TECHNICAL SPECIFICATION FOR ENGINEERING SERVICES OF FIRED HEATER PACKAGE (Rev.00)

Project	Integrated Battery Plant in Jamnagar, India
Customer	M/s. Reliance Industries Limited
Site Location	Jamnagar, Gujarat, India
PMC	M/s. Fluor
BHEL Enquiry. No.	24620

Rev. No.	Reason for Revision	Date
00	First Issue	19.12.24

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I. INTRODUCTION

Bharat Heavy Electricals Limited (BHEL) **(**www.bhel.com**)** is a Government of India Undertaking and a Maharatna Company, Established in 1964. BHEL is an integrated power plant equipment manufacturer and one of the largest Engineering and Manufacturing Company of its kind in India. The company is engaged in the Design, Engineering, Manufacturing, Construction, Testing, Commissioning and servicing of a wide range of products and services for core sectors of the economy, viz. Power, Transmission, Industry, Transportation (Railways), Renewable Energy, Oil & Gas, Water and Defence with over 180 products offerings to meet the needs of these sectors. BHEL has been the bedrock of India's Heavy Electrical Equipment industry.

BHEL has a widespread network of 16 Manufacturing Divisions, 2 Repair Units, 4 Regional Offices, 8 Service Centers, 6 Overseas Offices, 6 Joint Ventures, 15 Regional Marketing Centers and current project execution at more than 150 project sites across India and abroad corroborates the humungous scale and size of its operations.

Adding to its achievements, BHEL has joined the elite club of select global giants having an installed base of over 170 GW of power generating equipment globally. BHEL also has a widespread overseas footprint in 78 countries with cumulative overseas installed capacity of BHEL manufactured power plants nearing 10,000 MW.

BHEL has technology tie-ups with leading companies in the world including General Electric Company, Alstom SA, Siemens AG and Mitsubishi Heavy Industries Ltd., supported by technology developments in its own R&D centers. The quality & reliability of BHEL products are at par with other Global players and adheres to international standards.

Heavy Plates & Vessels Plant [HPVP] , Visakhapatnam

After being a subsidiary of BHEL for five years, the erstwhile Bharat Heavy Plates & Vessels (BHPV) was merged with BHEL on 30.08.2013. The new name of BHPV after merger with BHEL is “Heavy Plates & Vessels Plant” (HPVP) which is 16th manufacturing unit of BHEL located at Visakhapatnam, Andhra Pradesh, India.

HPVP is engaged in design, engineering, procurement, manufacture, supply, erection, testing and commissioning of various sophisticated equipment and systems for core business sectors like Refineries, Fertilizers, Petrochemicals, Steel Plants, Oil & Natural Gas, Heavy Chemicals etc.

HPVP's product range includes Heat Recovery Steam Generators (HRSGs), Coal/Oil/Gas fired boilers, Pressure Vessels, Columns, Heat Exchangers, Air Fin Coolers, LPG Bullets, LPG Spheres, LPG Mounded Bullets, Storage Tanks, Reactors, Nitrogen and Oxygen Plants, Ammonia Storage Tanks, Cryogenic Storage Tanks, Purge Gas Recovery Units, Evaporators, Industrial Boilers, Deaerators, Fired Heaters etc.

II. INTENT OF SPECIFICATION

BHEL-HPVP Visakhapatnam is working on a contract for M/s Reliance Industries Limited which is constructing an Integrated Battery Plant in Jamnagar, India as a part of Reliance Industries Limited's New Energy Initiatives.

M/s Fluor is the Engineering and Project Management Contractor for this project

BHEL invites offers from prospective Engineering Service Providers (ESP) for providing engineering support during:

1st Stage: Pre-Bid stage (While bidding for the enquiry floated by M/s Fluor).

2ndStage: Post Order stage (After placement of order on BHEL by M/s Fluor / Reliance).

BHEL will prepare and submit the techno commercial offer to the end customer. BHEL will be the prime bidder covering the scope including Detail engineering, procurement of material, manufacturing, supply, erection, testing and commissioning. ESP's role is limited to furnishing the engineering services/data as required during detailed engineering stage of the project (Refer ESP Scope of Work specified elsewhere in this document). BHEL will take the provision for engineering charges of ESP in their commercial offer, while furnishing final quote to the end customer. In the event of receipt of order form end customer., BHEL will place order on ESP for their services as per the detailed scope indicated elsewhere in this specification.

Documents containing Detailed scope of work, exclusions and other documents which will be required for the Engineering Service Provider are attached along with this document.

Note: BHEL will enter into an MOU with the successful ESP, whose validity shall be as per the details mentioned in **ANNEXURE-1** to this document.

III. DEFINITIONS

Various parties involved in the tender document shall hence forth be referred as follows:

Owner	BHEL / M/s Reliance
PMC/Consultant /EPCM	M/s Fluor
Contractor/ESP/ Bidder/ Vendor/Technology Know how Provider	Engineering Service Provider

IV. PROJECT INFORMATION

Following are some of the major details of the heater package:

		Normal	Maximum	Minimum
8	* SERVICE	Thermal oil system	Thermal oil system	Thermal oil system
9	HEAT ABSORPTION, Kcal/h.	30.26 *10^6 (Note 1)	32 *10^6 (Note 1)	7.565*10^6(Note 1)
10	* FLUID	Thermal oil	Thermal oil	Thermal oil
11	* FLOW RATE, t/h	2479(Note 1)	2621(Note 1)	620(Note 1)
	Thermal Oil Inlet temperature °C	210	210	210
	Thermal Oil Outlet temperature °C	230	230	230

NOTES:

1. There are in total 3 thermal oil heaters, 2 working and 1 spare. The total normal heat duty is 30.26 MMKcal/h, each heater duty will be 30.26/2=15.13 MMKcal/h, total design mass flow rate is 2621t/h and each heater flow rate is 1310.5t/h. The turndown ratio is 25% of normal case. The data for design and min. case is also for 2 heaters, need to be divided by 2 for one heater duty and mass flow rate.

Refer documents furnished by M/s Flour attached as **ANNEXURE-4** to this document for further technical requirements.

V. TECHNICAL QUALIFICATION CRITERIA:

Technical Qualification Criteria which the ESP has to satisfy without any deviation shall be as per **ANNEXURE-1** attached along with this document.

VI. ENGINEERING SERVICE PROVIDER'S SCOPE OF WORK:

ESP's scope of work shall be to provide engineering support to BHEL in:

- Validation & Updating of API Heater Datasheet furnished in the tender.
- Validation & Updating of Heater Auxiliary Equipment Datasheet furnished in the tender.
- Preparation of PG Test Procedure.

Technical Requirements/MR furnished by M/s Flour attached as **ANNEXURE-4** to this document shall be referred & complied by the ESP.

VII. EXCLUSIONS:

Following are excluded from ESP's scope of supply:

- Procurement/ Supply of material/ equipment.
- Generating Detailed Engg Drawings used for fabrication
- Fabrication of equipment.
- Site Work
- Erection & Commissioning of heater package (Refer Note below).
- Conductance of PG Test at site (Refer Note below).

Note:

1. PG Test at site shall be carried out by BHEL as per the PG Test procedure furnished by ESP.
2. In the event of non-performance of the heater, the price reduction/penalty towards the same, will be passed on to the ESP. **The maximum price reduction / penalty is limited to 10% of the ESP's total contract value.**

VIII. List of Documents to be submitted by ESP

The scope of work includes thermal design, mechanical design, supervision during commissioning and PG test.

The design of fired heater package includes, Burner Management System (BMS), Heat Recovery system (if applicable) including its items, stack, stack damper, silencer, fuel trains, complete Engineering of Electrical and Instrumentation, etc.

Engineering Service Provider (ESP) shall indicate and include design of all such items / services required for successful completion of the scope of contract with all performance parameters that are necessary for the safe and efficient operation of the fired heater.

<u>During Pre-bid stage:</u>

1. Furnishing pre bid queries after studying complete Tender documents issued by BHEL.
2. Filled in data sheets for Heater & auxiliaries/equipment as per the tender requirement.
3. Bill of materials including material and quantity / weight.
4. Material requisition for all fired heater equipment/auxiliaries for getting budgetary quotes
5. Performance Guarantees

6. P&I Diagrams as per the tender requirement.
7. General Arrangement drawing/line diagram of complete package
8. Coil arrangement drawing as per the tender requirement.
9. Heat recovery system schematics along with its auxiliaries: Drawings including coil arrangement, supporting, steel structure, steel work and platforming.
10. Thermal design calculations
11. Foundation plan and loading data (empty, operating, hydro test loads & wind, seismic shear and moments) at the top of foundation for
    - (i) Fired Heater base
    - (ii) Fuel gas knock-out drum
    - (iii) Fuel gas coalesce
    - (iv) Fuel gas heater
    - (v) Stack
    - (vi) fans
    - (vii) Additional equipment if any

<u>During Post order stage</u>

I. Process Engineering:

a. Preparation of detailed P&IDs for all the systems indicating all equipment, line numbers, equipment / instrument tags, process controls, interlocks

- Burner Management inputs (Heater Firing system)
- Heat recovery system data
- Air and Flue gas system data

b. Data sheets as per API for Fired heater, Burners for all associated equipment

c. Utility consumption list (Instrument air, service air, atomizing air, cooling water, service water, steam, nitrogen, electrical load etc.)

d. pressure drop calculation of the of heat recovery system (air side, gas side, fuel side, process fluid)

II. Mechanical Engineering:

a. Engineering calculations for thickness estimation for fired heater coils, casings, tubes, etc.

b. Arrangement drawing of Fired Heater and auxiliaries indicating all items, major dimensions, maintenance space requirement, loads etc., including arrangement of structural members.

c. Coil and headers sizes and its material specifications, slug flow analysis

d. Material requisition for all fired heater equipment/auxiliaries

III. Civil Engineering:

a. Foundation load data.

- All supportive documents to prove that ESP is satisfying the Technical Qualification Criteria.
- Queries/Deviations if any against applicable specifications, codes, duly consolidated at one place (**ANNEXURE-5** for Pre-Bid Query Format & **ANNEXURE-6** for Deviations Format). Please note that vendor specific deviations will not be considered. If no deviations are furnished, it will be presumed that all requirements are being fully met. Any deviations / deletions / modifications made by the bidder elsewhere will not be taken cognizance of and all such deviations shall be deemed to have been withdrawn by the bidder.
- Signed & Stamped NO DEVIATION DECLARATION (**ANNEXURE-7**)
- Filled in experience record proforma / reference list wherever applicable.
- Signed copy of Annexure-4 (Technical Requirements Index)

IX. KEY MILESTONES DURING PROJECT EXECUTION

Following shall be the key milestones during project execution, for the ESP:

Sr. No.	Activity	Time (in Weeks) from PO Placement
A	**ENGINEERING**	
1	Furnishing API data sheets and Mechanical Data sheets	3
2	Heater Auxiliary Equipment Design	4
B	**COMMISIONING / PG TEST**	
3	PG Test Procedure	8

X. LIST OF ANNEXURES

Following documents (attached separately) shall be referred along with this document for further details:

Sl. No.	Document No.	Document Description
1.	Annexure-1	Technical Qualification Criteria
2.	Annexure-2	DELETED
3.	Annexure-3	DELETED
4.	Annexure-4	Technical Requirements
5.	Annexure-5	Pre-Bid Query Format
6.	Annexure-6	Deviations Format
7.	Annexure-7	No Deviation Declaration
8.	Annexure-8	Consolidated Utility Requirements
9.	Annexure-9	DELETED
10.	Annexure-10	DELETED
11.	Annexure-11	DELETED

NOTE:

All technical amendments, corrigendum, addendums furnished by customer/consultant during the pre-bid stage will become a part of the technical specification/contract between BHEL & ESP.

ANNEXURE-1
PRE-QUALIFICATION CRITERIA

I. Technical Qualification Criteria

1.1 Bidder, as Engineering Service Provider (ESP) should have successfully completed works involving single point responsibility for "Heater design with heat absorption duty of minimum 5.0 GCal/Hr involving Engineering of Heater and APH System along with stack in at least 1 (one) no. of Fired Heater job in last 12 (twelve) years in a Refinery / Petrochemical Plant / Onshore Oil or Gas processing facilities / Fertilizer Plant". These work / job should have been completed during any of the last 12 (twelve) years ending on last day the month immediately previous to the month in which last date of bid submission (in case of extended bid submission date, original bid submission date shall be considered) falls. The heater designed by the bidder as Engineering Service Provider must have completed at least one year of successful operation from commissioning and bidder is required to submit documentary evidence in support of the same from client / owner / end user.

AND

1.2 The bidder should have completed at least one heater job with Alloy Steel Tubes of the P11 or P22 or Carbon Steel Tubes of the A106 Gr. B /C or higher materials in at least one Fired Heater / piping in a hydrocarbon service as covered by IBR, ASME Sec. I / Sec. VIII or B31.3 / API 530 / API 560 / in the last 12 (twelve) years in a Refinery / Petrochemical Plant / Onshore Oil or Gas Processing facilities / Fertilizer Plant. The above work mentioned in the para above must have completed at least one year of successful operation from commissioning and bidder is required to submit documentary evidence in support of the same from client / owner / end user.

From meting the qualification criteria as mentioned against point no. 1.1 and 1.2 above, bidder may submit one order for complying to the requirement of clause 1 and clause 2.

II. Commercial Qualification Criteria

2.1 Average annual turnover of minimum 50 lakhs for the last 3 financial years

2.2 Net worth: Positive during last 3 financial years

ANNEXURE-2

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ANNEXURE-3

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ANNEXURE-4

TECHNICAL REQIUREMENTS INDEX
(DOCUMENTS SHARED SEPARATELY DUE TO SPACE CONSTRAINT)

Below documents are shared separately due to space constraint

- 6. Supplier Contract Template
- 7. Commercial BID- RFX Instruction
- 1. RFQ Cover letter
- 2. Instructions to Bidders - Attachment A (Master Rev B)
- 3. Bidder Acknowledgment
- 4a. Bidder Response Summary UNPRICED RIL
- 4b. Commercial Query Sheet
- 4c. BOQ template for Thermal Oil Heater
- 5. Supplier Quality Surveillance

Above documents are shared thru
RFQ-4-0502 THERMAL OIL HEATER.RAR file due to large size

ANNEXURE-5

PREBID QUERY FORMAT

Pre-bid Queries (if any) shall be raised in the following format only:

Sl. No.	Technical Specification Reference			Requirement as per the technical specification	Clarification raised by bidder
	Doc. No.	Page No.	Clause No.		

Note:

1. It may be noted that this is a NO DEVIATION BID.
2. Vendor queries (if any) will be clarified only during the pre-bid stage.
3. Vendors must submit a NO DEVIATION DECLARATION (attached separately) along with the technical offer, without which the technical offer submitted by vendor will not be technically scrutinized for technical recommendation.

ANNEXURE-6

DEVIATIONS FORMAT

Deviations (if any) shall be raised in the following format only:

Sl. No.	Technical Specification Reference			Requirement as per the technical specification	Deviation by bidder
	Doc. No.	Page No.	Clause No.		

Note:

1. It may be noted that this is a NO DEVIATION BID.
2. Vendors must submit a NO DEVIATION DECLARATION (attached in subsequent sections) along with the technical offer, without which the technical offer submitted by vendor will not be technically scrutinized for technical recommendation.

ANNEXURE-7

NO DEVIATION DECLARATION

(TO BE SUBMITTED ON THE LETTERHEAD OF BIDDER)

NAME OF WORK : _____

BIDDING DOCUMENT. : _____

We …… *(*)* hereby agree to fully comply with, abide by and accept without variation, deviation or reservation all technical, commercial and other conditions of the Bidding Document and its Technical & Commercial Amendments, issued by BHEL.

We further hereby waive, withdraw and abandon any and all assumptions, deviations, variations, objections or reservations whatsoever hereto set out, given or indicated in our offer, clarifications, correspondence, communications, or otherwise with a view that the price bid submitted may be treated to conform to, in all respects, with the terms and conditions of the said Bidding Document including all Technical and Commercial Amendments.

We further hereby confirm that the price quoted in the price bid are as per the provisions of the Bidding document and there is no deviation to the provisions in the price bid.

**

For and on behalf of

Authorised signatory

(Name and signature of authorized signatory) Date:

* Here fill in the name of bidder.

** The bid compliance letter must be signed by the person (s) authorized to sign.

ANNEXURE-8

CONSOLIDATED UTILITY REQUIREMENTS LIST

Following values of utilities required at BATTERY LIMIT must be filled and submitted along with the technical offer:

S. No.	Utility	Parameter	Value required at battery limit (To be filled by ESP)		
			Minimum	Normal	Maximum
1	Service Air	Flow (TPH)			
		Pressure (mmwc)			
2	Instrument Air	Flow (TPH)			
		Pressure (kg/cm^2(g))			
3	Cooling Water	Flow (TPH)			
		Pressure (kg/cm^2(g))			
		Temp. (°C)			
4	Service Water	Flow (TPH)			
		Pressure (kg/cm^2(g))			
		Temp. (°C)			
5	Nitrogen (if required)	Flow (TPH)			
		Pressure (kg/cm^2(g))			
		Temp. (°C)			
6	Burner Main Fuel Gas	Flow (TPH)			
		Pressure (kg/cm^2(g))			
		Temp. (°C)			
7	Pilot Gas	Flow (TPH)			
		Pressure (kg/cm^2(g))			
		Temp. (°C)			
8	LP Steam	Flow (TPH)			
		Pressure (kg/cm^2(g))			
		Temp. (°C)			

Note:

1. In addition to the above, if vendor requires any additional utilities, the same may be indicated in the above format, as additional entries.

ANNEXURE-9

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ANNEXURE-10

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ANNEXURE-11

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