.2020

NAME OF PROJECT:	4X210 MW ESP CONTROL ROOM - R&M-NTPC KAHALGAON
NAME OF PACKAGE:	HVAC SYSTEMM
TECHNICAL SPECIFICATION No:	PE-TS-455-571-15000A-A001

SL NO	DESCRIPTION	UNIT	Qty	AMOUNT (Ex-Works)	
1	Filters (each type)	SET	4		
2	Compressor Oil	LOT	4		
3	Refrigerant	LOT	4		

NOTES	
1	ABOVE IS THE MINIMUM LIST. ANY OTHER COMMISSIONING SPARE REQUIRED FOR THE SYSTEM SHALL ALSO BE PROVIDED BY THE VENDOR WITHOUT ANY COST IMPLICATION.

Particulars of bidder / authorised representative					
	Name	Designation	Signature	Date	Company Seal

SUGGESTED PRICE FORMAT ANNEXURE - II LIST OF MANDATORY SPARES		Doc No:	PF-PE-455-571-15000A-A001	
		Rev No:	1	
		Date of issue	26.06.2020	
NAME OF PROJECT:		4X210 MW ESP CONTROL ROOM - R&M-NTPC KAHALGAON		
NAME OF PACKAGE:		HVAC SYSTEM		
TECHNICAL SPECIFICATION No:		PE-TS-455-571-15000A-A001		
S. No.	Description	UNIT	Qty	Amount
A	HVAC SYSTEM			
1	Electrical Actuators			
1.1	Actuators	1 no. of each type, class, size and model whichever is more.		
1.2	Control/selector switch	5 nos. of each type and rating		
1.3	Control fuses	5 nos. of each type and rating		
1.4	Neutral link	2 nos.		
1.5	Vertical busbar dropper support insulator	3 nos.		
1.6	Power fuses	12 nos. (equally divided for all ratings)		
1.7	Each type of contactor	2 nos.		
1.8	Contactor coil of each type and rating	3 nos.		
1.9	Indication Lamps	5 nos.		
1.10	Each type of push button	10 nos.		
1.11	Indicating lamp holders complete	10 nos. (equally divided for all ratings)		
1.12	Terminal blocks of each type and rating	12 nos.		
1.13	Horizontal busbar support insulator	2 nos.		
2	Control Panels			
2.1	Control supply transformer (if any)	1 no. of each type and rating		
2.2	Relays and timers	1 no. of each type and rating		
2.3	Contactors	1 no. of each type and rating		
2.4	LEDs	5 no. of each type and rating		
2.5	Control switches	1 no. of each type		
2.6	Selector switches	1 no. of each type		
2.7	Push buttons	2 nos. of each type and colour		
2.8	Any special meters	1 no. of each type		
3	Control & Instrumentation			
3.1	Process Actuated Switch Devices			
3.1.1	a. Includes all types of Pressure, differential pressure, flow, temperature, level switch Devices.	10% or 1 no. of each type and model whichever is more		
TOTAL				
Notes:				
a) Spares listed in Price Schedule is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender specification apart from specified above, same shall be deemed to have been covered in bidder's scope of supply.				
b) Wherever 'set' is indicated, it shall mean complete replacement for one main equipment.				
c) "Total Population" as mentioned in the table, refers to the total population of the corresponding item as installed for all the units.				
d) Quantity mentioned in percentage (%) is the % of total installed.				
e) If percentage comes as fraction next higher integer should be considered for the purpose of quantity required.				
f) All Spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is "not applicable" for particular equipment, then suitable applicable alternate spare shall be offered / shall be supplied by the bidder without any financial implication."				
g) Any item which is quoted as "not applicable" by the bidder in the above list and is found to be "applicable" at a later date shall be supplied by the bidder without any commercial and delivery implication.				
h) Any cell left blank in the unpriced schedule shall be treated as "Quoted" and is included in total price.				
Particulars of bidder / authorised representative				
	Name	Designation	Signature	Company Seal