SRU FOR SYNGAS PURIFICATION UNIT OF LSTK-2 : BHEL REPLIES TO PRE-BID QUERIES DATED 07-02-2025

Sl.No.	Part / Volume	Page No.	Clause No.	Subject	Exiting Provision	Bidders Queries dated 07-02-25	BHEL Clarification
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 10	5.9	Gaseous Emission	No H2S emission limit available	Emission limit for H2S is essential to properly design the thermal incinerator. BHEL to provide the latest applicable norms, where H2S emission limit is indicated, considering that the failure to meet this guarantee is considered a breach of contract.	Bidder shall guarantee the limits of pre-treated liquid effluents at the Battery Limit, gaseous emission to the atmosphere and noise levels (as specified) as per the relevant existing and latest norms of CPCB, PESO and other applicable stringent environmental norms of CPCB/ state pollution control board. The determination of the ability of Purification Plant to meet these guarantees will be made during the thirty days' guarantee test or at any other time under similar conditions prior to the Preliminary Acceptance of the Process Plant/ Units. In the event guaranteed pollution level are not fulfilled during the 30days' guarantee test it shall be breach of contract, requiring corrective action by bidder irrespective of the cost involved.
	ANNEXURE 5	-	1.0	Specification of Hydrogen Sulfide (H2S)	H2S Fraction composition for Design Case	Preliminary composition of H2S fraction provided at Annexure 5 indicates a normal H2S content of 34.08 % vol. A minimum H2S content of 25% vol is also indicated in Annexure 5. Since the minimum H2S content is the design case for the SRU, BHEL to confirm if the design case shall be defined as follows: - H2S content of 25% vol, - all other compounds: proportionally increased to normalize the composition up to 100% . - Total H2S Fraction flow rate: increased in order to reach a sulphur production of 8.8 TPD. Or alternatively, BHEL to confirm that H2S min. 25% value is discarded and the H2S fraction complete composition shall be considered.	The preliminary data available is provided to bidders. Bidders to size considering the stringent case, however, same cane be reviewed during detailed engineering stage.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 3	1.2	SRU Capacity	8 TPD +_ 30%	According to BHEL reply, the SRU normal capacity is approximately 8 TPD (7.8 TPD according to H2S fraction composition at Annexure 5) and additional 10% design margin has to be considered; the turndown capacity is 50% of the normal one. Therefore, the sentence of the capacity variation of ±30% can be disregarded during bidding phase. BHEL to confirm.	Yes, Bidder's understanding is correct.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 4	3.5	Sulphur Recovery Unit (SRU) & Sulphur Storage	Liquid / Solid Sulphur Facilities	Bidder understands that liquid sulphur shall be normally delivered in liquid state to the storage area . BHEL to define/confirm the following: a) Define the hold-up time of liquid sulphur in the sulphur pit. b) Confirm that sulphur storage area/facilities are excluded from Licensor scope of work. c) Confirm that no solidification unit is required. d) Confirm that no loading arm shall be foreseen. e) Define the battery limit pressure of the liquid sulphur from the Sulphur Pit Pumps.	Bidder to carry out the BEDP to meet the specifications listed under clause no. 5.8 of the tender specifications. a) Hold time shall be as per the ttachhed excerpts of specification. b) Sulphur storage area shall be designed by the main by the Engg. sub-contractor, however, all the necessary input data shall be furnished by the process licensor. c) As per the attached excerpts of specification soldification unit is not envisaged except the sulphur pit. d) Truck loading facility is envisaged as per the specifications. e) Bidder to finalise during detailed engineering, however, for preliminary design please refer to the plot plan which indicates the location of SRU unit and sulphur pit.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 8	5.5	Minimum facilities	Number of Claus Trains	At mentioned clause it is indicated that "Acid gas Knock out drum and Sour gas knock out drum can be shared after which the acid gas can be split for single train of SRU." Bidder is considering a single Claus Train. BHEL to confirm.	Yes, Bidder's understanding is correct.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 15/16	12.13	Works cost (Consumption of Raw material & Utilities)	Fuel Gas Availability	Fuel Gas is not indicated among Utilities. BHEL to specifity type, composition and conditions of Fuel Gas, available at SRU battery limits, both in normal operation and at SRU start-up.	**Fuel (If required)** Quality: Latest revision Pressure kg/cm²g: Atm. Temp. deg C: Ambient The available parameters from specifcatiosn are indicated above. However, bidder to inform for any additonal data if required and BHEL shall expedite the same form BCGCL.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 15/16	12.13	Works cost (Consumption of Raw material & Utilities)	Oxygen Availability	Oxygen is not indicated among Utilities. BHEL to specify composition and conditions of gaseous Oxygen, if available at SRU battery limits.	Bidder to inform the reuquirements and BHEL shall expedite the same form BCGCL.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 15/16	12.13	Works cost (Consumption of Raw material & Utilities)	Clean Syngas Availability	Hydrogen rich stream is required in SRU TGT section. BHEL to specify composition and conditions of Syngas available at SRU battery limits.	Bidder to refer to the attached snapshot in this sheet. Kindly note that the composition is based on the preliminary design and will be subject to changes during the detailed engineering phase.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 15/16	12.13	Works cost (Consumption of Raw material & Utilities)	Cooling Water Availability	Cooling Water is not indicated among Utilities. BHEL to specifity characteristics and conditions of Cooling Water, if available at SRU battery limits.	Bidder to refer to the attached snapshot in this sheet.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 15/16	12.13	Works cost (Consumption of Raw material & Utilities)	Utilities Conditions	BHEL to specify characteristics and conditions at SRU BL of the following imported utilities: Low Pressure Nitrogen, Demi Water, BFW.	**Nitrogen (Utility/Process)** Nitrogen: Utility: Process Pressure, kg/cm²g (Min/Nor/Design): 6.0/8.0/9.0: 35 Temperature: Ambient: ≤100 N_2, Vol %, min: 99.99%: 99.99% O_2, Vol ppm: < 10: <10
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 15/16	12.13	Works cost (Consumption of Raw material & Utilities)	Utilities Conditions	BHEL to specify conditions at SRU BL of the following exported utilities: Low Pressure Steam Condensate.	**L.P Steam** Normal: Design Pressure, kg/cm²g (Min/Nor/Max): 3.5/4.0/4.5: As per Design guidelines (Section.-5.1) Temperature, °C (Normal): -/180/-
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 13	12.4	Pollution Level	Liquid Effluent	BHEL to confirm if boilers blow down can be discharged to sewer after cooling.	Biddder to indicate the Qlty. & Qty. , BHEL will take care of the reqquired treatment.

Gaseous Emission:

Stack gas Emission Limits:

S. No.	Source	Suspended Particulate Matter (mg/Nm³)	SO_2 (mg/Nm³)	NO_x (mg/Nm³)	CO (mg/Nm³)
1.	Gas Purification section	≤ 5	<50	<250	<100

Note: Bidder to refer applicable latest statutory norms of stringent CPCB/state pollution control board.

The failure to meet above guarantees shall be breach of contract requiring corrective action by LSTK contractor irrespective of the cost involved.

Sulphur storage: Offsite storage facility (shaded with proper concrete dyke) shall be provided by LSTKCONTRACTOR.

- Storage Capacity = Fifteen day's production
- Storage area = ---- m^2 (To be specified by LSTK CONTRACTOR)
- Storage pressure = Atmospheric
- Operated/maintained by = OWNER
- Unloading facility from pipeline= by LSTK CONTRACTOR at B.L. of Storage.

Storage for solid Sulphur will be an open pit for min. 15 days storage.
The open pit shall have two compartments along with ramp provision for pay loader and truck loading arrangement. The open pit should have proper water drainage system. Flooring &dyke wall should be anti-corrosive. Dyke height will be min. 2 meter.

Transfer of liquid Sulphur from inter-mediate storage (i.e. Sulphur pit including de-gassifier) located at LSTK B.L. to above mentioned storage shall be the responsibility of LSTK CONTRACTOR. One Tank Truck lorry loading bay with covered shed for liquid sulphur to be provided by LSTK Contractor.

H2S Fraction

Given figures are the result of the preliminary investigation.

	H2S Fraction	
	mole%	Nm³/h
H2	0.19	1
N2	19.63	124
CO	0.01	0
Ar	0.00	0
CH4	0.02	0
CO2	44.14	278
H2S	34.04	214
COS	1.81	11
CH3OH	0.13	1
H2O	0.00	0
HCN	0.01	0
NH3	0.00	0
Total	100.00	630
Temp. [°C]	39	
Press. [kg/cm²(a)]	2.16	

Cooling Water (Added with suitable chemicals)	
Supply Header Pressure, kg/cm²g (Min/ Nor/ Max)	LSTK contractor to decide
Return Header Pressure, kg/cm²g (Min/ Nor/ Max)	LSTK contractor to decide
Mechanical Design Pressure, kg/cm²g	10
Supply Header Temperature, °C	36
Return Header Temperature, °C	By LSTK Contractor
Mechanical Design Temperature, °C	60
ΔT	10 °C max.
Relative Humidity at Lakhanpur.	100% (max.)
COC	5
Analysis of Cooling Water (indicative)	
pH	7- 8.5
Chlorides, mg/l	100
Sulphates, mg/l	-
Silica, mg/l	25
Iron, mg/l	1
Manganese, mg/l	-
Total Suspended Solids, mg/l	25
Total Dissolved Solids, mg/l	500
Oil & Grease, mg/l	Traces
Ammonia, mg/l	Traces
Alkanity, mg/l as $CaCO_3$	340
Calcium Hardness, mg/l as $CaCO_3$	500
Total Hardness, mg/l as $CaCO_3$	750

LSTK contractor shall limit the pressure drop of 1.5 kg/cm²g (Max) between supply and

	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	Sheet 13	12.4	Pollution Level	Sour Water	BHEL to specify conditions at SRU BL of the small Sour Water stream produced in TGT section. If liquid effluent quality as per table in para. 12.4 Pollution level is to followed, then LICENSOR will have to include dedicated pre-treatment facilities to match the required specification (e.g. 2 ppm of sulfides).	Bidder to follow the sour water reuquirements indicated in the table of clause 12.4 and accordingly take care of the design of the process & equipment.
	TECHNICAL CONDITIONS OF CONTRACT PY 54037 Rev1	-	-	-	Site Conditions	BHEL to specify site Climatic Data (temperature, humidity, etc.) required for the unit design.	Bidder to refer to the attached snapshot in this sheet.

CLIMATIC DATA:

Wind:

Wind Load Design: as defined in IS: 875 Part 3

Air Temperature:

Parameters	Temperature, °C	Remarks
Dry bulb (Summer)	Max: 47.19 ° Min: 10.99 °	
Dry bulb (Winter)	Max: 37.84 ° Min: 10.17 °	
Average Temperature	26.2 °	
wet bulb	-	
Max for Mechanical / Civil / Structural	35 °C (HOLD)	
Minimum for winterization (Average)	-	

7.2.1 Atmospheric Air Composition:

SOx	9.18
NOx	27.70
NH_3	-
SPM_{10}	44.15
HC (methane)	-
HC (non methane)	-
CO	-
VOC	-

NOTE: Bidder to take correction factors and worst atmospheric condition on above.

Relative Humidity:

Relative Humidity	RH%
Relative Humidity,Minimum	21.79%
Relative Humidity,Maximum	99.5%
Relative Humidity,Average	74%

Rainfall:

Rainfall	Value
Annual	1534.5 mm
Design rainfall (per hour)	-

Note: - Civil philosophy is to be referred

Barometric Pressure:

Barometric Pressure	Value
Average	904.45

Seismic Design Code:
Refer Section-5.5 (Design Philosophy – Civil & Structural Works) Part II-Technical.

Plant Elevation:
The final plant elevation shall be established in consultation with owner / consultant based on overall project requirement.

return cooling water header within his battery limit.

Demineralised Water	
Pressure @ B/L, kg/cm^{2}g (Min/ Nor/ Max)	4.0/ 5.5/ 6.0
Temperature, °C (Normal)	Ambient/40 (max)
Mech. Design Pressure, kg/cm^{2}g	10
Mech. Design Temperature, °C	70
pH	6.5-8.5
Total Hardness, ppm wt.	Zero
Total Dissolved Solids, ppm wt (max.)	0.1
Conductivity at 20 deg C, micro mho/cm (max.)	<0.2
M Alkanity as $CaCO_3$, ppm wt.	Nil
Chlorides, ppm wt.	Nil
Iron as Fe, ppm wt. (max.)	0.01
Silica as SiO_2, ppm wt. (max.)	0.02
Oil, ppm wt.	Nil
Sodium as Na, ppm wt. (max.)	< 0.1