


	LSTK-2: SYNGAS PURIFICATION UNIT NIT NO. : PNMM/PC288/E/001	
Corrigendum - 3 : Technical (Process) dated 18.09.2024		

SL. NO.	REFERENCE OF BIDDING DOCUMENT				AMENDMENT TYPE M/D/A	MODIFICATION
	Part/Sec.	Page No.	Clause No.	Description as per NIT		
1.	SEC-3.0	Sheet 9 OF 71	5.1.(i)	<u>Supply of License and Know-how</u>	M	1) Ammonia synthesis unit To be read as :- 1) Purification unit
2.	SEC-2.0	Sheet 9 OF 10	3.1	AMMONIA SYNTHESIS GAS		Pressure @ B.L of Purification Plant, kg/cm ² a (Min) =18 (HOLD) To be read as :- Pressure @ B.L of Purification Plant, kg/cm ² a (Min) =15.5
3.	SEC-2.0	Sheet 9 OF 10	3.1	AMMONIA SYNTHESIS GAS	M	Temperature, °C (Max.)= 30°C(HOLD) To be read as :- Temperature, °C (Max.)= 20°C
4.	SEC-3.0	Sheet 10 OF 71	6.0	ENGINEERING DESIGN SPECIFICATIONS		Design and Engineering, Procurement/supply of Equipment and Material, Construction, Pre-Commissioning, Start-up and Operation of the Ammonia Synthesis, Ammonia storage & associated Utilities. To be read as :- Design and Engineering, Procurement/supply of Equipment and Material, Construction, Pre-Commissioning, Start-up and Operation of the Purification unit & associated Utilities.

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5.	SEC-3.0	Sheet 31 OF 71	6.23	3.8 <u>HAZOP Study Report:</u>	M	<div>a) Basic Design and Detailed Engineering.</div> <div>b) Construction, Erection and Mechanical Completion.</div> <div>c) Plant Start-up and Commissioning.</div> <div>To be read as :-</div> <div>a) Detailed Engineering.</div>																																																																
6.	SEC-8.0	Sheet 4 OF 14	1.1.3	Works cost (Consumption of Raw material & Utilities) Guarantee	M	<table><tr><th>Sl. No</th><th>Raw Materials/ Utilities</th><th>Consumption per day (Q)</th><th>Cost per day (Q*R) INR</th></tr><tr><td>1.</td><td>Clean Syngas input</td><td>To be filled by LSTK contractor</td><td>Q*</td></tr><tr><td>2.</td><td>MP Nitrogen</td><td>To be filled by LSTK contractor</td><td>Q*3750</td></tr><tr><td>3.</td><td>Utility Nitrogen</td><td>To be filled by LSTK contractor</td><td>Q*3750</td></tr><tr><td>4.</td><td>De-mineralised water, M³</td><td>To be filled by LSTK contractor</td><td>Q* 53.69</td></tr><tr><td>5.</td><td>Condensate export (**)</td><td>To be filled by LSTK contractor</td><td>Q*(-)47.41</td></tr><tr><td>6.</td><td>Methanol (consumption & make-up) kg</td><td>To be filled by LSTK contractor</td><td>Q*28</td></tr><tr><td>7.</td><td>Steam</td><td>To be filled by LSTK contractor</td><td>Q*800</td></tr><tr><td>8.</td><td>Make-up Water for Cooling Towers Purification Plant, M³</td><td>To be filled by LSTK contractor</td><td>Q* 35.75</td></tr><tr><td>9.</td><td>Power, KWh</td><td>To be filled by LSTK contractor</td><td>Q* 4</td></tr><tr><td>10.</td><td>Instrument air</td><td>To be filled by LSTK contractor</td><td>Q* 600</td></tr><tr><td>11.</td><td colspan="2">Guaranteed Total Works Cost "A"/Day = $\sum (Q \times R)$ {Sl.No.1-9}</td><td></td></tr><tr><td>12.</td><td colspan="3">Production figures (per day):</td></tr><tr><td></td><td>a. Ammonia Syn. Gas (N₂+3H₂) "N"</td><td>=</td><td>Nm³</td></tr><tr><td></td><td>b. Carbon-Di-oxide Gas</td><td>=</td><td>Nm³</td></tr><tr><td></td><td colspan="2">Guaranteed Specific Work Cost/1000 Nm³ Ammonia Syn. Gas ("S" = A/N x 1000) =</td><td></td></tr></table>	Sl. No	Raw Materials/ Utilities	Consumption per day (Q)	Cost per day (Q*R) INR	1.	Clean Syngas input	To be filled by LSTK contractor	Q*	2.	MP Nitrogen	To be filled by LSTK contractor	Q*3750	3.	Utility Nitrogen	To be filled by LSTK contractor	Q*3750	4.	De-mineralised water, M³	To be filled by LSTK contractor	Q* 53.69	5.	Condensate export (**)	To be filled by LSTK contractor	Q*(-)47.41	6.	Methanol (consumption & make-up) kg	To be filled by LSTK contractor	Q*28	7.	Steam	To be filled by LSTK contractor	Q*800	8.	Make-up Water for Cooling Towers Purification Plant, M³	To be filled by LSTK contractor	Q* 35.75	9.	Power, KWh	To be filled by LSTK contractor	Q* 4	10.	Instrument air	To be filled by LSTK contractor	Q* 600	11.	Guaranteed Total Works Cost "A"/Day = $\sum (Q \times R)$ {Sl.No.1-9}			12.	Production figures (per day):				a. Ammonia Syn. Gas (N ₂ +3H ₂) "N"	=	Nm³		b. Carbon-Di-oxide Gas	=	Nm³		Guaranteed Specific Work Cost/1000 Nm³ Ammonia Syn. Gas ("S" = A/N x 1000) =		
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7	SEC-8.0	Sheet 7 OF 14	1.7.1	Product Ammonia Syn. Gas Quality	M	Pressure @ B.L of Purification Plant, kg/cm ² a (Min) =18 (HOLD) To be read as :- Pressure @ B.L of Purification Plant, kg/cm ² a (Min) =15.5				
8	SEC-8.0	Sheet 7 OF 14	1.7.1	Product Ammonia Syn. Gas Quality	M	Temperature, °C (Max.)= 30°C(HOLD) To be read as :- Temperature, °C (Max.)= 20°C				
9	SEC-8.0	Sheet 8 OF 14	1.7.6	Effluent from Purification Plant	D	Plant should be designed for zero liquid discharge (ZLD).				
10	SEC-8.0	Sheet 4 OF 14	1.1.3	Works cost (Consumption of Raw material & Utilities) Guarantee	A	Cost of Synthesis gas to be considered as INR 2.53/Nm3 of syngas. <table border="1"><tr><td>1.</td><td>Clean Syngas input</td><td>To be filled by LSTK contractor</td><td>Q*2.53</td></tr></table> i.e Q*2.53	1.	Clean Syngas input	To be filled by LSTK contractor	Q*2.53
1.	Clean Syngas input	To be filled by LSTK contractor	Q*2.53							
11	SEC-4.0	Sheet 5 of 14	2.2.8	Sulphur Recovery Unit Configuration	M	<ul style="list-style-type: none">De-aerator for feeding BFW into steam drums and condensers can be given as common				

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						<ul style="list-style-type: none"> All utilities header such as HP steam, LP steam, BFW, condensate recovery system can be given in sharing mode with separate tap-off for each vessel/equipment.(HOLD). <p>To be read as:-</p> <ul style="list-style-type: none"> All utilities header such as HP steam, LP steam (if available from balance of plant), BFW, condensate recovery system shall be provided at B/L at one point.
12	SEC-3.0	21 of 2323	1.5, Note 4	Following major streams shall be made available by the LSTK contractor at one point Syngas Purification Unit Plant Battery Limit (details to be provided along with the BID)	M	<p>Construction Power required for Coal Gasification Plant till mechanical completion shall be arranged by LSTK Contractor himself.</p> <p>To be read as:-</p> <p>Construction Power required for Purification Plant till mechanical completion shall be arranged by LSTK Contractor himself.</p>
13	Sec.-3.0	47 of 2323	6.22	<u>Hot Flare System:</u>	D	<p><u>Hot Flare System</u></p> <p>The LSTK Contractor shall prepare Design</p>

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						<p>and Engineering as per API-521 guidelines, of whole flare system (one for Ammonia Plant, one for common for both Ammonia storage tank including flare design loads (for each emergency condition, e.g. Power failure, Steam failure, Fire and other utility failure and Blocked in condition), separate Flare headers, separate Knock out drums up to LSTK battery limit. LSTK CONTRACTOR to consider Flare Knock-out Drums for Ammonia Plant within the battery limit of their unit.</p> <p>To be read as:- <u>Hot Flare System</u></p> <p>The LSTK Contractor shall prepare Design and Engineering as per API-521 guidelines, of whole flare system (one for Ammonia Plant, one for common for both Ammonia storage tank including flare design loads (for each</p>

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						<p>emergency condition, e.g. Power failure, Steam failure, Fire and other utility failure and Blocked in condition), separate Flare headers, separate Knock out drums up to LSTK battery limit. LSTK CONTRACTOR to consider Flare Knock-out Drums for Ammonia Plant (if applicable), within the battery limit of their unit.</p>
14	Sec.-3.0	52 of 2323	7.2.3	Civil work, Structural work and Buildings work		<p>1. LSTK Contractor shall Design and prepare construction drawings & specifications for all civil & steel structural works required to complete Ammonia Synthesis Unit, Ammonia storage and associated RCC Cooling Towers as given in scope of works.</p> <p>To be read as</p> <p>1. LSTK Contractor shall Design</p>

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						<p>and prepare construction drawings & specifications for all civil & steel structural works required to complete purification unit.</p>
15	Sec-1	5 of 6	2.3.5	Steam and Power	M	<p>LSTK Contractor to maximise the use of generated steam inside their B.L. However, available surplus steam may be exported outside B.L. if it matches with the main steam header parameters indicated in Section-2.0 of Part-II Technical. No steam credit shall be given to the LSTK Contractor.</p> <p>To be read as:</p> <p>LSTK Contractor to maximise the use of generated steam inside their B.L. However, available surplus steam may be exported outside B.L. if it matches with the main steam header parameters indicated in Section-2.0 of Part-II Technical. to the LSTK .Work cost to be calculated for Net steam based on differential steam import and export.</p>

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16	Sec-4	11 OF 14	6.2	De-Mineralised Water	M	<p>Surplus Steam may be exported to LSTK B.L., if it matches with the main steam header parameters as mention in Section 2.0 of Part-II Technical. No steam credit shall be given to the LSTK Contractor.</p> <p>To be read as:</p> <p>LSTK Contractor to maximise the use of generated steam inside their B.L. However, available surplus steam may be exported outside B.L. if it matches with the main steam header parameters indicated in Section-2.0 of Part-II Technical. Work cost to be calculated for Net steam based on differential steam import and export.</p>
17	Sec-8.0	1569 of 2323	1.1.3 Note ii)	Works cost (Consumption of Raw material & Utilities) Guarantee	M	<p>The guaranteed works cost shall include cost of materials and utilities required and power consumption for building cooling/heating, lighting, ventilations, air conditioning and consequent costs of such materials which are not in the usual operation of the plant.</p>

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						<p>To be read as:-</p> <p>The guaranteed works cost shall include cost of materials and utilities required and power consumption for building cooling/heating, lighting, ventilations, air conditioning and consequent costs of such materials which are not in the usual operation of the plant. Bidder shall indicate Total continuous and intermittent load which shall be guaranteed For intermittent load duty factor shall be 0.5 . Indicative list of aux. Power consumption shall be provided along with amendment.</p>
18	Sec-11	1637 & 1638 of 2323	1.1 & 2.1	OWNER'S ENGINEERS IN LSTK CONTRACTOR'S DESIGN OFFICE & OWNER'S ENGINEERS IN LSTK CONTRACTOR'S DETAILED ENGINEERING OFFICE	M	<p>The basis isman months for Purification Plant not exceeding..... Engineers at any time.</p> <p>To be read as:</p> <p>The basis is(10)....man months for each unit/ section (CO Shift, Methanol Wash, LNW and SRU) Purification Plant not exceeding....(5).... Engineers at any time</p>



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19	SEC-2.0	Sheet 3 OF 10	1.0	RAW SYNGAS	M	<p>Specification of Raw Syngas fed to Purification Plant for production of Ammonia Synthesis Gas is as follows:</p> <table><tr><th>Parameter</th><th>Unit</th><th>Value</th></tr><tr><td>Carbon monoxide(CO)</td><td>Vol %</td><td>33-35</td></tr><tr><td>Carbon di oxide (CO2)</td><td>Vol %</td><td>18-20</td></tr><tr><td>Methane(CH4)</td><td>Vol %</td><td>1.5 - 2</td></tr><tr><td>Hydrogen (H2)</td><td>Vol %</td><td>24 - 26</td></tr><tr><td>Nitrogen (N2)</td><td>Vol %</td><td>0.7-1.5</td></tr><tr><td>COS</td><td>Vol %</td><td>0.02-0.04</td></tr><tr><td>NH3</td><td>Vol %</td><td>0.4-0.6</td></tr><tr><td>HCN</td><td>Vol %</td><td>0.03-0.05</td></tr><tr><td>HCl</td><td>Vol %</td><td>0.01-0.02</td></tr><tr><td>Ar</td><td>Vol %</td><td>0.06-0.08</td></tr><tr><td>Hydrogen sulphide (H2S)</td><td>Vol %</td><td>0.05-0.1</td></tr><tr><td>H2O</td><td>Vol %</td><td>19 - 21</td></tr><tr><td>Pressure</td><td>Kg/Cm²abs</td><td>27-27.5</td></tr><tr><td>Temperature</td><td>°C</td><td>325 -350</td></tr></table> <p>Traces Contaminants:-</p> <table><tr><th>Parameter</th><th>Unit</th><th>Value</th></tr><tr><td>Ca</td><td>Ppm wt</td><td>0.5-10</td></tr><tr><td>Mg</td><td>Ppm wt</td><td>0.5-10</td></tr><tr><td>Na + K</td><td>Ppm wt</td><td>0.5-10</td></tr><tr><td>Pb</td><td>Ppm wt</td><td>0.01-0.5</td></tr><tr><td>V</td><td>Ppm wt</td><td>0.01-0.5</td></tr><tr><td>Hg</td><td>Ppm wt</td><td>0.05-0.3</td></tr><tr><td>As</td><td>Ppm wt</td><td>0.05-0.3</td></tr><tr><td>Ni Fe Carbonyls</td><td>Ppm wt</td><td>1-10</td></tr></table>	Parameter	Unit	Value	Carbon monoxide(CO)	Vol %	33-35	Carbon di oxide (CO2)	Vol %	18-20	Methane(CH4)	Vol %	1.5 - 2	Hydrogen (H2)	Vol %	24 - 26	Nitrogen (N2)	Vol %	0.7-1.5	COS	Vol %	0.02-0.04	NH3	Vol %	0.4-0.6	HCN	Vol %	0.03-0.05	HCl	Vol %	0.01-0.02	Ar	Vol %	0.06-0.08	Hydrogen sulphide (H2S)	Vol %	0.05-0.1	H2O	Vol %	19 - 21	Pressure	Kg/Cm²abs	27-27.5	Temperature	°C	325 -350	Parameter	Unit	Value	Ca	Ppm wt	0.5-10	Mg	Ppm wt	0.5-10	Na + K	Ppm wt	0.5-10	Pb	Ppm wt	0.01-0.5	V	Ppm wt	0.01-0.5	Hg	Ppm wt	0.05-0.3	As	Ppm wt	0.05-0.3	Ni Fe Carbonyls	Ppm wt	1-10
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LSTK-2: SYNGAS PURIFICATION UNIT
NIT NO. : PNMM/PC288/E/001



Corrigendum - 3 : Technical (Process) dated 18.09.2024

To be read as :-

Specification of Raw Syngas fed to Purification Plant for production of Ammonia Synthesis Gas is as follows:

	Design Case	Worst Case	Turn Down Case
Major Constituent	Vol. %	Vol. %	Vol. %
Hydrogen (H ₂)	23	22.5	20.3
Carbon monoxide(CO)	27.1	25.8	19.4
Carbon di oxide (CO ₂)	21.7	21.0	21.2
H ₂ O	25.5	28.0	36.9
Methane(CH ₄)	1.93	2.0	1.6
Minor Constituents			
Nitrogen (N ₂)	≤0.5	≤0.5	≤0.5
Argon (Ar)	≤0.08	≤0.08	≤0.08
Hydrogen sulphide (H ₂ S)	≤0.12	≤0.12	≤0.12
NH ₃	≤0.6	≤0.6	≤0.6
HCN	≤0.04	≤0.04	≤0.04
COS	≤0.04	≤0.04	≤0.04
HCL	≤0.01	≤0.01	≤0.01
Syngas Particulate content (mg/Nm ³)	<10	<10	<10
Pressure, Kg/cm ² g	26.5±0.5	26.5±0.5	26.5±0.5
Temperature, °C	325±25	325±25	325±25

Traces Contaminants:-

Parameter	Unit	Value
Ca	Ppm wt	0.5-10
Mg	Ppm wt	0.5-10
Na + K	Ppm wt	0.5-10
Pb	Ppm wt	0.01-0.5
V	Ppm wt	0.01-0.5
Hg	Ppm wt	0.05-0.3
As	Ppm wt	0.05-0.3
Ni Fe Carbonyls	Ppm wt	1-10
Se	PPB V	0.03-2.5
Cd	PPB V	0.01-0.3

LEGEND:

M: MODIFICATION, A: ADDITION, D: DELETION,