



BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT, NOIDA

Date-29-Oct-20

CORRIGENDUM- 06

PROJECT	:	NTPC, KORBA STPS, 3X200MW +3X500 MW+1X500 MW FGD
PACKAGE	:	GYPSUM DEWATERING SYSTEM
TENDER ENQUIRY NO	:	PE/PG/RGM/E-6514/2020 Dt. 03/09/2020
SUBJECT	:	REGARDING REPLY OF PRE BID QUERY

Type of Corrigendum			
Technical Corrigendum -	☒	Commercial Corrigendum -	☐

In reference to the above mentioned tender enquiry for **GYPSUM DEWATERING SYSTEM** package

Please find attached the reply of Pre-Bid query asked by bidders along with this Corrigendum no.6.

All the other terms and conditions of the tender enquiry remains same.

Yours faithfully,

For and on behalf of BHEL



NTPC KORBA-I, II & III
(3 X 200 MW + 3 X 500 MW + 1X500 MW)
PACKAGE: GYPSUM DEWATERING SYSTEM

SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

PRE BID CLARIFICATIONS - 1



NTPC KORBA-I, II & III
(3 X 200 MW + 3 X 500 MW + 1X500 MW)

PACKAGE: GYPSUM DEWATERING SYSTEM

SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

S I	Clause	Page No.	Statement of the referred clause	Clarification Required by Bidder(s)	BHEL's Clarification
1	5.6.B	45 of 600	Design clarified water analysis	Provide the temperature of the clarified water.	Clarified water shall be at 45 deg C.
2	2.1.1.5	31 of 600	Bidder to consider the requirement of the vertical seal water sump pumps (2 nos., 1 working + 1 stand by) in his scope for pumping the water expended from the Vacuum pump(s) to the Cake Wash Tank(s). The system shall be complete with pumps, valves, instruments and accessories along with associated supports, fasteners, gaskets etc. with drive (IE3 motor). Also, bidder to include all connection bolts/nuts/washers for installation. Required instruments and any safety device shall be supplied.	Please provide the PID for vertical seal water sump arrangement or bidder will consider the Valves, Instruments and accessories as per proven practice and same is consider for estimation.	P&ID of vertical seal pump with instrumentation requirement is already shown in "P & ID - Gypsum Dewatering System" page 477 of 600. Bidder to refer clause 2.0 of Sub section C4, page 262 of 600. Further, refer relevant clause in Sub section C4 for redundancy for instrumentation.
3	2.1.1.6	32 of 600	Vent fan including enclosure and its arrangement: Two (2) numbers	Bidder will consider Centrifugal type of vent fan. please confirm	Noted. Bidder to decide capacity and head of fan to meet system requirement in line with the tender specification.
4	2.1.1.6	32 of 600	Vent fan including enclosure and its arrangement: Two (2) numbers	Client to specify the MOC of Fume enclosure & ducting if any to be maintained.	Bidder to note that MOC of fan as well ducting shall be as per proven practice meeting the system requirement.
5	2.1.1.3	31 of 600	Vacuum belt filters complete with Accessories including discharge chute up to the gypsum conveyor skirt board.	Belt width & skirt board inside dimension to be provided to check the feasibility of proposed arrangement & profile of chute & angle.	Bidder to refer "Layout details of Gypsum Dewatering Building" page 505 & 506 of 600. The width of Gypsum conveyor belt is 800 mm and that of the skirt board is 533 mm.
6	2.1.1.9	32 of 600	Scope of below-mentioned interconnected piping (slurry, air and water pipes) along with valves, rubber lining (wherever applicable), instruments, valves, supports, gaskets, fasteners and accessories which is non-integral to Gypsum dewatering system is limited to engineering only and supply shall be made by BHEL. Engineering includes layout & routing of pipes, preparation of isometric drawing and BOQ:	We understand all the drawings required for the engineering shall be provided by BHEL (Drawings for valves, pumps and other requirements). Please confirm.	All relevant input drawings shall be made available during detailed engineering of the package
7	2.3	35 of 600	Any other items required not covered above but required for the completeness of the system; it shall be included in the offer and shall be supplied by the Bidder/supplier. Bidder shall refer to the P&ID enclosed in Annexure-IV, Sub-Section-D of Section-I for the items under the bidder's scope. All the items indicated in the P&ID are minimal requirements.	Items shall be supplied as per Client P&ID to make the system operable. If any specific requirement, please define.	Tender Specification requirement is clear. However, any specific query / clarity required may be sought by the bidder.



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SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

8	2.3	35 of 600	TERMINAL POINTS	TP point to be indicated in building GA for clarity. As mentioned in clause no. 2.3, point no.6 , TP distance at 5 meter from building boundary. Please identify the column & locate the same in GA drawing.	Coordinates shall be provided during detail engineering of the package.						
9	3.1	36 of 600	Codes & Standards	Design & Material shall be as per latest Indian Standard / Equivalent standards. Please confirm.	Latest edition of Codes and Standards mentioned at clause 3.1 and elsewhere in the tender Specification to be followed.						
10	4.3.4	38 of 600	The complete frame of the filter and all parts in contact with gypsum shall be made of corrosion resistant material or shall be provided with corrosion resistant liners of proven design.	since frames are not in contact with gypsum slurry hence shall be made of mild steel epoxy coated and parts which are in contact with slurry are mad of PP or MSRL. This is as per proven practice in similar application and same has considered.	Bidder is to follow the specification. The complete frame of the filter and all parts in contact with gypsum shall be made of corrosion resistant material or shall be provided with corrosion resistant liners of proven design. Accordingly, bidder may consider 'Corten / Weathering Steel' or 'SS 304' or any other suitable corrosion resistant material informing to ASTM A606-4, A588, A847 c. as applicable. The material so selected, could be meeting the strength requirement the belt filter.						
				As clause 4.3.4 does not clearly specify the MOC requirement for the filter frame, and as per our proven design for our earlier HBF installations, our Filter MOC considered is as follows:							
				<table><tr><th>Description</th><th>Details</th></tr><tr><td>Filter Frame</td><td>A36 Steel or equal</td></tr><tr><td>Surface Preparation / Coating for Steel parts / items</td><td>SSPC-SP10 / (1) Coat of 4 Mils of Red Oxide Primer+ (1) Coat of 4 Mils Epoxy pant (RAL5003). Total paint thickness of (8) Mils DFT</td></tr></table>		Description	Details	Filter Frame	A36 Steel or equal	Surface Preparation / Coating for Steel parts / items	SSPC-SP10 / (1) Coat of 4 Mils of Red Oxide Primer+ (1) Coat of 4 Mils Epoxy pant (RAL5003). Total paint thickness of (8) Mils DFT
				Description		Details					
				Filter Frame		A36 Steel or equal					
Surface Preparation / Coating for Steel parts / items	SSPC-SP10 / (1) Coat of 4 Mils of Red Oxide Primer+ (1) Coat of 4 Mils Epoxy pant (RAL5003). Total paint thickness of (8) Mils DFT										
Hence, request you to kindly confirm whether we can quote considering the above mentioned MOC, or should we consider SS 304 for Filter considering the clause 4.3.4.											



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PACKAGE: GYPSUM DEWATERING SYSTEM

SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

11	4.3.10	39 of 600	The filtrate from gypsum slurry and from cake washing shall be taken to a separate vacuum receiver tank(s) as per the proven practice of the supplier. Each belt filter shall have an independent vacuum pump.	Filtrate from slurry and cake washing will be collected in the single receiver, this is the proven practice hence Separate receiver tank is not required (as per Client PID dwg no : 3-FW-000-01095 filtrate is collecting in single receiver).	The P & ID attached with tender specification has to be followed.
12	4.3.11	39 of 600	Gypsum cake from each belt filter shall be discharged through a hopper onto belt conveyor being provided by the Employer.	Bidder understand that hopper means discharge chute only, Gypsum cake from each belt filter shall be discharged through a chute arrangement instead of hopper onto belt conveyor indicated in GA drawing.	Bidder's understanding is correct. Further note that in "Layout details of Gypsum Dewatering Building" page 505 of 600 cut out for discharge chutes have already been indicated.
13	4.5.6	40 of 600	All pumps shall be fitted with suction and discharge pressure gauges.	Bidder will supply pressure gauge as per Client PID.	The P&ID provided with tender specification has to be followed. However, if the pressure gauge is required at the pump suction for reliable operation; the same shall be provided to meet system control requirement.
14	4.4	39 of 600	Vacuum System	Client to specify the Margin of Motor for installed power over the Absorbed kW required to select the motor power	Bidder is to refer Clause 4.00.00 (b) page 202 of 600 of technical specification.
15	4.4	39 of 600	Vacuum System	Client to specify whether bidder can Choose either among rpm 1000 or 1500 rpm speed motor for vacuum pump?	RPM of vacuum pump shall be as per system requirement & should be of proven design of the sub supplier approved during detailed engineering.
16	4.4.2	39 of 600	The vacuum pump shall be of low speed liquid ring type of proven design.	Client to specify the low speed range for selecting the vacuum pump	RPM of vacuum pump shall be as per system requirement & should be of proven design of the sub supplier approved during detailed engineering.
17	4.4.6	39 of 600	Each vacuum receiver tank(s) shall be provided with slide plate type pneumatic vacuum breaker. The plate shall be stainless steel with a min. thickness of 3 mm.	Since we are maintaining sufficient barometric height and it is enough to break the vacuum. Further bidder shall provide vacuum breaker valve in Vacuum line to prevent excess vacuum generation if require.	Bidder to follow Tender specification



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PACKAGE: GYPSUM DEWATERING SYSTEM

SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

18	4.3.12	39 of 600	A 2 m (min.) wide platform shall be provided around each belt filter for easy approach & maintenance.	Not shown in provided Tender GA drawing. Please check & confirm the requirement. Please share Acad drawing to check the feasibility. This statement is contradicting with GA drawings where the one common platform is shown between both HBF's .Not all around. Also Client to confirm the scope of supply of Platform for both HBF and cyclone are in bidder's scope since it is not identified in Scope section.	Bidder to note that approach platform with access ladder for equipments in bidder's scope shall be provided by bidder. Regarding HBF, bidder to provide 2m (min) wide platform for each belt filter as per Clause 4.3.12, Page 39 of 600 or it may provide a common platform of 3.3m (approx.) width. The "Layout details of Gypsum Dewatering Building" page 505 & 506 of 600 is for reference purpose. In case, common platform for HBF is provided as mentioned above, a movable platform along with access ladder shall be provided for approaching equipment/item on other side of HBF. A 1000 mm wide platform with suitable approach shall be provided by the bidder for each hydro cyclone as per Clause 4.5.36, Page 42 of 600.
19	4.4.5	39 of 600	The vacuum receiver and pump internals shall be suitably lined to protect against the corrosive environment. The material selected for vacuum pumps & vacuum receivers shall be proven for similar application and shall be subject to approval of BHEL/NTPC.	Vacuum pump shall be without linings. bidder Will follow the vacuum pump specification mentioned in the page no 579 of 600. (consider Material of Construction of Vacuum Pump: MOC of vacuum pump shall be as below mentioned or better material as per SPECIFICATION No: PE-TS-466-571-A101 Page 3 of 5 1) Casting: ~ 2% Ni Cast Iron (GB 9439, HT 250)/ASTM A48, CLASS35 2) Shaft: Carbon Steel, En-8 or better 3) Impeller: Nodular Iron (ASTM A536, Gr.65-45-12) or better 4) Shaft Sleeve :(If applicable) Stainless Steel), please confirm.	Bidder to follow tender specification.



NTPC KORBA-I, II & III
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PACKAGE: GYPSUM DEWATERING SYSTEM

SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

20	4.5.8	40 of 600	Design pumps not to be damaged during reverse rotation at up to 150% of design RPM, at full discharge head in the event that a pump trips while the other operating pump remain on line.	Reverse rotation is not recommended. To have check valve, Immediately after discharge flange of pump.	The mentioned condition is for design. For routine operation, Check valve/ NRVs have to be considered as per requirement of system.
21	4.5.9	40 of 600	Pumps shall have stable head-capacity characteristics curve from run-off to shut-off. Shutoff head should be 115% of Best Efficiency Point (BEP).	We propose Shut-off head should be minimum 110 % instead of 115% of Best Efficiency Point (BEP). Please confirm.	Bidder to follow tender technical specification.
22	4.5.15	41 of 600	The pumps shall have mechanical seals of cartridge type with self-lubrication sliding ring cartridges. The static part will be mounted on the seal plate with circumferential ring (O ring) or another flexible sealing ring. Built in seal design will not be accepted.	The pumps shall be supplied with mechanical seals of single cartridge type with self-lubrication arrangement. However, other clause i.e. " The static part will be mounted on the seal plate with circumferential ring (O-ring) or another flexible sealing ring & built in seal design will not be accepted" is not applicable. Please confirm.	Bidder to follow Tender technical specification.
23	4.5.19	41 of 600	The material and thickness of the liners of slurry pumps shall ensure a minimum service life of 2 years before replacement. All the wear parts of the pump shall be guaranteed for a minimum wear life of not less than 14000 hours.	This clause is for slurry pumps only not for cake wash, Filter belt cloth wash and sump pump, slurry pumps are in client scope.	Filtrate extraction pumps to be installed at outlet of vacuum receiver tanks are slurry pumps which are in bidder's scope.
24	4.5.22	41 of 600	A common base plate shall be provided for pump assembly & Motor and the same shall be rigidly constructed, adequately braced and provided with finish pads for mounting pump.	It will be as per pump vendor standard.	Bidder to follow Tender technical specification.
25	4.5.34	41 of 600	Bidder to provide capacity of crane or hoist required for safe material handling and the details of heaviest component to be handled.	Details shall be provided during detail engineering. The handling facility for pumps in the layout shall be confirmed by Client to finalise the same.	Bidder's understanding is correct.
26	4.5.38	42 of 600	Equipments requiring monitoring during regular operation shall be approachable from the ground floor through staircase. Staircase with minimum width of 1200 mm shall be provided for approach to elevated structures at 5 m height from the nearest platform. Below this height, a vertical ladder with minimum clear width of 600 mm may also be acceptable.	As per enquiry document, platforms and staircase for Hydrocyclone and HBF are in bidder scope, others platform and staircase is in client scope, please confirm.	Refer the reply at point no. 18 above.



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SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

27	5.4	44 of 600	Hydro cyclone backpressure shall not exceed 20m H	Please clarify the requirement and Hydrocyclones feed inlet pressure will depends on the Hydrocyclone Vendor selection design to achieve the percents solids, Tonnage and PSD distribution.	Bidder is to follow specification requirement.
28	10.0.d	47 of 600	3d Modeling	There is no 3d modeling of layout from bidder side. Bidder shall provide the basic engineering of Equipment layout with load datas for the scope of supply of equipment and platforms by bidder. Rest all detail engineering of complete building by the client. The (Layout drawings) inputs to client shall be in Autocad format. Client to confirm the same.	Bidder to refer cl 10.0 (d) page 47 of 600 wherein 3D modelling has already been indicated under exclusion.
29	7.05.03	54 of 600	The vacuum pump shall be of low speed liquid ring type of proven design.	Client to specify the low speed range for selecting the vacuum pump	RPM of vacuum pump shall be as per system requirement & should be of proven design of the sub supplier approved during detailed engineering.
30		71 of 600	General Tech Spec- Part C-NTPC Spec.	This spec. is applicable for main contractor & not to BHEL's sub contractors. Please confirm.	Relevant clauses as applicable for the package are to be followed.
31	7.02.00	79 of 600	Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.	Not in bidder scope. Client to confirm.	Bidder to refer Clause 10.0 (c), page 47 of 600, wherein Cranes & Hoists for Material handling have already been indicated under exclusion.
32	8.00.00	79 of 600	DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY CONTRACTOR	This clause shall be discussed during meeting	Bidder to refer Note 1 of Annexure V, "Master drawing List with schedule of submission" page no 512 of 600.
33	8.03.01	80 of 600	BASIC ENGINEERING DOCUMENTATION & DETAILED ENGINEERING DOCUMENTS	This spec. is applicable for main contractor & not to BHEL's sub contractors. Please confirm. Bidder will provide the basic engineering documents and Detailed Engineering documents will be (As per scope of supply) as per mutually agreement.	The referred clause is of 'General Technical Requirements' of End client. The points relevant to bidder has to be followed. Further, Bidder to refer Annexure V, sub section D, page 508 to 513 of 600 of technical specification for drawing document submission schedule.
34	19.00.00	99 of 600	Colour coding	Vendor bought out equipments shall be as per vendor standards of colour coding and painting specs?.Pl confirm	Details shall be finalized during detailed engineering.



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(3 X 200 MW + 3 X 500 MW + 1X500 MW)

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SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

35	11.00.00	96 of 600	Equipment Bases:- A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete base.	Base frames for all pumps and vacuum pumps shall be MS Fabricated epoxy painted.PI confirm Also the Hold down/Anchor fasteners for foundations shall be MS Epoxy painted.PI confirm	Noted. Bidder to meet the system requirement.
36	7.15.00	205 of 600	The size and number of cables (for HT motors) to be intimated to the successful Contactor during detailed engineering and the Contactor shall provide terminal box suitable for the same.	It will decided by manufacturer according to the frame size	During detail engineering bidder will inform the size and number of cables as per their equipment rating/s. BHEL shall select the cable size as available from the procured lot and inform the same. Bidder shall provide terminal box suitable for the same.
37	3	262 of 600	MEASURING INSTRUMENTS (PRIMARY AND SECONDARY)	All instruments are mentioned in client P&ID will be taken into consideration.	Bidder to refer clause 2.0 of Sub section C4, page 262 of 600.
38	5.02.00	302 of 600	415 V/690 V LV VFD: The Variable frequency drive (VFD) system	Client scope	Bidder's understanding wrt. to Switchgears is correct. However, it does not include the VFD panel and same shall be in bidder's scope as per clause 30, Sub section C4, page 258 of 600, Specific Technical Requirements (C&I).
39	17.00.00	306 of 600	VFD PANEL REQUIREMENTS	As per TECH SPEC PART 2 OF 4 -PE-TS-466-571-A101 Technical specification pg. of 02 mentioned 11KV/3.3/415V Switch gears are in BHEL scope	Refer reply at SI No. 38 above.
40	19.00.00	307 of 600	HT SWITCHGEAR	As per TECH SPEC PART 2 OF 4 -PE-TS-466-571-A101 Technical specification pg. of 02 mentioned 11KV/3.3/415V Switch gears are in BHEL scope	Bidder's understanding related to switchgears is correct.
41	1.00.00	313 of 600	CONTROL DESK & PANELS	Not in bidder scope.	Bidder to refer clause 1, Sub section C4, page 256 of 600, Specific Technical Requirements (C&I), wherein it is indicated that GYPSUM DEWATERING SYSTEM (GDS) shall be operated from DCS (BHEL's scope).



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SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

42	1.0	315 of 600	LOCAL PANELS, This specification covers the Design, Manufacture, Inspection and Testing at the manufacturer's works, proper packing for transportation and delivery to site, supervision, erection, and commissioning at site of Local Panels required for control and monitoring of the Auxiliary Plant & Equipment.	Bidder will supply Junction boxes for the instruments	Noted. However local control panel, if envisaged by bidder for their system operation, same shall be provided.
43	2.b	438 of 600	Mandatory spares list 2,b) Belt - 2 Sets	For spare belt - bidder shall supply wear belt or sealing belt	Bidder to note that a set shall mean complete replacement for one equipment. All type of belts shall be covered accordingly.
44		506 of 600	Conveyor location	Please mark Centre line of conveyor w.r.t. to belt filter in GA drawing. BHEL to provide the conveyor details to finalise the profile of chute at conveyor feeding area (Skirt board inside width, length & height.) and The angle of inclination of conveyor is shown as 14 deg in feed zone. Client to ensure there is no slide back of cake.	Conveyor location is already indicated in the drawing attached with specification. However further details shall be provided during detailed engineering.
45		506 of 600	As per Layout drawing, Bucket Elevator, Lime feeding system, marked in vendors scope	These scope of engineering and Supply is Excluded from bidder scope, please confirm	These systems are excluded from the Gypsum Dewatering package and they are already marked under respective system supplier's scope in the layout drawing.
46		506 of 600	GA of GDW Building Sh1 of 2 & Sh 2 of 2-Monorail for HBF maintenance	Client to confirm the laydown/dropdown area anticipated for HBF components maintenance clearly in layout.	Bidder is to refer Notes mentioned at Page 505/506 of 600 of technical specification. The details shall be finalized during detailed engineering.
47		506 of 600	GA of GDW Building Sh1 of 2 & Sh 2 of 2 Height and location with respect to building grid of 1.Primary hydrocyclone feed tank 2.Sec hydrocyclone feed tank 3.Waste water tank 4.Filtrate tank	Client to confirm the height of Top of Tanks and dimensions from grid of HBF building.	Bidder is to refer Notes mentioned at Page 505/506 of 600 of technical specification. The details shall be finalized during detailed engineering.
48		505 of 600	GA of GDW Building Sh1 of 2 & Sh 2 of 2 Conveyor location	Bidder battery limit ends at bottom of discharge chute. Belt conveyor selection & conveyor profile & detailing by others.	Bidder's understanding is correct.



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SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

49	3	512 of 600	Only manual calculation with authentic supporting literature (e.g. extracts of hand Book/standard/codes) shall be acceptable. All design calculations and drawings shall be in SI system only.	The calculation done by reputed software, please confirm	Noted. However, all calculations shall be with authentic supporting literature (e.g. extracts of hand Book/standard/codes) shall be acceptable. All design calculations and drawings shall be in SI system only.
50	1.4	578 of 600	The vacuum box shall ensure tight sealing with the belt/cloth and shall be of proven design. MOC of Vacuum Box Should be preferably UHMW-PE	MOC of the Vacuum Box shall be Polypropylene (PP) material, which is the proven practice for the similar type of application.	Tender specification requirement is clear. However, bidder can propose any material equivalent or superior to UHMW- PE during detail engineering.
51	1.0.II.5	579 of 600	The pumps shall be connected to its motors by flexible couplings. All couplings shall have suitable rigid steel coupling guards having closed ends and anchored to the base plate.	Bidder generally suggest V- Belt driven Vacuum Pumps, which has the option to vary the rpm by changing the pulley diameter if required. Client to confirm whether v-belt pump is ok?	Vacuum pump drive arrangement shall be selected by bidder to meet system requirement as per proven practice and shall be approved during detailed engineering.
52	1.0.II.a.7	579 of 600	Impeller Tip speed to be kept in range of 13-22 m/sec.	provide the tip speed of Vacuum Pumps need to maintain.	Tip speed of Vacuum pump shall be in range of 13-22 m/sec.
53	III-B	580 of 600	For sealing of inspection doors labyrinth type arrangement to be provided.	For sealing of inspection doors of chute rubber gaskets shall be provided instead of labyrinth as it is static / stationary equipment. Please confirm.	Bidder may propose better proven solution for finalization during detailed engineering.
54	III-C	581 of 600	On e (1) no. chute blockage switch for each belt filter of proven type (subject to approval of the employer) shall be provided. Chute blockage switch shall trip the feeding conveyor in case of Chute blockage and protect the feeding conveyor equipment.	Since chute is around 2.4 m wide and 0.8 m width, chances of Cake blockage in the chute is less, as per the previous experience, it is not required for HBF Discharge chute. Hence supply is excluded from bidder scope.	Bidder to follow specification requirement.
55	1.0.III.c	581 of 600	Complete chute work in the region of flap gates shall be fabricated from 20 thk TISCRAI or equivalent.	Please confirm the requirement of flap gate & its location in layout.	Flap gate is not applicable.



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SECTION-III

ANNEXURE 3

DATE 23-10-2020

56	V.a	581 of 600	The cake/cloth wash pumps shall be horizontal centrifugal type designed for continuous operation with semi-open or closed impeller. Casing, Gland and Stuffing Box shall be of 2.5 Ni Cast Iron to IS:210 Grade FG 260 or equivalent. Impeller, Wearing rings (as applicable) shall be of Stainless Steel -316 grade and Shaft & Shaft sleeves shall be of SS-410 grade.	Noted.PI specify the MOC for filtrate pumps. Else bidder shall select the same and proceed as per process requirements.	Bidder may note the typical MOC of Filtrate Extraction Pumps as follows: a) Casing: 1. Ductile Iron (65-45-12, ASTM A536) with replaceable rubber liner- 14000 hours to be guaranteed. OR 2. Ductile Iron with Hi Chrome liner – 14000 hours to be guaranteed. OR 3.Hi Chrome (ASTM 532 Grade IIIA) - 24000 hours to be guaranteed. b) Impeller: Hi Chrome or superior material with 14000 hours guarantee. c) Solid Shaft: Duplex 2205 /EN8D /EN9 d) Shaft sleeve at mechanical seal: CD4MCU ASTM A 743/ Duplex 2205 e) Base Plate: Carbon steel with Epoxy Coating Bidder shall provide MOC of proven design to be approved during detailed engineering as per system/process requirement. The material and thickness of the liners shall ensure a minimum service life of 2 years before replacement
57	VI.a	581 of 600	Cake/Cloth Wash pump shall be 1500/3000 RPM.	PI specify the RPM for filtrate pumps if any preferred. Else bidder shall select the same and proceed as per process requirements.	RPM of pump shall be as per system requirement & should be of proven design of the sub supplier approved during detailed engineering.
58	VI C	582 of 600	The slurry pumps shall be provided with motorized suction and discharge valves. In addition, flushing water lines with motorized valves shall be provided for each pump for automatic flushing of the pump after each shut down.	Bidder will consider Pneumatic actuated butterfly valve as per Client PID, please confirm.	Pneumatic valves are acceptable.



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(3 X 200 MW + 3 X 500 MW + 1X500 MW)

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SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

59				Drip tray (civil work) design, Engineering and supply is in Client scope. Please confirm.	Noted. However, bidder to provide the input of the drip tray.
60			Vacuum System	Client to specify whether bidder can Choose either among rpm 1000 or 1500 rpm speed motor for vacuum pump?	RPM of motor may be selected by bidder as per system requirement.
61			-	Cake wash, Cloth wash and Filtrate pumps shall be direct driven pumps through spacer coupling or V-Belt connection as per pump Vendor standard.-.Please confirm	Direct driven pumps through couplings to be provided.
62			-	Piping software and version details to be provided	Bidder to note that CEASER is being used by BHEL for stress analysis. Bidder to share analysis compatible to same. Further details shall be shared during detail engineering.
63			-	Stress analysis /Critical line list to be provided	
64			-	Stress analysis software and version details	
65			-	Model review software and version details	BHEL is using SP3D/PDMS platform for 3D modeling. Bidder to share model compatible to same. Further details shall be shared during detailed engineering.
66			-	Interface details if any	Specification requirement is clear. Further details shall be discussed during detailed engineering.
67			Area is in safe or hazardous zone	Kindly Confirm	Area is not classified in Hazardous zone
68			Excluded 1. LCP & VFD Panel 2. Control Desk & Panels 3. Transformer 4. Furnitures	-	1) For LCP and VFD panel refer clarification at SI No. 38 above. 2) For control desk and panels refer clarification at SI No. 41 above. 3 & 4) Transformer and Furniture are excluded from bidder's scope.
69			Approved Vendor List	Kindly provide	Refer notes mentioned at Page 436 of 600.



NTPC KORBA-I, II & III
(3 X 200 MW + 3 X 500 MW + 1X500 MW)

PACKAGE: GYPSUM DEWATERING SYSTEM

SPECIFICATION No: PE-TS-466-571-A101

SECTION-III

ANNEXURE 3

DATE 23-10-2020

70			Particle Size Distribution	The Particle Size Distribution (PSD) provided by BHEL for Hydrocyclone feed is very fine resulting in very fine fraction particles feeding to HBF. This will impact on cake moisture and other process parameters.	Bidder to note the gypsum particle size distribution (PSD) to be used for designing Hydrocyclones and Vacuum Belt Filter shall be as per the PSD curve provided in the tender specification.
71			Particle Size Distribution	The percentage of fines at primary hydro cyclone feed are too high (50% <20 μ, 80% <30 μ). It is difficult to classify such high percentage of fines in hydro cyclone and may hinder the dewatering process in VBF. The maximum percentage of fines (<20 microns) shall be restricted to 15% in hydro cyclone feed. Please confirm.	All guarantees of Gypsum dewatering system performance shall be met by bidder as per the provided PSD only. The PSD curve provided in the technical specification is a standard curve and the Vacuum Belt Filter based on the same are running successfully.
72			Solid% in Gypsum Feed Slurry	The solids % in primary hydro cyclone slurry is comparatively dense (30%). Generally, it is in the range of 15-20%. Please confirm.	Bidder to follow specification.
73			Gypsum Purity	Chemical composition of solids in feed slurry at hydro cyclone inlet is not provided. The main concern is about the impurities (like inerts & fly ash) content in hydro cyclone feed since high impurities content (>10%) hinders the dewatering process in VBF. Hence, the impurities content shall be restricted to max. 10%. Please provide feed slurry solids chemical composition.	Bidder to refer clause 1.2.4 Sub section C1, page 38 of 537, wherein it is mentioned that the Gypsum purity is in BHEL's scope. However, the moisture content (<10%) and chloride content (<100 ppm) in the output gypsum cake is to be guaranteed by the bidder at rated capacity. Feed slurry solids composition will be shared during detail engineering.
74					P&IDs for Bidder's scope of Engineering as per Clause 2.1.1.9 (ii) (d), (e) & (f) are enclosed as Annexure-A to this pre-bid clarifications.

ANNEXURE-C

THIRD ANGLE
PROJECTION

No. REQ'D

A3

DRAWING No.

SECONDARY
HYDROCYCLONE A/B
B240-00451
FROM WASTE WATER PUMP A/B
00 HTM 05 AP 001/002

ENGINEERING BY GDW SYSTEM
SUPPLIER AS PER SUB SECTION C1,
CLAUSE 2.1.1.9 (ii) (d) & (f).

FILTRATE
B240-00411
FROM VACUUM RECEIVER A
00 HTM 02 BB 001
FILTRATE
B240-00412
FROM VACUUM RECEIVER B
00 HTM 02 BB 002
FILTER WASHING WATER
B240-00411
FROM VACUUM BELT FILTER A
00 HTM 01 AT 001
FILTER WASHING WATER
B240-00412
FROM VACUUM BELT FILTER B
00 HTM 01 AT 002
GYPSUM SLURRY
B240-00445
FROM SECONDARY HYDROCYCLONE A
FROM 00 HTM 02 AT 001
GYPSUM SLURRY
B240-00445
FROM SECONDARY HYDROCYCLONE B
FROM 00 HTM 02 AT 002

FILTRATE WATER TANK LEVEL SIGNAL
B240-00200
FILTRATE RETURN CONTROL
FILTRATE WATER TANK LEVEL SIGNAL
B240-00201
FILTRATE RETURN CONTROL
FILTRATE WATER TANK LEVEL SIGNAL
B240-00202
FILTRATE RETURN CONTROL
FILTRATE WATER TANK LEVEL SIGNAL
B240-00203
FILTRATE RETURN CONTROL

00-250-FS-4327-AA60
B240-00203
FROM ABSORBER
40 HTD 00 BB 001

00-300-FS-4321-AA60
B240-00202
TO ABSORBER
30 HTD 00 BB 001

00-25-WP-8530-CC01
PROCESS WATER
B270-10431

NOTE A001
MOTOR PID ARE NOT SHOWN.

NOTE A004
TO PREVENT NONFUNCTIONING OF SLURRY TANK,
PUMP SUCTION VALVE DUE TO SOLID SEDIMENTATION,
THE SHAFT OF BUTTERFLY VALVE SHOULD BE INSTALLED HORIZONTALLY
AND UPPER HALF OF THE DISC SHOULD BE TURN INTO TANK INSIDE.
SUCTION VALVES SHALL BE MOUNTED ON NOZZLE DIRECTLY
AS LONG AS ACTUATOR DOES NOT COLLIDE WITH TANK CASING.

NOTE A006
DISCHARGE OF DRAIN AND OVERFLOW LINE SHALL HAVE
45 DEG INCLINATION TOWARD FLOW DIRECTION OF TRENCH
FOR SMOOTH FLOW.

NOTE A008
TEMPORARY STRAINER SHALL BE INSTALLED AT THE PUMP SUCTION
FOR THE TERMS OF PRE-COMMISSIONING.

NOTE A009
THERE SHOULD BE CERTAIN DISTANCE BETWEEN NOZZLES FOR
INFLUENT LINE AND PUMP SUCTION NOZZLE AS LONG
AS THERE IS NO INSERT PIPE.

NOTE A011
RO SHALL BE INSTALLED IN VERTICAL LINE.

NOTE B002
OPEN AND CLOSE CONTACT SWITCHES ARE FOR REFERENCE ONLY.
IN CASE THAT THERE IS CUSTOMER'S SPECIFICATION,
THEY SHOULD BE DECIDED BASED ON IT.

CUSTOMER NOS: G205toG207&G505toG508

CUSTOMER: NTPC LIMITED.
PROJECT: KORBA STG-I,II&III(3X200MW&4X500MW)
FGD SYSTEM PACKAGE

DEPT	NAME (BHEL)	DATE
DRN	M.VENKATA RAMAN	16.05.20
CHD	P.N.REDDY	16.05.20
APPD	ACR/RSB	16.05.20

MITSUBISHI HITACHI POWER SYSTEMS, LTD.
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

PROJECT: P & ID-GYPSUM DE WATERING SYSTEM
(FILTRATE WATER TANK)

SCALE : NTS

NTPC DRG NO: 2100-109-PVM-F-020

SH 11 of 12

BHEL DRG NO

FILE NO

B240-00431

REV NO

00

S NO	SECTION	FLOW m ³ /hr	TEMP(°C)	DENSITY(kg/m ³)
1	Gypsum slurry from gypsum area drain sump pump	50	61.4	1219
2	Filtrate water from vacuum receiver	113.1	61.4	1006
3	Wash Water from vacuum belt filter	91.9	45.0	990
4	Underflow from sec waste water hydrocyclone	62.7	61.4	1259
5	Waste water slurry from waste water tank	46.9	61.4	1023
6	Suction line of filtrate tank pump	525	58.0	1068
7	Discharge line from filtrate pump	525	58.0	1068
8	Common discharge line to absorber	525	58.0	1068
9	Process water for flushing	3.0	45.0	990

0 1 2 3 4 5 6 7 8 9 10

ANNEXURE-C

THIRD ANGLE
PROJECTION

No. REQ'D

A3

DRAWING No.

ENGINEERING BY GDW SYSTEM
SUPPLIER AS PER SUB SECTION C1,
CLAUSE 2.1.1.9 (ii) (e).

NOTE A001
MOTOR PID ARE NOT SHOWN.

NOTE A004
TO PREVENT NONFUNCTIONING OF SLURRY TANK,
PUMP SUCTION VALVE DUE TO SOLID SEDIMENTATION,
THE SHAFT OF BUTTERFLY VALVE SHOULD BE INSTALLED HORIZONTALLY
AND UPPER HALF OF THE DISC SHOULD BE TURN INTO TANK INSIDE.
SUCTION VALVES SHALL BE MOUNTED ON NOZZLE DIRECTLY
AS LONG AS ACTUATOR DOES NOT COLLIDE WITH TANK CASING.

NOTE A006
DISCHARGE OF DRAIN AND OVERFLOW LINE SHALL HAVE
45 DEG INCLINATION TOWARD FLOW DIRECTION OF TRENCH
FOR SMOOTH FLOW.

NOTE A008
TEMPORARY STRAINER SHALL BE INSTALLED AT THE PUMP SUCTION
FOR THE TERMS OF PRE-COMMISSIONING.

NOTE A009
THERE SHOULD BE CERTAIN DISTANCE BETWEEN NOZZLES FOR
INFLUENT LINE AND PUMP SUCTION NOZZLE AS LONG
AS THERE IS NO INSERT PIPE.

NOTE A011
RO SHALL BE INSTALLED IN VERTICAL LINE.

NOTE B002
OPEN AND CLOSE CONTACT SWITCHES ARE FOR REFERENCE ONLY.
IN CASE THAT THERE IS CUSTOMER'S SPECIFICATION,
THEY SHOULD BE DECIDED BASED ON IT.

NOTE
BHEL SHALL REFLECT THE SIZE AND DESIGN OF TERMINAL POINT.
DRAIN LINE SHALL BE PROVIDED IF NECESSARY.

CUSTOMER NOS: G505toG508&G205toG207

CUSTOMER: NTPC LIMITED.
PROJECT: KORBA STG-I, II & III (3X200MW & 4X500MW)
FGD SYSTEM PACKAGE

DEPT	NAME (BHEL)	DATE
DRN	M.VENKATA RAMAN	16.05.20
CHD	P.N.REDDY	16.05.20
APPD	ACR/RSB	16.05.20

MITSUBISHI HITACHI POWER SYSTEMS, LTD.
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

TITLE: P & ID-GYPSUM DEWATERING SYSTEM
(WASTE WATER TANK)

SCALE : NTS

NTPC DRG NO: 2100-109-PVM-F-020

SH 12 of 12

BHEL DRG NO

FILE NO

B240-00451

REV NO

00

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DRAWINGS OF APPLIANCES EXCEPT WHERE PROVIDED
FOR AGREEMENT WITH SAID COMPANY.

S NO	SECTION	FLOW m ³ /hr	TEMP (°C)	DENSITY kg/m ³
1	Gyp slurry from sec hydrocyclone	104.5	61.4	1023
2	Gyp slurry to WW pump Suction	155.0	61.4	1023
3	Gyp slurry from WW pump discharge	155.0	61.4	1023
4	Gyp slurry to filtrate water tank	62.7	61.4	1023
5	Process water line for flushing	3	45	990
6	Gyp slurry to NTPC terminal point	52.0	61.4	1023

0 1 2 3 4 5 6 7 8 9 10