



**भारतीय पेट्रोलियम संस्थान**  
(वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद )  
**CSIR-Indian Institute of Petroleum**

(Council of Scientific & Industrial Research)  
P.O.I.P., MOHKAMPUR, DEHRADUN – 248005 (UA) INDIA  
Ph.0135-2525762 & 2525754, Fax. 0135-2660072, 2660202-203  
E-Mail-spo.iip@iip.res.in, bharat.spo@iip.res.in  
Website : [www.iip.res.in](http://www.iip.res.in)



**23.12.2022**

**CORRIGENDUM**

**Tender Notice Ref.: IIP/PUR/1/222-23/15596/RRB/LSPD/PO:**  
**Tender ID: 2022\_CSIR\_137255\_1**

With reference to above tender for 10Kg/day Methanol Synthesis from CO<sub>2</sub> please note that **following queries received from the bidders, uploaded for information of all the prospective bidders**

For & on behalf of CSIR

  
(Stores & Purchase Officer)

IIP Methanol Production Plant																																					
Query List																																					
Sr.No	Tender Sr. No	Item	Tender Specification	Queries	IIP Response																																
1	2.0	Design Temperature	<p>Proposed schematic flow diagram and its brief description for pilot plant. Schematic flow diagram is given in Annexure-I and brief description is given below.</p> <table border="1"> <thead> <tr> <th>S No</th> <th>Parameter</th> <th>Unit</th> <th>Operating Range</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Fresh Feed Rate H<sub>2</sub></td> <td>LPM</td> <td>30-200</td> </tr> <tr> <td>2</td> <td>Fresh Feed Rate CO<sub>2</sub></td> <td>LPM</td> <td>10-70</td> </tr> <tr> <td>3</td> <td>Fresh Feed Rate N<sub>2</sub> for PURGE</td> <td>LPM</td> <td>10-60</td> </tr> <tr> <td>4</td> <td>Operating Pressure</td> <td>Bar (g)</td> <td>60 (max)</td> </tr> <tr> <td>5</td> <td>Operating Temperature</td> <td>°C</td> <td>320 (max)</td> </tr> <tr> <td>6</td> <td>Design Pressure</td> <td>Bar (g)</td> <td>75-85</td> </tr> <tr> <td>7</td> <td>Design Temperature</td> <td>°C</td> <td>500</td> </tr> </tbody> </table>	S No	Parameter	Unit	Operating Range	1	Fresh Feed Rate H <sub>2</sub>	LPM	30-200	2	Fresh Feed Rate CO <sub>2</sub>	LPM	10-70	3	Fresh Feed Rate N <sub>2</sub> for PURGE	LPM	10-60	4	Operating Pressure	Bar (g)	60 (max)	5	Operating Temperature	°C	320 (max)	6	Design Pressure	Bar (g)	75-85	7	Design Temperature	°C	500	<ol style="list-style-type: none"> <li>Kindly confirm design temperature requirement for MFC as 500 Deg. C is not suitable for the same.</li> <li>Fresh feed rate N<sub>2</sub> for purge: 10 to 60 LPM Kindly confirm the requirement of MFC/ MFM/ Rotameter for N<sub>2</sub> gas flow line.</li> </ol>	<ol style="list-style-type: none"> <li>MFCs operating temperature is room temperature. The MFC given in recycle line may expose to higher temperature in case our chiller is not working. Accordingly the MFCs design temperature may be selected.</li> <li>It is okay.</li> <li>only Flow meter is required on nitrogen line.</li> </ol>
S No	Parameter	Unit	Operating Range																																		
1	Fresh Feed Rate H <sub>2</sub>	LPM	30-200																																		
2	Fresh Feed Rate CO <sub>2</sub>	LPM	10-70																																		
3	Fresh Feed Rate N <sub>2</sub> for PURGE	LPM	10-60																																		
4	Operating Pressure	Bar (g)	60 (max)																																		
5	Operating Temperature	°C	320 (max)																																		
6	Design Pressure	Bar (g)	75-85																																		
7	Design Temperature	°C	500																																		
3	2.0 II	Compressor	<p>Type: Positive displacement (Diaphragm) with suitable compression ratio for reactor expected operation Service fluid: Hydrogen- 50-80%, CO<sub>2</sub>-30-50%, CO-2-10%, Methanol-Traces Flow rate: Suitable to Plant Suction Pressure: 10-20 bars Discharge pressure: suitable to plant Make: reputed international make with complete system of surge, storage tanks etc. compact system</p>	<ol style="list-style-type: none"> <li>Kindly confirm the average molecular weight of gases mixture as the composition of service fluid is mentioned in wide range.</li> <li>Kindly confirm the minimum and maximum flow rate range for compressor</li> <li>Kindly confirm suction pressure as 10-20 Bar (g) range is not available for single compressor.</li> </ol>	<ol style="list-style-type: none"> <li>Av. Mol wt : 10-20. 2.Flow range : 250-300 LPM at NTP conditions ; suction pressure: 10-20 bar</li> </ol>																																
4	2.0 III	Reactor	<p>This preheated compressed mixed stream is passed to multi tubular reactor having down flow operation with jacket arrangement to control exothermicity of reactor which is heated up to 200 – 320 Deg. C at pressure of 50-60Bars. Catalyst of amount 3000-4000 gms (Density: 0.8-1.8 g/cc) will be fed inside the reactor. The discharge flow of feed and product is circulated to reduce load on utility. Reactor should have frequent and ease access for catalyst loading and unloading. All necessary arrangements for utilities should be of international make. Reactor should have automatic lifting lowering arrangement, necessary arrangement to move/ hold catalyst bed. Reactor should be of international quality certified by TUV and radiographed and tested through NABL approved labs. Reactor should be equipped with all safety measures and instruments as per IIP standard. Pressure temperature monitoring and safety measures as per standard. No local makes and components will be entertained. Workmanship should be of international quality. If any loose work or local non-standard work found will lead to immediate cancellation of PO</p>	<ol style="list-style-type: none"> <li>Kindly confirm whether isothermal condition is required in reactor section. If yes, kindly confirm isothermal requirement across the height +/- 5 Deg.C or +/- 2 Deg.C.</li> <li>Kindly confirm the requirement of Thermocouple /sensors for measuring catalyst bed temperature inside each tube.</li> <li>Kindly confirm the heating and cooling control range for Heating and Cooling system.</li> </ol>	<ol style="list-style-type: none"> <li>Yes; 2. Yes; 3. Yes</li> </ol>																																

5	2.0 IV	Product Section	The gaseous stream from reactor can be cooled using the cold feed stream and recycle stream to raise the recycle stream temperature to ambient and increasing the feed temperature. The purge stream is around 10 -20% of recycle stream. This reactor gas is to be cooled to in the range of 2-5 Degree C prior to its routing to gas liquid separators separates the gases/liquid with the help of nitrogen purging to remove any dissolve gases. Online/ Offline GC analysis Sampling connections are required at appropriate locations.	1. Kindly confirm minimum pressure requirement for High Pressure Gas liquid separator. 2. Kindly confirm the scope of chiller for utility supply to Condenser, HPGLS and LPGLS. Also confirm the quantity. 3. Kindly confirm the capacity, accuracy or repeatability of weighing balance	1. HPS will operate in the pressure range of 45-55 bars. 2. Chiller will supply the utility to condenser to reduce the reactor outlet gas temperature in the range of 2-5 degC. No utility requirement in HPGLS and LPGLS but HPGLS can be insulated to avoid the loss of cold. Quantity to be estimated by vender. 3. capacity 50 kg with accuracy of two decimal
7	3.0 II	General Requirements	Vent Header and combustion system with stack assembly : There are two purge streams (one from gas recycle stream and one from LPGLS. Moreover, there will be vent of gases during plant shutdown and abrupt pressure surge leading to PSV rupture. Accordingly, the whole system needs to be designed and fabricated by vendor to ensure complete burning and safe disposal for hazardous gases. Gas Vented in atmosphere at high stack( ~@2mtr)	1. Kindly confirm whether complete flare system is required?	Combustion of vent gases is required for their safe disposal.
8	3.0 X		The supplier should take care of all the electrical connections to be necessary/ <b>share necessary utilities requirements with IIP/NTPC after Design Package approval prior to installation requirement before shipment at site (NTPC Noida)</b>	Kindly clarify mentioned point	This implies that vender will inform the NTPC regarding the utility requirements like how much electric load and cooling water requirement will to run the plant so that these utilities can be arranged or their vailability can be evaluated for setting up the plant.The electrical connection cables and others if any to connect the pilot plant to utilitites points will be in vender scope. NTPC will provide the utility points as required.
9		Annexure- I Schematic of process		1. Kindly confirm the pressure range of H2, CO2 and N2 stream from cylinder. 2. Kindly confirm the requirement of Pressure regulators for H2, CO2 and N2 gas stream. 3. Kindly confirm the exact composition and flowrate of recycle gas stream for MFC. 4. Kindly confirm the requirement of gas flowmeter?	1. Cylinder pressures ( H2: >50 Bar, CO2: >50 bars, N2: >50 bars. 2. There will no need of pressure regulations for CO2 and H2 and MFC has to be used in line. For nitrogen , pressure ragulation is not required but a manual valve is required to control the flow during the purging activities. 3. Exact composition and flow rate of Recycle stream can not be provide at this stage. This will be typical syngas containg hydrogen , carbon monooxide and CO2 and flow will also vary. The flow rate will be in the range of 175-230 LPM at NTP conditions (15 degC and 1 atm ) 4. It is not clear that vender is talking about which flowmeter. However, the flow meter to measure the flow rate of purge stream, Nitrogen gas will be required. The flow meter on gas going to compressure shall also help in plant operation.

Sr. No.	Queries	Reply to Queries
		Hydrogen and CO2 Cylinders
1	Source of Hydrogen and CO2 battery limit	Cylinder pressures ( H2: >50 Bar, CO2: >50 bars,
2	Supply pressure of hydrogen and carbon dioxide at battery limit	Nitrogen Cylinder (N2: >50 bars).
3	Nitrogen supply pressure at battery limit	Yes-10kg/day ,methanol
4	Plant capacity is 10kg/day of Methanol production. Pl confirm.	Yes- (10-20 Bars)
5	As per our understanding feed gas and recycle gas will be combined at 10 bar g and compressed to 60 bar g. Pl. confirm	48-500 hrs
6	Pl inform Plant operation duration at steady state	Catalyst will be supplied by CSIR-IIP. It is extrudates form (metal oxide catalyst). MeOH selectivity per pass ~50%
7	Pl confirm that catalyst will be supplied by IIP and also let us know the properties of catalyst. Also selectivity of the catalyst and per pass conversion.	It is exothermic reaction (CO2+3H2 =CH3OH+H2O; Heat of reaction ~41 KJ/mol)
8	Pl inform heat of reaction for designing reactor cooling system	Yes-Top -Middle and bottom
9	Pl inform reactor internal thermocouple requirement? No of thermocouples required	
10	Pl specify reactor pressure control element. Flow controller is controlling recycle flow rate at differential pressure 50 bar g .Pressure control element is missing to purge out gas from system	Yes-It will be at HPS top
11	Pl inform utility available for condenser located at reactor downstream. Is cooling water or chilled water available. PL specify cooling water specifications	The final temperature requirement is 2-5 deg Centigrade. Accordingly utility can be selected
12	PL specify scope of online GC. Is it in IIP Scope of supply? Location of the same from the unit	IIP/NTPC Scope
13	Pl specify Methanol water tank capacity/weigh scale capacity	40-50 liters/ 50kg
14	PL inform area classification for the plant. Whether safe or hazzardous?. If hazzardous, pl specify area classification	Vender needs to decide based on the operating conditions and service fluids
15	As The whole reactor and control system set-up to be installed in a single closed room. Pl inform us the room size.	Space is not contrait
16	Where to locate combustion system with stack assembly ?	Near the reactor
17	Pl inform Gas detector scope of supply and LEL concentration for detectors	CO will be present in the purge gas, so the LEL concentration level should be <1ppm
18	IIP has mentioned Operating from PLC HMI as well as through SCADA/Workstation. Manual operation to comply when automation fails. Panel mounted controllers are required for manual operations? Pls confirm.	Yes- Needed
19	Delivery Dates are contradictory. Some where its mentioned June and 4 mths. Which to be considered?	4 months
20	Please let us know the commissioning scope. i.e. operation duration, runs, etc.	continuous at least 500h
21	Please let us know the applicable payment terms for FOR destination	Within 30 days of receipt of materials in good cndition and its installation and commissioning
22	Liquidity Damages : As per IIP it is 1/2% to max 10%. Request to accept 1/2% to max 5%. Pls confirm	Max 10% LD as per tender will be applicable.