

BHEL- PSER KOLKATA 	3X660 MW NABINAGAR SUPER THERMAL POWER PROJECT TECHNICAL ENQUIRY SPECIFICATION FOR LHP & GHP OF FGD	DOCUMENT No. NTPC/NABINAGAR
	Customer : NABINAGAR POWER GENERATING COMPANY PRIVATE LIMITED (NPGCPL)	IS-1-19-2015

**TECHNICAL SPECIFICATION FOR
LHP (LIMESTONE HANDLING SYSTEM) & GHP (GYPSUM HANDLING SYSTEM) OF FGD
(FLUE GAS DESULPHERIZATION)**

3X660 MW NABINAGAR SUPER THERMAL POWER PROJECT

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A. PROJECT INFORMATION:

Present proposal is for setting up Limestone Handling system & Gypsum Handling System for 3 X 660 MW NTPC - Nabinagar Super Thermal Power Project, a pit head coal based thermal power project, which is located at Nabinagar, Aurangabad districts of Bihar State. NPGCPL is a joint venture of NTPC and BSEB.

B. BROAD SCOPE:

The scope broadly covers providing labour, supervision, T&Ps, consumables etc. as per technical specification and terms & conditions of tender taking into account all clarifications, confirmations and agreements till date for complete work of handling including receipt of materials from BHEL/Client's stores/storage yard, arranging their issue, site transportation, temporary storage prior to erection, if required, cleaning, transportation to site, preservative painting, pre-assembly erection, alignment, welding, leveling, adjustment, chipping & leveling of foundation, grouting, cabling, termination, completion of electrical and C&I work in all respect, including erection of free supplied material by BHEL, Handing over of mandatory spares, all pre-commissioning tests, commissioning, start-up and trial operation and handing over of Limestone Handling System (LHS) & Gypsum Handling System (GHS) of Flue Gas Desulphurisation System of 3 X 660 MW NPGCL Nabinagar FGD, Aurangabad, Bihar.

Touch-up paint at site of all equipment's/items after erection & commissioning shall also be in the bidder's scope of work.

Bidder to note that E&C of all free issue items (in mechanical as well as electrical scope) in this specification shall also be in bidder's scope of work.

Assistance towards achieving the PG parameters of equipment/system and complete conveying system as a whole, during PG test conducted for limestone handling and gypsum handling shall be the responsibility of the bidder.

INSTALLATION SERVICES, ERECTION AND COMMISSIONING:

- 1) Scope includes preparation of storage area, preparation/ construction of temporary covered shed for storage & preservation of all supplied material for this package, storage, security, site handling, shifting to erection location, erection & commissioning, trial operation, preparation of protocols and getting signed from end customer, final painting at site after erection, carrying out performance guarantee tests and handing over to the end customer until satisfactory completion and written confirmation from the end customer.**
- 2) For Free issue items: For free supply items such as, HT MOTORS (for Crushers).**

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3) Below mentioned tentative list of equipment is to give only general idea of LHS & GHS system/ equipment's to the Contractor for complete erection and commissioning of Limestone Handling System (LHS) & Gypsum Handling System (GHS) package. Any increase in the quantity, if required to meet the system/maintenance/operational requirement shall be absorbed by the bidder without any extra cost implication to BHEL. Also, any equipment's/systems not mentioned in this specification but which are required for the completion and smooth running of the FGD system, contractor shall do the erection and commissioning of that system within the finally accepted rates / prices. The list of equipment given below for erection, commissioning, testing, trial run, PG Test and Handing over of LHS & GHS Package is only for reference and not exhaustive and any other associated equipment/items required for satisfactory completion of the systems shall be in bidder' scope: -

LIMESTONE HANDLING PLANT		
Sl. No.	ITEM DESCRIPTION	QTY.
1	Truck Tippler capable of handling minimum 40 Ton Capacity Trucks (Gross Weight: 60 Ton) with all associated Electricals and C&I.	2 Nos
2	Surface Feeder/Box Feeder/Bulk Receiving Unit Rated 200 TPH and Design 220 TPH capacity with Dust extraction system its enclosures and inspection doors complete with all associated Electricals and C&I.	2 Nos
3	Conveyor System- Rated capacity/Design capacity- 150/165 TPH – 800 mm BW. (Uncrushed Limestone) , -Complete with idlers (with brackets), all types of pulleys, deflector rollers, drive chain system (LT motors, gear boxes, all types of fluid couplings, geared couplings, brakes, input output couplings, etc.), skirt boards, technological structures, deck plates, gravity take up arrangement, foundation bolts, drive base frame etc. complete with all associated Electricals and C&I.	1 lot
4	Belting – Ny/Ny – FR grade (Thickness – Top/Bottom – 5/2 mm), 800 mm belt width	1 Lot
5	Limestone reversible Hammer Mill Crusher - Rated capacity/Design capacity- 150/165 TPH (-) 250mm , occasional lump size of 1-2% 400 mm to be reduced to (-)20mm output size complete with all associated Electricals and C&I.	2 Nos
6	Vibration Isolation System for crusher	1 Lot
7	Limestone Sampling Unit at Limestone Crusher House complete with all associated Electricals and C&I.	1 No

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8	Vibrating Screening Feeder - Rated capacity/Design capacity- 150/165 TPH complete with all associated Electricals and C&I.	2 Nos
9	Belt scales/Belt Weighers along with all electricals and C&I.	4 Nos
10	Suspended Magnets with fixing lugs, all electricals and C&I.	2 Nos
11	Metal Detectors with all electricals and C&I.	4 Nos
12	Inline Magnetic separators (ILMS) with belt, drives, fixing lugs, rope fixing accessories, tramp iron chute all electricals and C&I etc.	2 Nos
13	Belt feeder (LC 1A/B, 2A/B, 3A/B) – Rated / Design Capacity - 150/ 165 TPH , (in Crusher House & TP)	6 Nos
14	Rack & pinion gate	6 Nos
15	Rod Gates	6 Nos
16	V Type Plough Diverter	6 Nos
17	Chutes with chute support structure, chute block switches, chute vibrators in TPs, crusher house, truck tippler complex etc. including liners in crusher supporting RCC deck, tramp iron chutes Liners, Deck plates, Skirtboards	1 Lot
18	Flap gates with actuators with supports, all electricals and C&I	4 No.
19	Electrical Hoist with all electricals and C&I.	1 Lot
20	Manual hoist with travelling trolley and chain pulley blocks.	1 Lot
21	Sump Pumps including discharge piping valves, accessories & support structure along with all electrics and C&I.	1 Lot
22	Field Instruments as per NTPC specifications	1 Lot
23	Dust Extraction system for all conveyor discharge & receipt points in JT's, Crusher house, Silos, Box Feeder/Bulk Receiving Unit complete with all associated Electricals and C&I.	1 Lot
24	Ventilation system complete with all associated Electricals and C&I.	1 Lot
25	Water system complete with all associated Electricals and C&I. - Drinking Water Pumps - Service Water Pumps	1 Lot
26	Exhaust Fans for battery rooms & toilets	1 Lot
27	Fluid Couplings (as applicable)	1 Lot
28	Belt vulcanizing machine, Hydraulic/Pneumatic press type with all accessories, consumables, etc.	1 No
29	All scrappers (internal & external) for conveyors and belt feeders	1 Lot

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30	Bulk Limestone Storage Silos Accesories	1 Lot
31	Passenger cum goods Elevator – 16 persons (1088 kg capacity), AC, Conventional enclosure type (rope and sheave type), Staircase access for machine room shall also be provided in the crusher house complete with all associated Electricals and C&I.	1 Set
32	Bucket elevator (150 TPH/165 TPH)	4 Sets
33	Vibro Feeder	4 Nos.
34	Limestone Reversible Belt feeder LSRBF#1/2– Rated / Design Capacity : 150 / 165 TPH complete with all associated Electricals and C&I.	2 Nos
35	Debris Chute for all junction towers and LCH and Tramp Iron Chute for ILMS and Tramp iron trolleys (4nos) for crusher house.	1 Lot
36	Weigh bridge 100 MT capacity complete with all associated Electricals and C&I.	1 Nos.
37	Sump Pump, capacity 50 m3/hr	1 Lot
38	Complete erection, commissioning of all Electrics and C&I items as required for the mechanical scope including BHEL supplied free issue items.	1 Lot
39	Handling Over of Mandatory Spares as Per Annexure A	1 Lot
	GYPSUM HANDLING PLANT	
Sl. No.	ITEM DESCRIPTION	QTY.
1.	Conveyor System GHS1A & GHS 1B respectively from below of vacuum belt filter discharge chutes for gypsum discharge, Rated/Design :150/165 TPH-800 mm Belt Width —Complete with idlers (with brackets), all types of pulleys, deflector rollers, drive chain system (LT motors, gear boxes, all types of fluid couplings, geared couplings, brakes, input output couplings, etc.), skirt boards, technological structures, deck plates, gravity take up arrangement, foundation bolts, drive base frame etc. complete with all associated Electricals and C&I.	1 Lot
2.	Belting – Ny/Ny – 800 mm belt width FR grade (Thickness – Top/Bottom – 5/2 mm)	1 Lot
3.	Travelling Tripper (with Two way chute arrangement) – Rated capacity/ Design capacity – 150/165 TPH with supports, rails, rail fixtures, clamps and other all electricals and C&I, drives & accessories	2 Nos

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4.	Chutes with chute support structure, chute block switches, chute vibrators in TPs, crusher house, truck tippler complex etc. including liners in crusher supporting RCC deck, tramp iron chutes Liners, Deck plates, Skirtboards	1 Lot
5.	All scrappers (internal & external) for conveyors and belt feeders	1 Lot
6.	Field instruments	1 Lot
7.	Chute Block switch	1 Lot
8.	Weigh bridge 100 MT capacity complete with all associated Electricals and C&I.	1 Nos.
9.	Dry Type dust extraction system for gypsum storage shed complete with all associated Electricals and C&I.	1 Lot
10.	Sump Pump, 50 m3/hr	1 Lot
11.	Complete erection, commissioning of all Electrics and C&I items as required for the mechanical scope including BHEL supplied free issue items	1 Lot
12.	Handing Over of Mandatory Spares as Per Annexure A	1 Lot

- 4) Bidder to erect & commission monorail electric hoist for handling of Truck tippler sub-assemblies.
- 5) Minimum two (2) Nos. sump pumps in gypsum storage shed complete with motors, local control panel, level switches, individual discharge piping with fittings and valves to nearest plant drain including pipes etc. up to disposal point.
- 6) Successful bidder shall take prior approval from BHEL while placing the E&C order for this package to their sub-contractor. BHEL reserves the right to disapprove/reject any such E&C contractor which BHEL deems not fit for executing E&C for this contract.
- 7) Bidder's scope shall also include supply and filling of consumables, lubricants, hydraulic oil for flushing, first fill, and further top up for bidder's equipment as well as free issue items, till final handing over to the end customer.
- 8)** Bidder's scope shall include erection and installation of belts (for conveyors, belt feeders), Crushers & Hammer Mills (along with scoop couplings, drive base frame, vibration isolation system, HT/LT motors), Screens with drive, drive system and machine mounted DE system), with associated electricals (as mentioned in Sec-E: Electrical scope) in this project. For these items, receipt, unloading at site, storage, and security shall be in bidder's scope. Including raising the requisition to store manager, shifting these items to erection fronts, followed by erection & commissioning, painting at site after erection, trial operation and carrying out PG test under the supervision of respective equipment OEM for these items.

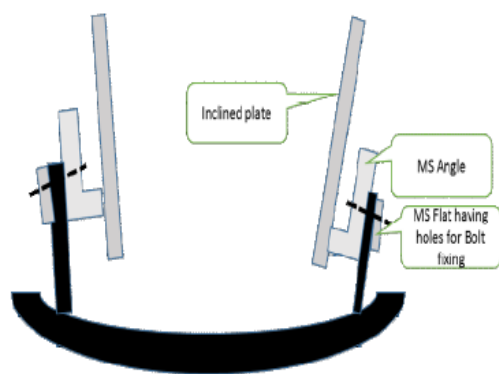
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- 9) Erection of all technological structures of conveyors, HGTU tower structures, hoist maintenance platforms, access stools & ladders, flap gate support with access ladders, chutes & chute supporting structures, supporting arrangement for flap gate actuators, tramp iron chute, mounting brackets for switches etc. in TPs/JTs, Pent Houses, Crusher House, etc. shall be in the bidder's scope of work.
- 10) Technological structure of HGTU/VGTU shall also include the HGTU/VGTU tower along with other items like HGTU trolley, trolley support, sheaves, wire rope, counter weight box, cradle etc. and all these shall be in bidder's scope of erection and commissioning. Erection of structural steel for VGTU (except for the ones appearing along with buildings or in between conveyor trestles) & HGTU tower shall also be in bidder's scope. Fabrication and erection of such towers is also in the scope of bidder. BHEL Civil shall provide foundation based on the inputs provided by bidder.
- 11) The guide pipes/ channels and fixing brackets for take-up units shall be in bidder's scope. Guide Pipes for counterweights/ take-up travel in VGTU and HGTU shall be supported at various elevations to avoid any bending of guide pipes. The cradle is to be designed accordingly.
- 12) counterweights for conveyors shall be of cast iron type, E&C of the same is in the scope of the bidder.
- 13) Impact idlers with 400mm spacing (min. 6 nos.) shall be provided at loading point.
- 14) Discharge hood, spout, chute work from Bulk Receiving unit & below in truck tippler complex, complete discharge hood, spout, interconnecting chute work in crusher house (i.e. (a) above & below screens, (b) between screens and crushers, (c) below crushers, and (d) including chutes with liners in GERB VIS deck and rubber bellows at inlet and outlet flanges of crusher and screen), and reclaim hopper complex shall be in bidder's scope of E&C. Bidder shall prepare interconnecting chute drgs. based on equipment GA drawings furnished by BHEL.
- 15) The location of chute block switch in chutes shall be based on the approved coasting time calculation of that conveyor.
- 16) Gear boxes shall be helical conforming to IS:3681 (latest revision) or spiral bevel speed reduction units conforming to suitable Indian Standards Above 40 kW drive rating, all gearboxes shall be helical or bevel helical type only.
- 17) Bidder shall get the selected pulley diameter vetted for its adequacy from the belt supplier. Any changes suggested in pulley diameter or its type by belt supplier thereof shall be incorporated by the bidder. Minimum pulley diameter and face width will be selected as per IS-8531 or recommendation of belt manufacturers, whichever is higher.
- 18) Height of skirt board shall be minimum 900 mm for uncrushed limestone, 750 mm for crushed Limestone.

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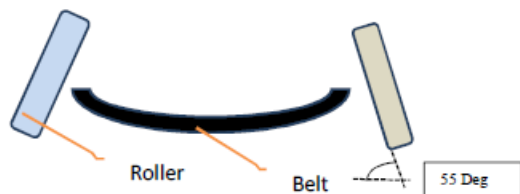
Skirt board shall ensure centralized loading of conveyor belt to avoid material spillage. Suitable 'Skirt Plates' shall be provided for entire feeding chute and shall be extended minimum 3m ahead of front edge of chute and 500 mm beyond rear edge of chute. The width of the Skirt Boards shall be two-third the conveyor belt width. In the belts where Limestone of appreciable lump size (250 mm) is being conveyed, the gap between the bottom of the skirt board and the belt shall be made to increase uniformly in the direction of belt travel. The height of the skirt boards shall be sufficient to contain the material volume as it is loaded on the belt and shall not be less than 750 mm for conveyors. The height of the skirt board for belt feeders/ reversible belt feeders (if any) shall be minimum 1000 mm. The skirt plates shall be fitted with replaceable belt piece having facility of adjusting the pressure on the belt conveyor.

- 19) Guard to be erected to all pulleys.
- 20) Fixed idlers pulley shall be erected at return side of conv. gallery at suitable location for lying of new belt. Take-up shall be provided with mark-up scale to monitor belt stretch.
- 21) Chute loads are to be considered and indicated in drawing for clogged conditions.
- 22) Guide rollers to be erected at the discharge point of Limestone from the skirt board in Plough Feeder, in belt feeder, reversible belt feeders and in the side of pulley in GTU.
- 23) Bidder to note & confirm that skirt board shall ensure centralized loading of conveyor belt to avoid Limestone spillage and height & length of skirt board. The skirt board shall also meet the limestone feeding requirements.



- 24) Guide rollers shall to be provided at the discharge point in belt feeder, in reversible belt feeders and in the side of pulley in Gravity Take-up as per the sketch shown below.

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- 25) Bidder shall carefully read all the NIT document and its corresponding clarifications and amendments:
- 26) Bidder shall be provided Sump pumps along with level switches & piping at all locations, wherever natural drainage is not possible and its discharge shall be led to waste water service sump. The capacity of each pump shall not be less than 50 m³/hr. Minimum 10% margin on capacity and 20% margin on computed head shall be considered for selection of pumps. Size of the drain pit shall not be less than 2.0 meters x 2.0 meters x 1.8 meters deep. One no. of settling pit shall also be provided before sump pit so that water without heavy coal, limestone, gypsum particles goes into sump pump pit. High and low level switches shall be provided in the sump pump pit.
- 27) Rated capacity (corresponding to LHP conveyor capacity) shall be guaranteed capacity for 100% duty equipment under Limestone handling plant. For 50% duty equipment design capacity shall be guaranteed capacity. For purpose of guaranteed power consumption rated capacity shall be considered in either case.
- 28) Design capacity of the conveyor system shall be considered for the selection of belt width, belt speed and the continuous motor rating at 50 deg C Ambient.
- 29) 2x100 % (one working + one standby) conveying stream shall be provided in the LHP and GHP conveyor system.
- 30) Bidder to note that scoop coupling of all HT motors for conveyors shall be air cooled type for oil circuit. But to optimize the floor plan the air heat exchanger shall be kept suitably and for this if additional circuit of piping required same shall be considered without any additional price impact to BHEL later on.
- 31) Bidders to consider below wrt mechanical, civil and structural system:
- Simultaneous running of both conveyors at rated capacity.
 - Starting of one stream with other stream in standstill condition.
 - Starting of one stream with other stream in operation at rated capacity.
 - Round the clock operation of Limestone Handling Plant.
 - The following aspects shall be taken care of Limestone:

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- 32) The limestone delivered to power station shall be of size 250mm and below. However, occasionally 1-2% Limestone of 400 mm lump size may also be encountered.
- 33) Moisture content in Limestone varies between 12% to 15%. However, for design purposes moisture content of 20% shall be considered for both Limestone and limestone.
- 34) Also occasionally, metal pieces like broken shovel teeth, brake shoe, wires etc. may also come along with Limestone.
- 35) The limestone as received' shall contain varying percentage of fines. This may form adhesive lumps particularly during monsoon when surface moisture is at its maximum value. The sizing and selection of all equipment shall take care of above.
- 36) Design capacities & margins, Drive equipment Rating, Gear Box Rating, Coupling, Hoists, Belting and Pulleys for LHP shall be as per NTPC NIT spec. and subsequent amendment & clarifications
- 37) **Dry type Dust extraction system with Bag filter shall be** provided for LHP crusher house, Limestone storage silo, junction tower Vibrating Feeders at LHP crusher house and Gypsum handling storage shed.
- 38) **Bidder to consider following density of materials:**

Limestone Handling System:

- a) For volumetric computation -1400 kg/m³
- b) For load/ strength - 1700 kg/m³
- c) 2x100 %(one working + one standby) conveying stream shall be provided in the limestone handling system.

Gypsum Handling System:

- a) For volumetric computation -900 kg/Cu. m
 - b) For load/ strength - 1250 kg/m³
 - c) 2x100 %(one working + one standby) conveying stream shall be provided in the Gypsum handling system.
 - d) The covered storage shed for gypsum shall be sufficient to store gypsum equivalent to generation of minimum 7 days.
- 39) Chutes for Limestone, Gypsum & ash conveyors handling system: inside cross section of chute shall be 5 times the belt load cross sectional area for the given belt of the particular conveyor.
 - 40) **Limestone Handling Plant and Gypsum Handling Plant:** The Limestone conveyors shall also be suitable for handling limestone unloaded at Truck tipplers and being conveyed to limestone crusher house at 150 MTPH rated/ 165MTPH design. Limestone conveyors before limestone crusher house and upto limestone storage shed. The capacity of all gypsum handling conveyors shall be 150TPH rated/ 165TPH design.

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41) Belting and Pulleys for 150TPH rated conveying capacity (LHP &GHP):

- a) Minimum number of plies shall be three (3). Other details of belting shall be as specified elsewhere in the specification.
- b) For Pulley, following minimum parameters shall be followed:
 - (i) Maximum allowable deflection of shaft at hubs : 5 Minutes
 - (ii) End disc plate thickness : 16 mm (min.)
 - (iii) Shell plate thickness : 12 mm (min.)
 - (iv) Diameter:
 - i. All drive pulleys : 630 dia (min)
 - ii. All balance pulleys : 500 dia (min)
- c) Maximum type of pulleys permitted based on pulley diameter and shaft diameter shall be limited to three (3) nos. These shall comprise of two (2) nos. drive pulleys & one (1) no. for all balance pulleys excluding tripper & SS pulleys.

42)The rotor/shaft of the pulleys etc. should be turned through several rotations periodically to prevent point deformation between rollers and races of the bearings. It should be ensured that rotor doesn't stop at the same point; but preferably at 90 degrees from the original point.

43)Ground conveyors shall be provided to the extent possible based on layout. Open/close type hood shall be provided for ground conveyor portion only and it shall be in bidder's scope, only structural gallery is excluded from bidder's scope. For remaining portion, conveyor gallery shall be provided. However, yard conveyor shall be kept open.

44)Successful bidder shall prepare and submit 2D AutoCAD drawings of all Transfer Points, conveyors, equipments associated with the scope of work of this package. After the completion of engineering of the corresponding complete 2D drawings shall be handed over to the NTPC & BHEL employer for its evaluation as well as for reference.

45)Preparation of belt schedule including endless belt length and splice joint length in line with detail drgs of conveyor shall be in bidder's scope.

46)Hoist GA drawings & schedule shall indicate hoist cap, no. of fall, lift, monorail beam size, tag no., the hoist quantity & its Erection and commissioning shall be as per requirement and NTPC drgs approved during detail engg. Capacity of Hoist in the Buildings shall be decided considering the heaviest equipment or the belt drum lifted to the top floor of building, whichever is heavy. Hoist Pendent shall be provided with fluorescent up/down/forward/reverse travel push buttons and indicating lamps. The control panel shall be wall mounted type and easily approachable from the floor by a standing man.

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- 47) Base frame and fixing/foundation bolts for all mechanical equipment /items and related electrical equipments and motors including its alignment shall be in bidder's scope.
- 48) During erection of technological structures, interconnection activities such as fixing of stringer post in gallery runner - cutting of seal plate, drilling hole, gas cutting & notches, nut & bolt and/or welding if required shall be in bidder's scope of work.
- 49) Bidder shall provide Sump pumps along with level switches & piping at all locations, wherever natural drainage is not possible and its discharge shall be led to waste water service sump. The capacity of each pump shall not be less than 50 m³/hr. Minimum 10% margin on capacity and 20% margin on computed head shall be considered for selection of pumps. Size of the drain pit shall not be less than 2.0 meters x 2.0 meters x 1.8 meters deep. One no. of settling pit shall also be provided before sump pit so that water without heavy Limestone, limestone, gypsum particles goes into sump pump pit. High and low level switches shall be provided in the sump pump pit.
- 50) Bidder's scope shall include sump pumps complete with all mechanical & electrical accessories, with sump covers, drive, control panels, valves, fittings, pipe work, support hangers, level switches, drain pit in Truck tippler complex, underground buildings, gypsum storage shed, areas where natural drainage is not possible etc. shall be in bidder's scope.
- 51) Necessary provisions shall be considered in the equipment/ items/ systems. Integration of conveyor system with complete LHP w. r. t. other systems / equipments, auxiliary systems such as dust extraction, service water, drinking water system, AC, CW, VS & other Limestone handling equipment and final handing over to NTPC upon satisfactory completion and written confirmation from NTPC for complete system / machines shall be in bidder's scope only.
- 52) Construction of closed covered storage shed (minimum dimension - length 90m x width 20m x height 8m) with brick wall construction, concrete flooring, sloped roof, rolling shutter, RCC column with max. span of 6 meters, RCC beams at every 3m height from finished floor level, brick infill up to total height of shed, Windows and access doors shall be provided and it shall be in the scope of bidder.
- 53) Round the clock security for storage shall be maintained by bidder by employing minimum 4 persons per shift till completion of bidder's scope of work.
- 54) **Bidder to note that scoop coupling of all HT motors for conveyors shall be air cooled type for oil circuit. But to optimize the floor plan the air heat exchanger shall be kept suitably and for this if additional circuit of piping required same shall be considered without any additional price impact to BHEL later on.**

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- 55) Training of customer personnel at equipment manufacturer's factory premises and O&M training at site, as per equipment manufacturer's standard training modules, is also in the scope of bidder.
- 56) Bidder shall erect & commission equipment handling systems (such as chain pulleys, manual hoist, electric hoist etc.) as per system requirement in the entire Limestone handling region (Truck Tippler complex, Crusher house, other buildings, pent houses, complexes, TPs, bull dozer shed, pump houses, ventilation rooms, control rooms, MCC/switchgear etc.
- 57) All Idler sets along with brackets shall be provided. Self-aligning idlers be in bidder's scope.
- 58) For all conveyors & belt feeders, deck plate of min. 3 mm thickness shall be provided throughout the conveyor length.
- 59) Flow diagram and Plot plan attached with this specification are indicative only and doesn't show comprehensive scope of work and actual things may vary during detail engineering. However, all respective package Bidders to make all efforts to optimize the sizes of JTs and Crusher house (i.e. L x B x H) which shall be prepared by BHEL.
- 60) Painting scheme shall be submitted by bidder in line with specification and same shall be subject to NTPC approval.
- 61) Cleaning of any debris produced by the bidder during E&C shall be done immediately at each front.
- 62) Construction Power and Construction Water Facilities shall be provided at one location (which shall be allocated after mutual discussions at site among successful bidder, BHEL & NTPC). Bidder to make his own arrangements to take it to his working location. The charges only for the actual energy consumed by the Contractor shall be recovered by the BHEL/NTPC based on prevalent.

D. OTHER IMPORTANT POINTS

Points mentioned in this section also form part of Technical Specification and bidder to also consider these things in their scope apart from referred bid documents and broad scope mentioned above.

- 1) Erection and testing of the equipment shall comply with all the currently applicable statutes, regulations and safety codes in the locality where the equipment is to be installed and shall also conform to the latest edition of Indian and other international standards and codes. Nothing in this specification shall be construed to relieve the contractor of the required statutory responsibility. In case of any conflict & ambiguity in the standard to be followed the decision of BHEL shall be final and binding.
- 2) Bidder shall strictly follow and adhere to the guidelines laid down in the enclosed BHEL's health, safety and environment manual (HSE).

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- 3) Bidder shall visit the site to familiarize with the limestone, gypsum and site constraints before submitting the complete offer to BHEL in all respects. No issues arising out of site condition or layout constraints shall be entertained later on during detail engineering and any modification required due to site condition or layout constraints shall be done by successful bidder without any cost implication to BHEL.
- 4) Supply of grouting cement and grouting of all mechanical equipment / items and its base frame along with free issue items shall be in the bidder's scope. BHEL / BHEL's civil contractors shall provide only the foundation pockets for pedestals (wherever necessary) as per GA drgs of the bidder.
- 5) Bidder shall submit all fabrication and erection drgs for technological structures, chutes with liners, drive base frame, head, tail & bend pulley frames, discharge hoods, GTU structures etc. progressively after manufacturing clearance is given from BHEL for respective GA drg.
- 6) Bidder shall furnish the fabrication details of all stools and inserts to be incorporated in the GA drg. Any other details for of stools and inserts which are required by our civil & structural shall be provided on time and as and when demanded failing which it shall be supplied by bidder at their own cost without any cost implication to BHEL.
- 7) Erection of foundation bolts will be done by BHEL's civil contractor. However, timely correctness of erection shall be ensured & checked by bidder. Also bidder to furnish the foundation bolt schedule for all items during detail engg.
- 8) Erection & commissioning of Motorised winches for gravity take-up units and counter weights wherever applicable shall be in bidder's scope.
- 9) Drilling of holes on structural members for crusher deck dampers springs shall be in bidder's scope of work and it shall be done in consultation with BHEL's civil & structural contractor and VIS supplier. Similarly, drilling of any holes on stools and inserts during erection of equipments shall be in bidder's scope of work. Accordingly, bidder shall mobilize suitable drilling machine to site.
- 10) Minor chipping i.e. up to 50 mm thickness, micro leveling and providing shim plates for erection of equipment / items shall be in the scope of bidder.
- 11) Cleaning of any debris produced by the bidder during E&C shall be done immediately at each front.
- 12) Rust preventive paint after inspection at shop floor before dispatch shall be in bidder's scope.
- 13) Input and out couplings with coupling guards shall be in the scope of bidder's scope.
- 14) Electro Thruster brakes for conveyors shall be provided as per the coasting time calculation.

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- 15) Provision of any temporary supports/platforms required for E&C of mech. equipment / items shall be in the scope of bidder.
- 16) Dust seal shall be provided for all equipment.
- 17) Periodic checks for stored items such as rotation of bearings ends, belt drum and other condition checks shall be the responsibility of bidder. The objective is to ensure that the equipments/items are not damaged due to long storage.
- 18) Material of construction for all equipment shall be subject to BHEL/ Consultant /Customer approval during detail engineering.
- 19) Bidder shall make their own arrangements well in advance for erection equipments such as crane, hydra, trolley, truck, trailer, all tools & tackles, via chain pulley block, wire ropes, grinding machine, welding machines (including single phase portable welding machine), cutting sets, coupler, pulling & lifting tools such as slings, D-shackles, winches, etc. including precision measuring instruments that are required for E&C purposes at no extra cost to BHEL.
- 20) Bidder shall submit weekly progress reports in BHEL's format and depute full project team for attending all project review meetings called by BHEL/ NTPC'S Consultant /NTPC without fail.
- 21) **Bidder shall strictly adhere to BHEL/ NTPC approved vendor list. In case bidder proposes a new vendor for an item, acceptance shall be subject to approval by NTPC/BHEL without any price implication to BHEL-ISG. In case of items not covered in the list, bidder shall consider reputed make and obtain prior approval from NTPC/ BHEL before placing order, without any price implication to BHEL-ISG.**
- 22) Bidder to note that time is the essence of this contract, thus they shall furnish the submission schedule for erection & commissioning along with the offer.
- 23) Bidder shall furnish the L-2 project schedule indicating various milestones and constraints along with the bid. Successful bidder shall furnish the L-3 project schedule in-line with L-2 schedule after award of the contract.
- 24) Bidder to note that LHP fronts during erection will be given progressively in a staggered manner. So, bidder has to consider and envisage mobilization of all resources required, including manpower, in a shortest possible time during execution time. For this bidder has to consider advance resource planning so that erection by the successful bidder is not delayed.
- 25) Bidder to ensure sufficient manpower throughout the contract for carrying out engineering and erection & commissioning activities in parallel at site.

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- 26) Construction Power and Construction Water Facilities shall be provided at one location (which shall be allocated after mutual discussions at site among successful bidder, BHEL & NTPC). Bidder to make his own arrangements to take it to his working location.
- 27) Document and drawings must essentially contain the following but not limited to these and any drg/doc required by BHEL shall be furnished by bidder during detail engineering:
- General Arrangement drgs of equipment/items
 - Inputs for Civil assignment drgs along with Load data
 - Various schedules
 - Design & capacity calculations
 - Data sheets
 - Operation Philosophy
 - Fabrication drgs
 - O&M manuals
 - PG test procedures, QAPs, FQPs
- 28) Bidder to ensure submission of hard copies as per Customer's requirement for all engineering drg/doc and for all subsequent revisions along with a soft copy sent thru' email addressed to Project manager and concerned project team. Bidder to also ensure submission of additional 4 sets of hard copies over Customer's requirement to BHEL's site office. However, all the engineering related information shall be furnished in soft editable form to BHEL.
- 29) Bidder to extend all help and documentary support for compliance and addressing any statutory issues raised at site which pertains to the area / work under bidder's scope.
- 30) Open Storage of items at site shall be done over concrete sleepers.
- 31) All working parts requiring lubrication shall be of sealed construction so that dust, dirt and other foreign matter do not come in contact with wearing surface.
- 32) All bearings shall be properly lubricated. Grease nipples and reservoirs shall be furnished wherever necessary.
- 33) During the operation period of Limestone/Gypsum Handling Plant, if the conveyor belts get elongated then cutting, re-splicing and joining of the belt shall be done by the bidder and it shall be in bidder's scope of work.
- 34) All the equipment shall be of robust construction, suitable for operation in dusty, humid and outdoor operation.
- 35) Quality assurance and inspection of equipment shall be as per NTPC specification.

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Bidder shall ensure the correctness of civil assignment drgs which shall be an input for BHEL's civil and structural design agency.

36) BHEL shall provide only the pedestals at locations as indicated in bidder's drgs. Any extra pedestal if not indicated in the drg. but is required at site, then the same shall have to be taken care by the bidder at site by engaging his own resources without any cost implication to BHEL.

37) BHEL shall provide insert plates at locations as indicated in bidder's drgs. Any extra insert plate if not indicated in the mech. GA drgs. and required at site, then the same shall have to be taken care by the bidder at site by engaging his own resources without any cost implication to BHEL.

1. Bidder shall depute continuously and maintain & depute following minimum nos. of engineers and supervisors, at site for supervision of E&C, coordination and commercial activity for the package.

- a. Resident Manager – 1 member
- b. Mechanical Engineer (min 2 years site experience) or mechanical supervisor (min 5 years site experience) – 1 members
- c. Electrical Engineer (min 2 years site experience) or Electrical Supervisor (min 5 years site experience) - 1 members
- d. Quality cum safety engineer (Minimum 2 years site experience) – 1 member
- e. Storekeeper/for commercial activities - 1 member

In case Bidder fails to maintain the above minimum manpower at site till contract completion, suitable pro-rata deductions shall be made from RAB payables, for the duration of such absences, at the prevailing rate of BHEL manpower cost as penalty at the sole discretion of BHEL whose decision shall be final and binding.

38) On completion of erection of any major items along with its auxiliaries, the same shall be thoroughly inspected by the Contractor together with BHEL/ Customer's Engineers for correctness, completeness and acceptability for Pre-Commissioning Tests. Though the NTPC's Engineers associate themselves with such inspection, the responsibility for declaration for correctness, completeness and acceptability shall rest with the Contractor and the pre-commissioning tests shall be carried out after such declaration. The pre commissioning tests to be performed at site as well as necessary documentation and formats for the protocols to be signed during and after the tests shall be prepared by the Contractor taking into account relevant Indian/International Manufacturer's standards as applicable and finalized by the NTPC sufficiently in advance through mutual discussions. On conclusion of satisfactory pre-commissioning tests of each equipment, the trial operation shall start consistent with parameters of the technical specifications.

The duration of trial operation shall be for 14 days during which period the system/equipment shall run as follows: The trial operation the equipment including standby auxiliary equipment shall

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run for a minimum period of more than 72 hours during which period the equipment including standby equipment shall run at its rated capacity for a maximum period of 24 hrs. Any interruption caused by the Contractor up to 24 hours will not affect the period of 14 days trial operation indicated above. In case of such interruption occurring for more than 24 hours, the above period shall be extended correspondingly. The system/equipment is deemed to be commissioned on successful completion of the above trial operation. Upon successful completion of trial operation, a protocol shall be signed by the both parties.

A document shall be prepared on the results of trial operation. This document besides recording the details of the various observations during the trial run will also include the date of start and finish of the trial operation and will, be signed by the representative of both the parties. The document of the trial operation shall have log sheets and all adjustments, repairs, interruptions etc., shall be recorded therein. The readiness of the system/equipment for the trial operation shall be intimated by written notice to NTPC.

The trial operation shall be carried out in compliance with relevant manufacturer's standards and/or relevant Indian / International standards and manufacturer's operation directions before starting them. Defects shall be listed in the above mentioned documents and shall be rectified by the Contractor in accordance with the agreement in all respects.

- 39) During the Guarantee period of LHP & GHP, if the conveyor belts get elongated then cutting, re-splicing and joining of the belt shall be done by the bidder and it shall be in bidder's scope of work.

E. Electrical Scope:

ELECTRICAL SCOPE DIVISION: The scope of this package also includes storage, erection, testing, commissioning, handing over of electrical and C&I system (including free issued items by BHEL) for LHP&GHP area of FGD package awarded to BHEL ISG by NTPC for FGD Nabinagar Thermal Power plant.

Terminal point – Outgoing from FGD Main MCC/Control building to respective electrical equipment's of LHP area & GHP area.

For Free issue items: Bidder's scope starts from raising the requisition to BHEL's store manager, loading/unloading at site, shifting these items to erection fronts once issued by BHEL, followed by erection & commissioning, trial operation, preparation of protocols and getting signed from end customer, final painting at site after erection, carrying out performance guarantee tests (under the supervision of respective OEMs) of integrated system and handing over to NTPC until satisfactory completion and written confirmation from NTPC.

Store: Bidder to construct store for their supplied items as per NTPC FQP for storage.

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Construction Power:

To meet the construction power requirement of the FGD and associated systems, the Employer shall provide Two Number 415V feeders in LT switchgears of Nabinagar STPP. The Contractor shall extend supply from these Construction power feeders to meet the construction power requirements at the various locations included in the Contractor's scope through suitably rated Isolation Transformers along with LT distribution boards as per requirement. LT Packaged Sub-stations with isolation transformers may also be used for this purpose. Suitable metering arrangement along with associated Instrument transformers and Metering Cubicles meeting the DISCOM requirements shall be provided by the Contractor at each Construction power feeder, for the measurement of actual energy consumed by the Contractor. The charges only for the actual energy consumed by the Contractor shall be recovered by the Employer based on prevalent rate of DISCOM.

Supply, erection, testing and commissioning of all equipment's as required for further distribution for meeting the construction power requirements shall be in the Contractor's scope. All necessary statutory requirements for charging construction power of Contractor's network shall be in the Contractor's scope. Construction power supply network is a temporary arrangement which shall be used during the project construction phase. To meet this requirement, the equipment's may be arranged by Contractor either by shifting their existing equipment's at other installation or by fresh procurement, which may be taken back after commissioning of the project.

Even though the Employer shall make all efforts to maintain a continuous supply of construction power, the same is not guaranteed and Employer shall not be responsible for any loss or delays which the contractor may suffer on this account. Also the Employer shall not entertain any claim for exemption/reduction of liquidated damages for delay in execution of the contract due to irregular power supply. Contractor shall arrange/provide necessary backup arrangement on his own for uninterrupted power supply.

The Contractor shall maintain a minimum drawl power factor as per DISCOM regulations for their substations, and all such devices for maintaining power factor shall be under the scope of contractor. All temporary wiring must comply with local regulations and will be subject to Employer's inspection and approval before connection to supply. Power supply shall not be provided for use in labour and staff colony.

SN	ADDITIONAL NOTES LIMITED TO ERECTION & COMMISSIONING
1	The equipment shall be complete with all standard parts and accessories which are required for safe and trouble-free operation of the plant but not specifically mentioned in this specification. All safety feature, as required, shall be included.
2	Transportation, Erection, Testing & Commissioning of all Electrical and Control & Instrumentation related to entire mechanical scope as per NTPC specification is in bidder's scope.
3	Technical Specifications furnished in this document are minimum tentative specifications to be considered by bidders however NTPC NIT specifications, clarifications, amendments shall be fully binding in case of any conflicts.
5	Civil inputs as required for related electrical equipment's to be furnished by bidder.
8	Vibration monitoring cum analysis system is only applicable for HT motors/Crushers/equipment's –

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SN	ADDITIONAL NOTES LIMITED TO ERECTION & COMMISSIONING
	VMS panel (supplied by BHEL) shall be located in LHP control room by BHEL. Cabling from field to the VMS panel shall be in bidder's scope. Also software for vibration analysis through LHP control desk HMI shall be in BHEL's scope. However, drive/driven equipment shall be provided with mounting pads for mounting of vibration Detectors by bidder if required/applicable. Notch/ provision for mounting key phasor on motor/coupling/driven equipment/shaft shall be provided by the bidder as required
11	PJB/CJBs (supplied by vendor) shall be strategically located in each area to enable usage of multicore cables to DCS and optimize the cable lengths.
12	All the field instruments shall be of latest models. For the sake of completeness of the system and in order to ensure desired performance and safety measures, any hardware or software item felt required, shall be in the scope of bidder irrespective of their explicit or implicit inclusion in this specification.
16	Specification of various electrical equipment shall be as per the attached NTPC Tender specification, clarifications & amendments issued.
17	Obtaining all necessary statutory clearances for bidder's equipment and systems shall be under the bidder's scope.
20	Construction power of 415V, 3-phase, 4 wire shall be provided at one point from the Distribution Transformer/Distribution Board. Further distribution (including Tariff Meter installation) from the Distribution Transformer/Distribution Board shall be carried out by the bidders as per requirement.
21	Vendor shall submit equipment layout, cable tray layout, lighting layout, earthing layout drawings for respective machine/equipment as applicable. List of Drawings to be submitted for each equipment/system shall be intimated to the successful bidder during detailed engineering and drawings shall be submitted in line with the list.
22	Bidder's cable schedule shall be prepared in BHEL format which will be furnished during detailed engineering stage.
23	The Bidder/Contractor shall furnish the reports of all the type tests carried out within five years of the date of bid opening as per specification and relevant standards for all components / equipment / systems. These reports should be for the tests conducted on identical/similar components / equipment / systems to those offered / proposed to be supplied under this contract. If the above reports are not found meeting the spec/relevant standards or not available, then all such test shall be conducted under this contract by the vendor free of cost to purchaser and reports shall be submitted for approval.
24	Potential free NO-NC contacts are required from all equipment for interlocking purpose to DDCMIS.
25	Training of Customer and BHEL personnel for operation and maintenance of Bidder supplied equipment is included in the bidder's scope.
26	Testing, Erection and Commissioning of Bidder supplied equipment/systems is in Bidder's scope. Further, alignment of all motors (during erection/commissioning) shall be included in the scope of Bidder.
27	In case of any conflict & ambiguity, decision of BHEL/customer shall be final and binding.