GUJARAT INDUSTRIES POWER COMPANY LIMITED
SURAT LIGNITE POWER PLANT (SLPP)

VOLUME II — Mechanical Technical Specification - Package A

Design, Engineering, Supply, and Construction of Package A, B, C & D
New Lignite Feeding System, Associated Works, Contingency Feeding Arrangement & Dismantling

Tender No.: GIPCL/SLPP/R&M/LHS/FB-RE/LOCATION/EPC/2026

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Gujarat Industries Power Company Limited
Surat Lignite Power Plant (SLPP), Village: Nani Naroli, Taluka: Mangrol, Dist.: Surat, Gujarat

Table Of Contents

1 New Lignite Feeding system (LHS)

a. Lignite handling systems include ramp, unloading system, feeder breaker, sizing of lignite, conveying, stone picking arrangement, including covered conveyor gallery. Junction tower/transfer tower, modification of existing lignite handling system for interfacing of the new lignite feeding system to existing lignite feeding. The system shall comprise all the auxiliary systems required for ease of operation and maintenance of the system. Further system will comprise the weigh scales, fire prevention system, the lignite handling system shall be generally as per the system description, **flow diagram, and plot plan** etc. enclosed. The system shall be complete in all respects with all mechanical, civil, structural, electrical and instrumentation.

b. The schemes, system configurations, specifications, drawings, and descriptions provided in this tender document are indicative in nature and are intended to guide the Bidder in understanding the broad scope of work. The Bidder shall be deemed to have carefully examined and satisfied itself regarding the completeness, adequacy, and suitability of the proposed systems and shall undertake detailed engineering accordingly to meet the specified performance and operational requirements.

c. The Bidder shall be responsible for designing, engineering, supplying, erecting, testing, and commissioning a complete and functional system, including any additional equipment, components or modifications required to ensure reliable, safe, and efficient operation, even if the same are not explicitly specified in the tender document. Any such inclusions shall be deemed to be within the scope of work and shall not entitle the Bidder to any additional cost or time.

d. During detailed engineering, execution and commissioning/post commissioning, if any changes or modifications are required to meet performance guarantees, reliability, safety, statutory requirements, or site conditions, the same shall be carried out by the Bidder in consultation with the Owner, without any impact on the Contract Price or Project Schedule. The Owner reserves the right to make reasonable changes in system configuration or scope and the Bidder shall accommodate such changes within the overall scope of the Contract.

e. The extent of supply under the contract includes all items shown in the flow diagram/plot plan etc., not-withstanding the fact that such items may have been omitted from the specifications or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and / or schedule notwithstanding the fact that such items may have been omitted in the diagram/description.

f. The things mentioned in the scope, scheme, specification, diagram etc. are for tendering purpose only. The Lignite Handling System shall be taken comprehensively. Any change in the scope, scheme, specification, drawings shall be in bidder scope without any implication of time and cost.

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i. During detailed engineering, execution and commissioning/post commissioning if any, changes or modifications are required to meet performance guarantees, reliability, safety, statutory requirements, or site conditions, the same shall be carried out by the Bidder in consultation with the Owner, without any impact on the Contract Price or Project Schedule. The Owner reserves the right to make reasonable changes in system configuration or scope and the Bidder shall accommodate such changes within the overall scope of the Contract.

1.1 Supply of Lignite

Lignite shall be supplied from the pit head of mines Valia mines etc through EV/CNG/LNG/Diesel dumpers. The size of the Lignite “as received” from the pit head is likely to be 1000 mm to 1200 mm (nominal) along with **large size stones of up to 1000 mm size.** Bidder has to consider the suitable trucks/dumper while designing and developing of the system i.e. ramp, road, culvert etc.

1.2 Path of new lignite feeding system

Refer Plot Plan/flow diagram for lignite Handling System. Lignite handling system comprises conveying of Lignite from Feeder Breaker to phase-1 lignite handling system preferably BCN-M2A. However, during detailed engineering the actual interface would be finalized.

1.3 Lignite Handling System (LHS) description:

The lignite from mine is transported through dumpers (by others) and shall be unloaded into feeder breaker hopper from ramp. It is envisaged that, the lignite unloading/feeding shall be carried through dumper having payload capacity from 20MT to 40MT. The ramp will have sufficient space for turning of the dumpers having heaviest/largest size in this payload capacity segment. Dumpers unload the material into the over ground hopper with 300mm x 300mm grizzly above feeder breaker to restrict big size stones. Feeder Breakers fitted with skirt Board shall break the **ROM lignite along with stones** from 1200 mm nominal size to 250 mm nominal size. The lignite and stones thus broken to 250mm nominal size from feeder breaker shall be fed to the associated slow speed belt conveyor of rated capacity of 1200 TPH with suitable arrangement of stone picking at suitable locations with pickling type idler rollers at stone picking zone. Belt weighers shall be provided to monitor the lignite weighing. Hopper capacity shall be sufficient to maintain the feed rate of 1200TPH continuously to match the downstream conveyor capacity or existing system conveyor capacity i.e 1200TPH rated. There shall be one feeder breaker below hopper where hopper size shall be designed to unload two no's of dumper simultaneously and the hopper capacity shall be minimum 90 M^3. However, the actual capacity shall be finalized during detailing. There shall be conveyor below feeder breaker, which will receive the lignite from feeder breaker. This belt will be slow speed conveyor belt with high belt width. **The same is require for stone picking manually which is one of the essential requirements of the system**. It is envisaged that the system shall be designed to remove the stone from running belt easily and for the same, respective stone picking arrangement shall be made. Based on experience of existing system, it is observed that the stone picking is quite easier in horizontal condition of the belt having slow speed and high belt width. Hence the system shall be considered to design accordingly to accommodate maximum no's of manual stone picking stand/arrangement. Accordingly, the conveyor and conveyor gallery shall be designed for ease of stone picking from the belt and removing of the stones those are already removed and stacked near conveyor belt. Removing of the stones from running belt by stone pickers which is generally being thrown outside, resulting the damaging of the structural conveyor gallery due to impact. The accumulated stones outside the conveyor area is usually collected by JCB. In case of structured/covered gallery, removing of the stones is not easier. Hence, stone picking area gallery design shall consider the above aspects. Typical section of the gallery at stone picking is given in the elevation drawing of the conveyor.

New lignite feeding system shall be designed holistically considering the existing dumper movement at apron feeder and for proposed lignite feeding system, stockpile area mapping and dumper movement, existing weigh bridge location, proposed weigh bridge location vide package-B, existing road for dumpers, proposed road for dumpers etc. Hence the system design shall be governed by whole logistic movement for both the feeding points and at stockpile area. Considering above, contractor shall have to make the comprehensive layout of the area including package-A and package-B in combined form for development of the area as a complete system. Bidder shall consider the overall layout development of the plot plan of the system in AutoCAD- file comprising the package-A,B,C and existing LHS plot plan.

II. Rated capacity of lignite handling system (LHS)

The rated system capacity shall be 1200 TPH including feeder breaker and slow speed conveyor system.

III. Duty of lignite handling system (LHS)

Normally one stream of equipment shall operate for about 16-18 hours in a day however it shall be possible to operate LHS for 24 hours in a day continuously for any period.

IV. Properties of Lignite

Sl. No.	Aspect	Value/ Feature
a.	Material to be handled	Worst lignite with a lowest GCV of 2450 Kcal/kg
b.	Moisture content including surface moisture	54%
c.	Bulk Density:	
i)	For capacity/Volume calculation	800 kg/cum
ii)	Density of compacted lignite in the stockpile which has to be considered for design of equipment power rating	1000 kg/cum
iii)	For structural design	1200 kg/cum

c.	Angle of repose	35 degrees
d.	Angle of surcharge	20 degrees
e.	Top lump size of lignite as received of at Feeder Breaker	1000 mm to 1200 mm (nominal) along with large size stones of up to 1000 mm size
f.	Top lump size of lignite downstream of feeder breaker up to the primary crusher house	Nominal 250 mm
g.	Other properties of lignite	Friable, sticky and non-flowable
h.	Hard Grove Grindability Index	100 - 160

V. Ramp

The unloading area (ramp) is considered having sufficient fleet movement space, gradient, turning space, haulage/laybay along with return path considering suitable gradient for trucks/dumper having payload capacity from 20MT to 40MT. The ramp area (entry area) is considered to cater the requirement of the fleet movement during emergency (full load operation/ both stream in operation i.e. apron feeder system and feeder breaker).

Start point of the ramp is critical considering the existing fleet movement at near apron feeder. Hence the design of the ramp shall be adjusted preferably to accommodate the existing weigh bridges of the system. At the same time the existing fleet movement should also not be disturb preferably for un-interrupted fuel supply to existing power plant.

The gradient of the ramp shall be maintaining properly for ease of the travelling of the dumpers those are likely to be heavy dumpers come in future. The stability of the ramp shall be considered during design as one of the major aspects. Periphery drain, approach road to each location for operation and maintenance is to be consider during design of the system.

VI. Feeder breaker and Hopper

The feeder breaker which shall be of heavy-duty type shall consist of a single roll crusher and chain feeder. The roll crusher shall be capable of

crushing ROM Lignite to the size specified. Feeder breaker shall be capable of receiving two dumpers at a time and shall be capable of storing/loading three dumpers (90M3 hopper capapcity) of lignite at a time. The materials of construction and features of construction of chain feeder shall be designed as per the capacity specified. The chain design shall be based on this. The chain shall be as per vendor list. The crusher construction and all other features shall be suitable for handling large ROM lignite and stones of 1000mm size. The feeder breakers shall be provided with skirt boards of sufficient length or minimum. height to receive lignite from mines and there shall be provided with a remote operation arrangement along with local operator's cabin to facilitate local operations.

The feeder breaker shall be designed to consider 25 to 40 tones dumper capacity (payload capacity of dumper) and the feeder breaker shall have the arrangement to receive the material from 2 dumpers at a time through over ground dump hopper.

Feeder breaker shall be capable to start while hopper is full with lignite. The design of the FB shall consider the same.

Feeder breaker shall be capable to control the feed rate of the fuel from 5% minimum (of rated capapcity) possible onwards of rated capacity.

Maintenance provision shall be there for feeder breaker head end & tail end side along with breaker roll/drive, sprocket maintenance, chain replacement etc. Respective provision shall be arranged above feeder breaker area.

The hopper area shall be covered with structural shed and it will be covered from all side above dump hopper except dumping side. Hopper shall be fitted with suitable grill of size (as per detail) opening made of heavy-duty plates to restrict big size stones.

VII. Conveyor system:

A. Belt Conveyor

1. The fire-retardant anti-static (FRAS) belt used for conveyor shall be carefully selected considering the service requirements, loading cycle, loading and unloading points. It shall be adequately designed to convey the required tonnage of the material of specified lump size. The number of plies and tensile strength shall be suitable for the performance required. The plies shall be skim-coated and the belt shall be mill dew resistant.

   The carcass shall have adequate strength and adequate number of plies as specified in data sheet-A. Maximum tension during normal operating

condition with load shall be considered for checking against 90% of maximum allowable tension of conveyor belt.

2. The percentage of elongation shall be limited to 2.5% of belt length. However, take up travel shall be based on minimum 2.5% of length of the conveyor + 600mm. The percentage of belt sag shall be based on IS: 11592.

B. Idler units

1. All idler rolls shall be manufactured from ERW tubes conforming to latest edition of IS: 9295 or from seamless tubes conforming to IS: 3601 / BS-1775. The bearing housings shall be pressed steel and both the bearing housings shall be welded to the rolls simultaneously. Minimum thickness of bearing housings shall be as per specification. The maximum friction of each idler unit shall not exceed 0.015.

2. The idler units shall be heavy duty and suitable for continuous operation at high capacities. In the case of troughing idlers having rolls of equal length, the rolls as well as the roll components shall be interchangeable. The minimum roll size of idlers shall be as specified in data sheet-A.

3. The frames for all fixed type troughing units shall be steel or malleable form with provision for securely bolting to the stringers of the conveyor frames. All fixing bolts shall have spring washers.

4. Slotted holes of 1.5D on both sides of the frames shall be provided.

5. For the impact type units, the rolls shall be made of steel tube and securely held in place. The rolls for all other troughing units shall be of tubular steel construction. Idler spacing at loading points shall be reduced to prevent excessive sag. The first impact idler shall be placed approx. 150 mm behind the loading point.

C. Pulley units

All pulleys shall be of welded steel construction with solid end discs conforming to IS: 1891. The end discs shall be located to give minimum rim overhang. The face of each pulley shall be smooth, wider than the contacting belt by 200 mm with a tolerance of + 3.0 mm on the nominal width. One circumferential and two longitudinal rim welds per pulley shall be permitted. The welds for pulley construction shall be ground smooth and each shall develop the full strength of the plate. The load rating for the pulleys shall be in accordance with the latest edition of BS-2890. All drive pulleys, snub pulleys and all other pulleys shall be in accordance with the latest edition of BS-2890. All pulley shall be with hot lagging. All drive pulleys shall be lagged with an diamond groove rubber lagging of 12 mm thickness and non-drive pulleys shall be lagged with

plain rubber of 10 mm thickness. Grooving on the pulleys shall be designed to prevent material build up and provide maximum self-cleaning.

D. Belt Cleaning Units

Head end scrapper shall be made of flat rubber strip considering suitable scrapper ability. Metallic/spring-based scrapper is not envisaged at head end. Tail end scrapper shall be required i.e. V-plough type internal scraper at tail end. Design of the head end scrapper shall be finalized during detailing.

E. Take-Ups

Automatic vertical gravity type assemblies complete with counter weights and structural steel supports shall be provided for belt conveyor more than 20m in length. Take ups shall be mounted on steel frames with safety stops to prevent the fall of the take-up pulley in the event of belt breakage. The stops shall be permanently and positively set at a point low enough to allow for normal belt stretch. The gravity take-up (GTU) shall be positioned along the conveyor so that lower end of GTU weights is not more than 1500mm from ground level. The take up shall be provided with maintenance platforms at different levels. These maintenance platforms shall be provided with access ladder. The counter weights box shall be of covered with handrail above the ground level or maintenance platform level. Counter weights can be made from structural box for ease of lifting in case of snapping of the belt. Each take up shall be provided with a marked-up scale beside the structural frame to monitor belt stretch. Each take up shall be provided with a minimum travel of 2.5% of length of conveyor plus 600 mm for conveyors with EP belts.

F. Chutes, Skirtings, Switches, Frames, Deck Plates and Belt Housings

Bidder shall consider the chute arrangement, design considering the lignite property like stone presence in lignite, flowability of the lignite, moisture content etc. Considering the critical & essential technological items of the conveyor system, chute valley angle, shoe portion and material receiving & discharge direction shall be considered carefully by the bidder. Thickness of the chutes, liner arrangement shall be based on factors like impact on chutes due to stones, high capacity discharge system, costing time of upstream conveyor/system etc. The liner selection and fitting arrangement / composite chutes arrangement shall be based on flowability and durability of the liners etc. High durable & robust deign of the lignite handling conveyor chutes are to be considered. Detachment / bending of the liner inside the chute may lead damage of the belt, chocking of the material etc.

The chutes, skirtings and housing shall be welded and bolted units made of structural steel plates, unless otherwise specified. All units shall be made as

dust tight as practicable. Bolted joints shall be provided with felt gaskets. Provision for ready access to the interiors of skirtings, housing and other possible trouble points shall be made by means of readily removable, bolted on plates or by hinged and latched doors.

All chutes shall be fitted with heavy duty hinged & heavy duty inspection doors with proper sealing. The outlet opening size of chutes along the length of conveyor shall be based on minimum two times the lump size or three times the flow rates through the chute depending upon whichever gives maximum dimension. The minimum dimension of outlet of chute across the conveyor shall be 2/3rd belt width. The chute hood shall be provided with baffle plates to guide the lignite into the discharge chute. The location of the baffle plate shall be adjustable. The chutes shall also be provided with dust curtains.

All skirt plates shall be made of steel plates having a minimum thickness of 12.0 mm. All cover plates for skirt boards shall be of 5mm (SS-409) thick steel plate (suitable shape to prevent lignite deposition above cover plate). Conveyor skirtings at loading points shall be equipped with rubber dust flaps and polyurethane sealing strip where needed to provide a substantially dust tight job.

Note: Chutes & skirt boards design are critical for lignite handling system looking to presence of stones, high moisture content. Further, during monsoon, lignite flow become severe. Hence, reliable chute design provision shall be considered by bidder. The above-mentioned details of mother plate and liner are indicative only. Bidder have to provide the robust, reliable and have to maintain the flowability of the lignite.

G. Safety Switchers

Rope operated emergency stop switches (pull cord switches), belt sway switches, zero speed switches and all auxiliary switches shall be rated at break 10 Amps and 240V AC. Lockable type de-interlock switch having three positions ‘interlocked’ ‘off’ & de-interlocked’ shall be provided for each belt conveyor. The de-interlock switch shall be located in the remote-control panel. However, there shall be local ‘start’, ‘stop’ push buttons for enabling starting / stopping of conveyor in the ‘de-interlock’ mode. The local stop switch shall be lockable type.

H. Manual Stone picking arrangement from running conveyor

The conveyor has to design for high belt width and slow speed conveyor suitable for manual stone picking arrangement from both side of the conveyor. Conveyor shall be suitable for the positioning of the manual stand picking with safety gears mounting nearby like pull cord switches along with ropes.

Preferably the manual picking stand shall be framed/position in horizontal length of the conveyor. The inter distance of the manual stand picking shall be suitable for continuous removal of the stones/stacking etc. The gallery of the conveyor shall be considered to remove the stones, stacked nearby of the gallery. The design of the gallery/canopy of the conveyor system shall consider the suitable walkway/approach to conveyor etc.

Conveyor shall be designed for minimum 30 meter (Preferably) horizontal portion should be available for stone picking arrangement.

I. Junction tower

The structural junction tower to be fabricated from structural steel section and shall be of suitable size (height/width/floor size) for interfacing of the new conveyor with existing system conveyor i.e. phase-1 system conveyor. The covered junction tower shall comprise the drive system of the of the conveyor, discharge chute, technological structure and bottom conveyor system. The floor area shall be sufficient of the maintenance. Proper staircase arrangement shall be made in the junction tower connecting all the floor of the JNT and i.e. from outside of the JNT, however it shall be covered from roof as well. If the drive floor height will be more than 6 meter, in that case electric hoist shall be provided. However, monorail arrangement shall be there with suitable capacity (lifting capacity) of the heaviest part of the drive system. The monorail shall be projected minimum 2.5 Meter from the house.

The Junction tower shall be covered with sheeting (As per civil specification) from all side. Sheeting shall be supported with purlin and rafter of the structure.

J. Conveyor Gallery

Conveyor gallery shall have permanently colour coated metal sheet on roof and both sides. Roof framing shall be given a slope of 1 vertical: 3 horizontals. Along the length of the conveyor, on either side of the conveyor gallery. Supporting arrangement for the cable trays shall be provided on the outer side of the conveyor gallery along with a maintenance platform. Maintenance platform shall be decided during detailing based on the system requirement. A typical conveyor gallery structure shall be considered by bidder including seal plat, deck plate both side walkway as per IS standard, hand rail on outer side the of the both the walkway, lighting as per standard etc.

The bottom portion of conveyor gallery shall be provided with seal plates along the entire length of gallery as applicable to avoid material spillage considering the safety aspects. The bottom structural sections of gallery has to be fabricated with box type structure and where the short post support is to be

given from conveyor, that entire portion of the bottom box type section has to be build-up with plate having thickness not less that 10mm.

The walkway of the gallery shall be made from electroforged hot dip galvanized grating on both the side of the walkway.

The stone picking area shall be considered the horizontal portion of the gallery. The horizontal portion of the gallery where the stone picking shall be carried out may consider the gallery which is not structurally enclosed. It may provide with outside pedestal canopy arrangement as per existing site. Bidder may assess the same during site visit, accordingly height & width shall be considered. The gallery shall be considered fully enclosed with both side walkways when the gallery starts inclination/elevated.

Considering stone picking preferably in horizontal portion of the conveyor gallery, a wider canopy type structure may consider by the bidder. The typical structure of the canopy as per flow diagram/plot plan etc.

Note: It is envisaged that, the conveyor will pass through below BCN-M1A gallery and will interface with BCN-M2A conveyor after extending back the tail pulley of the BCN-M2A outside the JNT-13. Contractor has to make all the efforts to make the gallery elevation in such a way that there shall be clear headroom to pass the vehicle/hydra from the existing route (Between JNT-13 to apron feeder).

K. Modification/rectification in existing system

Phase-1 system comprising BCN-M2A, JNT-13 and BCN-M1A. The new lignite feeding system shall be interface with existing system at suitable location (Exact location shall be finalized during detailed design). All the modification in existing system of the phjase-1 wherever required shall be done by contractor for seamless interfacing of the existing conveyor system with new lignite feeding conveyor system. The modification shall comprise all the required structural, mechanical, civil, electrical and C&I related interfacing. Any other work mentioned but not limited to above shall be in contractors' scope. The modification plan and design shall be very well planned and executed for smooth system operation of the current stream as well as integration of the new conveyor system till stabilization of the new system. Road /approach or any other temporary/permanent work required for smooth function/safety of the system before/during/after modification shall be considered by bidder only.

L. Interfacing of the new lignite feeding system and time schedule

New system will interface with existing conveyor system of the phase-1. The interface shall be seamless considering all discipline work i.e.

civil/mechanical/electrical and C&I. The new system control system shall be interface with existing PLC/SCADA system of the lignite handling system. All the operation shall be carried out from control room; hence all required resources/efforts shall be made by contractor.

Note: This part shall be critical and will required detailed planning to minimize the down time of the system during modification/interfacing and contractor shall have to made all the efforts and resources to minimize the downtime of the system in best possible manner. Contractor will be required to submit the hourly based planning considering round the clock work for modification and interfacing of the system considering all safety compliances of the system. GIPCL reserves the right to change/modify the plan and ask the contractor to deploy required resources or for necessary changes for the interfacing.

M. Dust suppression system (DSS)

Plain water dust suppression system is envisaged at dump hopper, feeder breaker to conveyor receiving and conveyor discharge area at JNT. Tapping point of water from nearby area shall be provided to contractor for laying of the line and nozzles. Suitable pipe line shall be designed for spraying of the plain water. Nozzle size and quantity may decide during detailing.

N. Firefighting system

Fireline along with fire hydrant shall cover the dumper hopper area/, feeder breaker area, conveyor discharge/JNT. Tapping for fire line shall be provided from nearby area. Bidder shall design the suitable size fire line along with fire hydrant for new lignite system to cover the area comprehensively. Fire sprinkler line shall be provided along the conveyor in both side i.e. carrying and return side. Tapping point shall be taken from the nearby area. One of hydrant post shall be provided at dumper hopper ramp area, feeder breaker drive floor area, and feeder breaker ground floor/conveyor tail end. In addition to it, conveyor drive floor and BCN-M2A tail pulley area shall have one no's of hydrant post.

Moreover, one no of fire monitor shall be provided at feeder breaker ground floor and one no's at BCN-M2A tail end area.

1.4 Design requirements

General requirements

1. The Bidder acknowledges that this tender document outlines an indicative functional scheme for a Lignite Handling System. The system capacity, layouts, and ratings specified are minimum guidelines.

2. **Bidder has to consider preferentially, the spare interchangeability considering the optimization of the inventory. Any system having marginal difference (choosing higher one) in the design and if it could match the other system for spare changeability, that system has to be configured accordingly to optimize the inventory.**

3. All the equipment shall normally handle lignite continuously at the rated capacity as indicated in the data sheet. However, for calculating motor rating based on density of 1000 kg/m^3 of compacted lignite, a margin of 10% over the rated capacity shall be considered.

4. The belt conveyor, drive shall be provided with conventional electromechanical drives.

5. Surface moisture content of lignite during rainy season shall be considered for design of equipment as 15 %.

6. Bulk density of lignite is to be 1200 kg/m^3 for design of structural.

7. The ratings of motors, sizes of gearboxes, couplings and pulleys for conveyors shall be standardized. The different types of motors, gearboxes and couplings and pulleys of different conveyors and of different types shall be limited to minimum possible.

8. All equipment drives shall be capable of starting on full load..

9. The motor rating for all equipment shall have a minimum margin of 10% over the BKW. The service factor for selection of gear boxes, flexible & resilient couplings (equipment with electro-mechanical drives), brakes, etc. shall be minimum 1.5 on the motor rating.

10. Speed reduction units for all equipment with drive motor rating of above 10 kW shall be ground and hardened helical / bevel helical type. The gearboxes shall be provided with fan cooling arrangement wherever required and water-cooling arrangement shall not be provided. Gearboxes shall be provided with flooded lubrication. Oil seals shall be mechanical type. Hollow shaft gear boxes shall be provided with keyway fit up arrangement. For all the inclined conveyors integral type hold back shall be provided in the gear box.

11. The type of high speed coupling between motor and gear box shall be as follows:

i. For motor rating up to 30 kW – Resilient type.

ii. For LT motors of above 30 kW – Traction type fluid coupling.

iii. For HT motors – Actuator operated scoop type fluid coupling

12. For the scoop type fluid coupling (if comes in the system), fan cooling arrangement shall be provided. Water cooling is not acceptable. Fixed body type scoop control fluid coupling followed by electrical actuator to be provided. Whenever equipment provided with HT motor trips due to fault in itself or due to tripping of succeeding conveyor/equipment, the fluid in the fluid coupling shall be emptied by the scoop for disengaging the motor from the load and the HT motor shall continue to run. The actuation time of the scoop tube actuator shall be less than the coasting time of the succeeding conveyor/equipment. Scoop controlled fluid couplings shall be fix body type and both side end connection shall be designed in such a way that complete scoop coupling can be removed without disturbing the alignment of motor and gear boxes.

13. All inclined conveyors shall be provided with cam roller type hold back integral with the gear box in addition to thruster brakes to prevent reverse rotation of conveyor in the event of power failure under all weather conditions. The rating of the holdbacks shall be 1.5 times the full load torque of the drive and shall be provided in the intermediate shaft of the gear box. Hold backs shall be provided on the non-drive end of drive / head pulley shaft. Hold backs of ratchet and pawl type are not acceptable.

14. Electro-hydraulic type thrustor operated drum brakes provided on all inclined conveyors shall serve as back up to hold back. These shall also be used for adjusting the coasting times of different conveyors. On horizontal conveyors, if brakes are required to adjust the coasting time, the same shall be provided and shall be of electro-hydraulic thrustor brakes. The brake actuation time without delay relay shall be limited to 3 seconds. The couplings between gearbox and driven equipment shall be of resilient type.

15. All equipment drives including conveyors including crusher drives shall be capable of starting fully loaded equipment. Electro-hydraulic type thrustor operated drum brakes shall be provided for all conveyors, feeders, equipments wherever applicable.

16. All the bearing pedestals shall be of horizontal split type for easy inspection with four bolt fixing.

17. Friction coefficient "μ" (between drive pulley and the belt) shall be considered as 0.35 for arriving at tight side / slack side tension.

18. All conveyor drives shall be single snub pulley drive with minimum angle of wrap of 210 deg.

19. The radius of curvature for all conveyors shall be calculated as per IS: 11592. However, while calculating radius of curvature for travelling trippers of stacker cum reclaimers, the maximum tension (T_c max) at the curve may be calculated based on 20% of the full load. The head end of conveyor shall preferably be horizontal and horizontal length of conveyor at head end shall be minimum 5 meters. The maximum spacing of carrying idlers in the convex curve portion of conveyor shall be limited to half the normal spacing of carrying idlers. The tail end also shall be preferably horizontal.

20. Conveyors carrying 300mm size lignite shall have a maximum inclination of 10° .

21. For all conveyors, transition idlers of 5°, 10° 15° and 20° shall be provided at either end at a spacing similar to other carrying idlers.

22. The skirt boards shall be terminated over an idler.

23. Snub pulleys of all conveyors at head end shall be covered in the main discharge chute.

24. For over ground conveyors, take-up shall not be provided in the pits. The take up shall be positioned so that the lower end of the take up weight is not more than 1.5 m from the ground. GI Chain Link around the take up weight for a height of 2.5 m shall be provided (Take-up arrangement shall subject to approval). Sand pit shall be provided at the ground level. The counter weights shall be cast iron of suitable size for easy handling.

25. The coasting time of conveyors and feeders shall be adjusted such the material discharge and equipment shall have highest coasting time and the preceding equipment shall have equal or lower in descending order.

26. The design of belt conveyors shall be as per IS – 11592. The artificial co-efficient of friction shall be considered as 0.03 for calculating the power requirement for conveyors.

27. Design of chute and hopper outlets should be such that wet and sticky lignite shall flow freely without arching / plugging of chutes. The sizes of chutes and hopper outlets shall be large enough to achieve this. The chutes shall have preferably conventional (replaceable) cross section nearer to feed points to conveyors so that the material while feeding on conveyor can be

centralized. The chutes shall be as far as possible straight and where bends have to be provided a minimum side plate angle of 70 deg for lignite. Other hoppers shall be provided with a maintenance platform and access stairs to carry out any maintenance in the event of any flow problems. Chute design shall consider as one of the most critical aspects of the lignite handling system. Bidder shall consider the most reliable chute design considering stones presence in lignite and high moisture content that leads damage of the chute and choking of the chutes respectively.

28. Considerations of secondary resistance to additional impending forces:

29. Crowned / gabled deck plates shall be used to effect drainage of water while washing. The deck plates of all conveyors shall be provided with ribs at frequent intervals to have adequate stiffness. The ribs shall be provided in the transverse direction to the direction of travel conveyor.

30. Safety guards shall be provided for drive pulleys and tail pulleys of all conveyors and feeders, couplings, brake drums of all conveyors and hydraulic drives. All over ground conveyors shall be provided with covered galleries.

31. Take-up arrangement, safety guards, etc., shall be as per relevant Indian standards.

32. For natural ventilation of galleries of above ground conveyors, a gap of 350 mm shall be provided throughout the length of gallery between roof and side cladding at the top. Electro forged gratings in walkways shall be provided.

33. All conveyor galleries shall be provided with Perspex sheets on the roof and on the sides of gallery at every 10 M intervals for natural lighting in the galleries. Sheet cladding shall be provided for roof and side cladding for galleries and junction towers as per civil specification.

34. The bottom portion of all galleries of conveyors running at an elevation 1.5m above the grade level and whichever are crossing buildings, roads, main plant areas, etc., shall be provided with seal plates along the entire length of gallery as applicable of 3.15 mm thick MS below the return run of belt covering the entire opening. Also, the walkways shall be provided with Electro forged grating only.

35. Painting as per Structural section.

36. Adequate no. of hoists (manual / electrical) shall be provided for handling the equipment / components, etc. It is envisaged that, electric hoists are not considered in the system however due to change (in case of) bidder shall

consider the electric hoists for maintenance, material lifting etc. The size and capacity shall be finalized during detailing.

1.5 Performance and availability requirements

System Performance Requirements

- The lignite handling system and equipment shall perform satisfactorily to meet the guarantee requirements and also those specified in this specification.
- After the lignite handling system is ready, the same shall be tested at rated capacity within one (1) months from the date of trial operation preferably during the monsoon season to prove the performance of the system and equipment. The capacity figures specified for the equipment shall have to be achieved with tolerance on the positive side. The guarantee requirements shall be met without undue vibrations in the conveyor supports, junction towers, etc.
- The lignite handling system from feeder breaker area to bunkers/stockpile area shall operate continuously at an average capacity as specified over a period of 24 hours.

  The capacities of all equipment / conveyors / feeders shall be equal to or more than the specified.

- All drive motors shall be suitable for direct-on-line starting and capable of starting fully loaded conveyors / feeders.
- Noise level produced by any rotating equipment individually and collectively should not exceed 85 dBA at a distance of 1.0 meter from it in any direction under any load condition.
- Vibration level of equipments at bearings shall not exceed the following limits for different equipment. All HT drives shall be equipped with DCS connected vibration monitoring system.

  Vibration levels shall conform to the limits specified below and shall be measured as per VDI 2056 / BS 4675.

  All drive pulley bearings of HT drives shall be equipped with DCS/PLC connected temperature monitoring system.

2 CALCULATIONS / TECHNICAL DATA AND DRAWINGS TO BE FURNISHED FOR APPROVAL / REFERENCE OF PURCHASER / CONSULTANT AFTER AWARD OF CONTRACT

2.1 Design basis report shall be submitted for following system.

Lignite dumping at each feeder breaker through trucks of various size & various payload capacity (20MT to 40MT payload capacity). Hence, each feeder breaker size shall be calculated based on turn around timing of the dumper/trucks at dump hopper for lignite feeding as well as blending. The calculation of the trucks and system design shall be based on handling of the lignite from lignite stockyard (outside the plant boundary/near to plant boundary) to match the desired feed rate and blending ratio of the system.

1. Design philosphy /design memorandum of the system
2. Detailed plot plan and flow diagram of the system
3. Ramp arrangement and fleet movement arrangement from weighbridge/stockpile area
4. Dumping arrangement/calculation at dump hopper
5. Detailed calculation and arrangement of the system for lignite sizing
6. Structural arrangement and design philosophy of Lignite handling system for conveyor gallery, conveyor's technological structures, trestles, JNT's etc. (Considering corrosiveness of the lignite property)
7. Design and performance guarantee parameters including PG tests parameters of the system for LHS, shall be provided for approval.

2.2 Design Calculations

A. Mechanical

The Bidder shall furnish the design calculations / computer output for capacity calculation, power consumption of conveyors, Feeder Breakers, within 6 weeks from the date of letter of intent. The other calculations required to be submitted are also listed below. These calculations shall also include details of belt tensions at different locations, belt curvature, starting time, coasting time, etc.

The calculations for power consumption of belt conveyors shall also include the following:

Belt tensions at different locations for various conditions such as no load, full load, normal working and full load starting conditions.

- Discharge trajectory of material

- Transition distance of tail pulley
- Radius of curvature
- Starting time, coasting and braking time.
- GD^2 and equivalent weight calculations of conveyors and drive equipment
- Selection of hydraulic drives
- Counter weights
- Diameter of various pulleys, diameter of pulley shaft, etc.
- Selection of idlers, idler shaft size calculations
- Schedule of scrapers

Characteristic curves for fluid couplings, motors and super imposed on each other for checking selection of fluid couplings. Also data sheets pertaining to selection of fluid couplings shall be submitted.

2.3 List of drawings to be submitted for review/ approval of the purchaser / consultant

A. Mechanical

Flow diagram of LHS, along with composite flow diagram of the LHS system showing Bidder's scope clearly.

Plot Plan along with composite plot plan of LHS showing the coordinates of different equipment and structures along with package-B parts and stockpile area etc.

General arrangement drawing of ramp, hopper, feeder breaker, conveyor, conveyor gallery, JNT, interfacing arrangement along with other structural and mechanical arrangement. etc. showing the sectional elevations of conveyors with center lines of supports, locations of idlers, pulleys, etc. elevations of tail pulley head pulley, gravity take up pulley etc. loading details and general specifications of feeder breaker, conveyors.

General arrangement drawing of the following structures giving equipment layout in different floors both in plan and sections and location of openings, fixing details, loading data, location of monorails, location of stair cases, handrails, details of side sheeting / cladding and roofing, doors and windows, etc.

- Dump Hopper Complex
- Feeder breaker floor
- junction towers.
- General arrangement drawings of switchgear

- GA of pulleys
- Pulley schedule
- GA of idlers
- GA of scrapers
- GA of skirt boards and chutes

B. Structural

The Bidder shall furnish structural design calculations for hopper, shed, feeder breaker, conveyor gallery, trestle, JNT and crusher houses. However, the Purchaser reserves the right to ask for any other design calculations in addition to it.

C. Civil

Design calculations and drawings for Ramp, retaining wall/counterfort wall and all facilities and services like roads, culverts, bridges, pavings, road / rail crossings, drainage, pump house, drains, sewers, trenches, ducts, etc.

2.4 Quality, inspection, shop and site testing

Detailed shop tests procedures including sample calculations for all the systems/equipment/ components

Detailed site tests procedures including sample calculations for all the systems/equipment/ components

Material test certificates and performance test certificates for all equipment tested at works.

Procedure for tests before taking-over which shall include performance guarantee tests, performance guarantee test procedure, unit characteristic test, reliability test etc.

2.5 Erection and commissioning manuals

Contractor has to provide detailed Instructions manual for erection and commissioning of the system.

2.6 Operation and maintenance manuals

Contractor has to provide detailed Instructions manual for operation and maintenance of the system.

2.7 As built drawings / documentation

As-built drawings and documentation for the entire plant and all equipments / system supplied under this contract, for all building / structures / works under this contract incorporating all changes / modifications upto the time of commissioning / handing over to the Purchaser.

Project design manual consisting of concept studies of all the systems, design criteria, sizing calculations for all major equipment / systems bill of material, equipment list, etc.

3 DATA SHEET TO BE FILLED BY BIDDER

NOTE: *Bidder shall fill in Data sheet-B. Values are contractually binding. Incomplete data will render the bid non-responsive.*

4 FACTORY ACCEPTANCE TEST (FAT) REQUIREMENTS

FAT shall be carried out at the manufacturer's works before dispatch. GIPCL/PMC shall be given a minimum of 15 days advance notice for witnessing. FAT reports shall be submitted and approved before dispatch clearance is given. **Following FAT tests are indicative, contractor has to provide the detailed FAT tests and the same shall be approved.**

4.1 FAT — Feeder Breaker

Sr.	Test Activity	Acceptance Criterion
1	Dimensional Check (Pan width, c-to-c length, Roll dia.)	As per OEM
2	Material Test Certificates (main frame, chains, flights)	As per IS:2062 / ASTM equivalent; traceability required/ As per OEM
3	Breaker Roll Hardness Test	As per OEM specification (min. 60 HRC for picks)/ As per OEM

Sr.	Test Activity	Acceptance Criterion
4	Chain Tension and Sprocket Alignment Check	Within OEM tolerance; no slack
5	No-load Trial Run (minimum 2 hours)	Smooth operation; no vibration/noise anomaly; all safety guards in place
6	VFD Functional Test (speed ramp up/down)	Full speed range 5–100%; no hunting; communication to test PLC
7	Dust Sealing Check	All seals in place; no gaps; access doors operable
8	Paint Film Thickness (DFT)	As per specification/ As per OEM
9	Nameplate and Markings Check	All plates in SS; all markings legible and correct

4.2 FAT — Belt Conveyor (Representative Components)

Sr.	Test Activity	Acceptance Criterion
1	Head and Tail Pulley Dimensional Check	As per OEM
2	Pulley Dynamic Balance Test	Per IS:13261; residual imbalance as specified
3	Belt Splice Quality Check (sample)	As per approved specification

Sr.	Test Activity	Acceptance Criterion
4	Belt Weigher Calibration	As per approved specification
5	Safety Device Testing (sample at factory)	Pull-cord, sway switch operation demonstrated
6	Motor Routine Tests per IS:325	No-load current, winding resistance, IR test passed

5 QUALITY ASSURANCE PLAN (QAP) AND FIELD QUALITY PLAN

The Contractor shall prepare and submit a comprehensive QAP in due course of contract. The QAP shall cover: design, procurement, manufacturing, fabrication, supply, erection, and commissioning stages.

5.1 QAP Framework

- Contractor shall submit the detailed quality assurance plan and field quality plan for approval before commencement of the work this comprising all discipline work like civil, mechanical. electrical and C&I etc as per respective sections.
- Quality Policy and Objectives: Contractor's quality policy statement; quality objectives for this project.
- Quality Organization: Designated QA/QC Manager; interface with GIPCL/PMC; authority to stop non-conforming work.
- Inspection and Test Plans (ITPs): Per major item/discipline;
- Root cause analysis; corrective and preventive actions.
- Document Control: Drawing and document numbering system; revision control; transmittal records.
- Material Control: Material identification and traceability from mill certificate to installed component.
- Sub-vendor Qualification: Approved sub-vendor list to be submitted; GIPCL/PMC approval required.

6 MANDATORY AND COMMISSIONING SPARE PARTS

The Contractor shall supply the mandatory spare parts as part of the Contract, to be handed over to GIPCL at the time of Taking Over Certificate (TOC). Commissioning spares shall be available at site before commencement of commissioning. **Indicative list of the spares has been provided, however contractor has to provide all required spares (Commissioning /mandatory) which are required for reliable system operation.**

7 APPROVED MAKES AND VENDORS

The list specifies acceptable makes for major equipment and components. Bidder shall indicate proposed make for each item in the Data Sheet/list. Substitutions require prior written approval from GIPCL/PMC.

8 FABRICATION, ERECTION, PRE-COMMISSIONING AND COMMISSIONING REQUIREMENTS

8.1 Fabrication Requirements

- All structural steel fabrication shall be carried out at the Contractor's works or approved sub-fabricator. Mill test certificates shall be maintained for all steel materials with traceability. All fabrication at site/works shall be as per approved quality plan only. Contractor shall submit the detailed quality plan for structural fabrication for approval.
- All welding shall be performed by qualified welders with valid Welder Qualification Test (WQT) certificates per IS:9595. Welding procedure specifications (WPS) shall be submitted and approved before fabrication.
- Non-Destructive Testing (NDT): DPT/MPI on all critical fillet welds; UT on all full-penetration butt welds in main structural members.
- All fabricated items shall be inspected for dimensional accuracy per IS:7215 and IS:12843 before dispatch.
- Surface preparation & painting as per specification. Material/item/equipment fabricated at works shall be painted as per approved painting specification before dispatching to site.
- Structural steel shall be match-marked for erection. All connections shall be pre-assembled (trial erection) for critical structures.

8.2 Mechanical Erection Requirements

- Erection sequence & detailed planning shall be submitted and approved by GIPCL/PMC before commencement.
- All equipment shall be installed strictly per OEM erection manual and approved GA drawings.
- Equipment to be handled using appropriate slings, hooks, and rigging; OEM handling instructions to be followed.
- All alignments (motor-gearbox, conveyor belt tracking) shall be carried out by OEM-trained engineers or OEM representatives.
- Feeder Breaker assembly: pan, chains, flights, breaker roll installation per OEM manual; all clearances verified.
- Belt conveyor: belt installation and splicing per OEM instructions; initial take-up adjustment; belt tracking fine adjustment during trial run.

8.3 Pre-Commissioning Checks

I. Mechanical Pre-Commissioning

- Verify all equipment is installed per GA drawings and OEM manuals.
- Check all guards, covers, access doors are in place and properly secured.
- Verify all lubricant levels (gearboxes, bearings, centralised lubrication system).
- Check alignment of all drive trains: motor-gearbox-driven equipment (per OEM tolerance).
- Check belt conveyor tracking: belt centered on all pulleys; no edge contact at any point.
- Check Feeder Breaker chain tension and slack: As per OEM specification.
- Check hopper grizzly bars: all bars in place; no gaps; properly welded/bolted.
- Check skirt board rubber sealing strips: all in contact with belt; no gaps.
- Verify operation of dust suppression system: nozzle spray pattern.

8.4 Commissioning — Load trial (with Lignite)

- GIPCL will provide lignite for Load trial / commissioning. Contractor to ensure all systems are pre-commissioned and cold-run approved before requesting lignite.
- Load trial /commissioning: Feeder Breaker and conveyor loaded with lignite; all process parameters monitored (TPH, vibration, temperature, Leakages, Noise etc).
- VFD speed control range: demonstrated from minimum to maximum (5% to 100%) without hunting.
- Belt weigher accuracy: verified against weigh bridge during Load trial run.
- All dust suppression systems: operational during Load trial run; no excessive dust emission.
- 24-hour Trial Operation: monitored continuously; any downtime exceeding 1 hour to be noted; trial to be restarted if cumulative downtime exceeds 4 hours in any 24-hour period.

9 PERFORMANCE GUARANTEE TEST PARAMETERS — PACKAGE A

PG Tests shall be conducted under supervision of GIPCL/PMC for a minimum continuous period of 24 hours under rated operating conditions. GIPCL shall provide lignite for PG Tests. Up to 3 attempts are permitted; failure after 3 attempts will be taken as per tender document clauses, However GIPCL decision/directives will be considered as final.

9.1 PG Test — Package A Parameters (Indicative)

I. Feeder Breaker – Guaranteed Parameters

S.No.	Guaranteed Parameter	Guaranteed Value	Measurement Method
1	Throughput capacity (TPH)	≥ 100% of rated TPH	Belt weigher / weigh feeder
2	Maximum lump size – feed	As per design	Physical measurement

3	Product lump size – discharge	98% passing ≤ as specified	Screen / grizzly check
4	Noise level at 1 m	≤ 85 dB(A)	Calibrated sound meter
5	Vibration – bearing housing	≤ 4.5 mm/s	Vibration meter

II. Belt Conveyor – Guaranteed Parameters

S.No.	Guaranteed Parameter	Guaranteed Value	Measurement Method
1	Throughput capacity (TPH)	≥ 100% of rated TPH	Calibrated belt weigher
2	Belt speed	Within ±2% of rated speed (m/s)	Tachometer / speed sensor
3	Belt tracking / mis-alignment	Within ±50 mm of centreline at all idlers	Visual + alignment gauge
4	Vibration – drive unit bearing	≤ 4.5 mm/s	Vibration meter
5	Noise at 1 m from drive unit	≤ 85 dB(A)	Calibrated sound meter
6	Belt slip at drive pulley	Zero slip at rated speed and full load	Visual / speed sensor comparison

NOTE: *The approved PG Test procedure document shall be submitted by the Contractor 30 days before scheduled PG Test date and shall be approved by GIPCL/PMC before testing commences. All instruments used for PG Tests shall have valid NABL/accredited lab calibration certificates.*

9.2 Documentation on Completion of PG Tests

- PG Test Report signed by Contractor, GIPCL/PMC, and O&M Representative.
- All test records, instrument calibration certificates, and measured data to form part of the final O&M documentation.
- As-built drawings for all disciplines to be submitted within 60 days of Taking Over Certificate (TOC).