AnnexureIV
(Revised and issued as part of Corrigendum-I)

TECHNICAL CREDENTIAL OF APPLICANT

Following documents/information shall be submitted by applicant in support of their technical credential:

1. Brief of the Applicant's Electrolyser technology for H2 production including basic principle, major operating conditions/parameters, quality of H2 produced etc.

2. Advantages/merits of Applicant technology compared to other electrolyzer in market.

3. Confirm electrolyzer design ensures compliance to all applicable standards/codes for installation and operation within Refinery.

4 . Confirm whether design standards are equivalent to ISO 22734. Applicant to provide details.

5 . Mention Quality of Green Hydrogen produced, along with impurity level.-Bidder to refer product specification mentioned under clause 7.1 of Technical specification.

6. Pressure and temperature at which Green Hydrogen shall be produced (Min pressure reqd- 24 kg/cm2g at max temp of 40degC)

7. Power per unit of H2 production.
   Provide Estimated power requirement on kwhr basis per kg of Hydrogen produced at 100% capacity (This shall be total power consumption including electrolyzer and balance of plant). Balance of Plant (BoP) includes all other equipment excluding Electrolyser stack/modules assembly . It shall include feed preparation unit, gas purification section, pumps & compressor (if applicable), Exchanges, control system, all associated auxiliaries etc)

8. Land Area/Footprint per module/stack basis. Equivalent H2 generation capacity per module/stack to be indicated. Also indicate total area for the 500TPA plant (excluding substation)(Area shall not exceed 500 m2)

9. Confirm entire plant (Electrolyzer, BOP) including, but not limited to, instrumentation controls/PLC etc is considered for installation within 500 m2 (max) and no additional space is required whatsoever.

10. Typical unit plot plan to be provided (Max area available is 500 m2)

11. Based on the meteorological design data provided elsewhere in this tender document, and statutory/safety requirements, applicant to confirm plant is designed for outside/outdoor installation. Bidder to confirm if it is a skid mounted/containerized unit.

12. Utilities required for normal operating of the plant (eg. Nitrogen/Service Water/Plant Air/Instrument Air/Cooling Water/Others(specify)). Please specify on per min/per hour basis for the 500 TPA plant

Sl No.	Parameter	Unit of Measurement	Quantity	Frequency
1	Nitrogen			
2	Service Water/DM Water or both(Specify)			
3	Plant Air			
4	Instrument Air			
5	Cooling Water			
6	KOH/NaOH (See Note)			
7	Any other chemical			
8	Others			

Note: Bidder to specify the KOH/NaOH strength and make-up and/or replacement frequency to enable MRPL to assess storage requirement

13. Estimated utility requirement in standard litres per minute if DM water is provided by MRPL versus utility requirement in standard litres per minute if treated raw water is provided versus utility requirement in standard litres per minute if desalinated water is provided.

14. KOH or NaOH or any other chemical required from battery limit (continuous or intermittent with frequency and strength of chemical)

15. Estimated Capital Investment for the Project

Sl No.	**Item Description**	**UOM**	**Qty**	**Rs. Cr**
1	Supply & Installation of Electrolyser Stack:	Lump-sum	1	
2	Supply & Erection of Balance of Plant (BOP) and Commissioning (SAT) of entire Green H2 Plant, PGTR etc	Lump-sum	1	
3	AMC Charges for 1st year after the expiry of warranty period.	Year	1	
4	AMC Charges for 2nd year after the expiry of 1st year AMC	Year	1	
5	AMC Charges for 3rd year after the expiry of 2nd year AMC.	Year	1	
6	Bidder to indicate any other periodic replacement/replenishment/refurbishment required as per design(including but not restricted to electrodes, absorbent replacement of H2 purification system, alkaline replacement/make up)	To be specified by bidder	To be specified by bidder	

16. Requirement of flare to be confirmed

17. Effluent generation if any (Solid, Liquid, Gaseous) to be confirmed with nature/type, approximate quantity and frequency.

18. Previous experience of the applicant in implementing electrolyser based green hydrogen production projects. Experience /reference list of green H2 plant executed in past

19. Catalogue/ detailed technical details of the relevant system/ product of the applicant

20. Details about electrolyzers in successful commercial production for a min. period of 6 (six) months prior to the last date of month previous to the one in which bids are invited.

21. Turndown capacity of electrolyzer being offered (Min. shall be 25%)

22. Guaranteed Service Life of Electrolyzer Stack (Min. shall be 80000 hrs)

23. Electrolyzer cold start-up time and stand-by start up time

24. Cell Temperature and efficiency. Operating pressure

25. Ramp up capability and ramp up time from turndown capacity to 100% capacity

26. Maintenance Requirement, frequency and no. of shutdown days. Bidder to clearly specify.

27. Ability of technology to handle intermittent renewable power (i.e. transient range) vs requirement of continuous rated renewable power?

28. Power is available in the Refinery at nameplate voltage of 6.6 KV+10% at HT level or 415V+10% at LT level. Applicant to indicate power requirement at LT level or HT level.

29. MRPL prefers to supply power at voltage level of 6.6KV+10%. Applicant shall step down the voltage to lower voltage level as required for operation of the Green Hydrogen plant. However, applicant to note that total available area is only 500 m2 for the entire Green H2 plant including all required facilities/auxiliaries. Applicant to confirm acceptance.

30. Copy certificate from customer about satisfactory performance of the unit already commissioned

31. Engineering strength of applicant, for execution of the project, if job is awarded in future.

32. Detail about the collaboration/tie up details with any manufacturer (if applicable).

33. Execution period required (project schedule) from the date of award of job to commissioning of the facility. Applicant to specify (Shall not exceed 15 months)

34. Name and Production Capacity of Electrolyzer manufacturer in KW/MW per year. Concurrent commitments.

35. The electrolyser stack shall be designed such that one or more modules can be removed online for maintenance, without affecting the plant operation. Further, the module design shall ensure compatibility for replacement and/or integration with next generation electrolyzer modules that may be manufactured by the electrolyzer manufacturer. Bidder to confirm/clarify.

36. Bidder to indicate the min. stack size and/or standard stack size that can be delivered/manufactured. Bidder to indicate on KW basis.

37. Any other technical detail which applicant would like to highlight, about its technology for consideration of EoI in future.

38. Bidder to provide the total list of Feed streams/Product streams/Utility streams/Effluent streams to be considered by MRPL for tie-in purpose.

(Sign & Company
Seal) Authorized
signatory