

**MAITREE 2X660 MW
FLUE GAS DESULFURIZATION SYSTEM**

**TECHNICAL SPECIFICATION FOR
Abrasion Resistant(MOULDED) FRP Grating**

**CUSTOMER : BIFPCL (BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.)
LIMITED), Bangladesh**



BIFPCL:MAITREE: GRATING: REV-00

Prepared	Checked	Approved
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R00 dated 20-09-2019		

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1.0 PROJECT INFORMATION:

a.	Owner	BIFPCL (BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED), Bangladesh
b.	Buyer	BHEL, Ranipet
c.	Process/Application	Flue Gas Desulphurization

A) SITE CONDITIONS

1.	Ambient Temperature and Relative Humidity		
a.	Average Site Condition ASC		
	Ambient Temperature	:	27.3 deg C
	Ambient Humidity	:	87%
	Ambient Pressure	:	1007.6 mbar
b.	Summer Site condition SSC		
	Ambient Temperature	:	36.9 deg C
	Ambient Humidity	:	60%
	Ambient Pressure	:	1007.9 mbar
c.	Winter Site condition WSC		
	Ambient Temperature	:	12.2 deg C
	Ambient Humidity	:	100 %
	Ambient Pressure	:	1017.2 mbar
d.	Reference Site condition RSC		

	Ambient Temperature	:	31 deg C
	Ambient Humidity	:	88%
	Ambient Pressure	:	1007 mbar
2.	Design ambient conditions for Equipments		
a.	Maximum Design temperature (outdoor)	:	45 deg C
b.	Maximum daily average ambient shade temperature	:	38 deg C
c.	Maximum monthly average temperature (in the shade)	:	34.6 deg C
d.	Maximum annual average temperature (in the shade)	:	27.3 deg C
e.	Maximum design temperature of the electrical equipment installed indoors in air conditioned rooms	:	40 deg C
f.	Maximum design temperature of the electrical equipment installed indoors in non-air conditioned rooms	:	45 deg C
g.	Minimum design temperature	:	0 deg C
3.	Plant Elevation	:	+5.0 m above sea level
4.	Wind Load	:	As per Bangladesh National Building code-2012, Part-6, Chapter 2.4
a.	Basic Wind speed, three-second gust at 10m above ground in exposure C, having a return period of 50 years	:	73 m/s, Exposure category-“C”
5.	Seismic Load	:	Seismic Zone 1 as determined by Bangladesh National Building code (BNBC-2012)

Note:

1) Equipment and Material must be suitable for the range of ambient site conditions. In particular the saline atmosphere has to be considered.

B) PROJECT LOCATION AND APPROACH

a.	State/Division	Khulna
b.	District	Bagerhat district
c.	Place	Moithara Village, Rampal Upazila
d.	Location	Latitude- 22 deg 37' 0" to 22 deg 34' 30"N Longitude- 89 deg 32'0"E to 89 deg 34'5"E

C) APPROACH TO SITE:

The nearest town Khulna is at a distance of 23 km from project site. The site is connected by road from Mangla- Khulna Highway. Nearest Domestic airport is Jessor, Bangladesh at a distance of about 107 KM and international airport is Dhaka at a distance of 263 KM, Bangladesh. The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given above is for general guidance and shall not be contractually binding on the Owner. Bidders shall obtain clarifications/ information, if any, before submitting their offers, regarding scope of work, facilities available at sites, etc. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of above. All relevant site data/ information as may be necessary shall have to be obtained/ collected by the Bidder.

2.0 INTENT OF SPECIFICATION

- 1 There are two units of Maitree each of 660 MW. Each unit of Maitree is envisaged with one Absorber for Flue Gas Desulphurization (FGD) system.
- 2 Recirculation pumps are located in the absorber bottom and it will recirculate the Gypsum Slurry to the absorber. Suction screens (i.e. gratings made of FRP) is installed inside the absorber to protect the recirculation pumps. Drawing of the absorber bottom is enclosed with this specification indicating the arrangement of the suction screen/FRP Gratings.
- 3 Design, Manufacturing, Inspection and Testing of the gratings shall comply with all the currently applicable statutes, regulation and safety codes in the locality where the equipment are to be installed. The item shall also conform to the latest applicable British/American/Japanese/International standards. **Indian/Chinese standards are not acceptable.** Nothing in this specification shall construe to relieve the contractor of the required statutory responsibility.

- 4 Vendor shall guarantee that the FRP grating will withstand the slurry conditions inside the absorber as given in CI 4.3.
- 5 Compliance to this specification shall not relieve the vendor of responsibility of furnishing the item of proper design, materials and workmanship to meet the specified requirements.
- 6 In case of any deviation taken by the vendor, it shall be listed in the proposal under separate section titled as " list of deviations/exceptions" from the enquiry document (Annexure I)

3.0 QUALIFICATION CRITERIA

Bidder shall be a manufacturer of Moulded Abrasion Resistant FRP Grating. Copy of PO/test reports where they have supplied such grating for similar applications to be submitted along with the offers.

4.0 SCOPE OF SUPPLY

- 1 Design, manufacture, testing and supply gratings made of best Quality FRP suitable for the duty condition as specified in respective clauses.
- 2 Part items of the equipment shall be identified by Tag Nos and have to be packed in order to minimize the possibility of damage during storage or transit. The equipment/item shall be packed as per sea worthy packing and shall be protected for storage of 12 months at site, any extra precaution to be taken by the Purchaser for storage beyond 12 months shall be explicitly indicated in the operation and maintenance manuals. Packing shall be done separately for Unit 1 and 2.
3. Ten copies containing all details of reference drawings and technical data shall be furnished by the Bidder.

5.0 BASIC DESIGN

This section covers the manufacturing and performance requirements of the FRP Grating

5.1 Material of construction of the grating :

Gratings shall be of Fibre-reinforced plastic (FRP). The material shall be made of best quality resin material . Raw material (Resin/Glass material) imported from China is not acceptable. Proper resin material shall be selected to prevent any damage or blister.

Grating should have ant-slip surface, high impact resistant, UV resistant and abrasion/corrosion resistant.

5.2 Dimensions of FRP

Dimension of the each element in the grating shall be 24.8 X 24.8 X 25 (all in mm). Bidder shall refer to the Annexure -III for details of the grating element.

5.3 SLURRY ANALYSIS:

The grating material has to be chosen to withstand the below slurry condition:

S.No	Constituents	Parameters
1.	Slurry to be handled	Gypsum Slurry
2.	Chloride Content	<27,000 ppm
3.	Specific Gravity at pump section	1.211
4.	Vapor Pressure at Pump	20.3 KPa
5.	Viscosity at Pump	0.01 Pa.S
6.	Concentration of Solid	30% wt.
7.	SiO ₂ Content	4 to 6 g/l
8.	Ph	4-8
9.	Slurry Temperature	60 deg C (Max)

Sketch of the grating arrangement with the Recirculation pumps is given in Annexure-IV. Gratings has to withstand the conditions existing inside the absorber as shown in the arrangement. The quantity of grating required is given as per the below list :

S.No	Type As per Drawing no 3-FW000-00789	Size of the Grating (mm)	Qty per absorber(Nos)	Qty for both the units
1	Type A	999x851	1	2
2	Type B	999x831	1	2
3	Type C	999x851	1	2
4	Type D	999x831	1	2
5	Type E	999x999	12	24
6	Type F	989x976	6	12
7	Type G	999x979	6	12
8	Type H	999x999	6	12
9	Type I	999x979	6	12

6.0. WARRANTY

The warranty period shall be 24 months from the date of supply or 18 months from the date of commissioning whichever occurs first.

7.0. INSPECTION & TESTING

The General inspection requirements to be considered are as below:

1. Bidder shall furnish written copies of shop production, fabrication , quality test procedures and drawings for review by BHEL/BIFPCL prior to manufacture. Inspection of above mentioned tests by BHEL representative at bidder's works is envisaged.
2. The test procedure will be reviewed and approved by the BHEL/BIFPCL. Inspection and testing requirement shall be as per approved Quality plan.
3. Sample shall be offered to BHEL for approval and inspection.
4. Final inspection and release by the BHEL/BIFPCL is a mandatory requirement unless specially waived.
5. BHEL/BIFPCL shall witness the test at Bidder's works and a notice of minimum three (3) weeks shall be given for attending the inspection.
6. Bidder to arrange all calibrated gauges, Instruments during inspection.
7. Bidder to arrange Instruments and all accessories for the measurement at site using Impact method.

8.0 SPECIAL TOOLS & TACKLES

Any special tools & tackles required for the entire equipment to disassemble, assemble or maintain the units, they shall be included in the quotation and furnished as part of the initial supply. List of special tools & tackles shall be decided by bidder as per his proven practice. When special tools are provided, they shall be packaged in separate, boxes with lugs and marked as "Special Tools for (tag / item number)." Each tool shall be stamped or tagged to indicate its intended usage. Levers and eye bolts for the removal of parts to be serviced shall be submitted with special tools.

9.0 COLOR SHADE

The surface has to be painted with acrylic urethane paint . Color shade will be intimated during contract stage

10.0 DOCUMENTATION

10.1 INFORMATION TO BE FURNISH ALONG WITH THE OFFER

- a) Compliance to the specification
- b) Data sheet of the FRP grating indicating the composition and mechanical properties.
- c) FRP grating profile with dimensions
- d) Datasheet of the resin and the glass fiber
- e) Reference list where similar grating has been installed and the application
- f) For bought out items vendor has to provide the sub vendor list
- g) Quality plan
- h) Total weight including individual weight of the gratings.

10.2. DOCUMENTATION TO BE FURNISHED AFTER PURCHASE ORDER

- a) Datasheet of the resin and glass fiber to be furnished for review and approval.
- b) Drawing to be furnished for review and approval.
- c) Quality plan to be submitted for approval, Inspection and Testing.

Annexure I**LIST OF DEVIATIONS/EXCEPTIONS TO THE ENQUIRY DOCUMENT**

Sl No	Clause No	Page No	Description of Deviation

Bidder sign & seal:**Designation:****Date:**

Annexure II

BHEL drawing no : 3-FW-000-00789

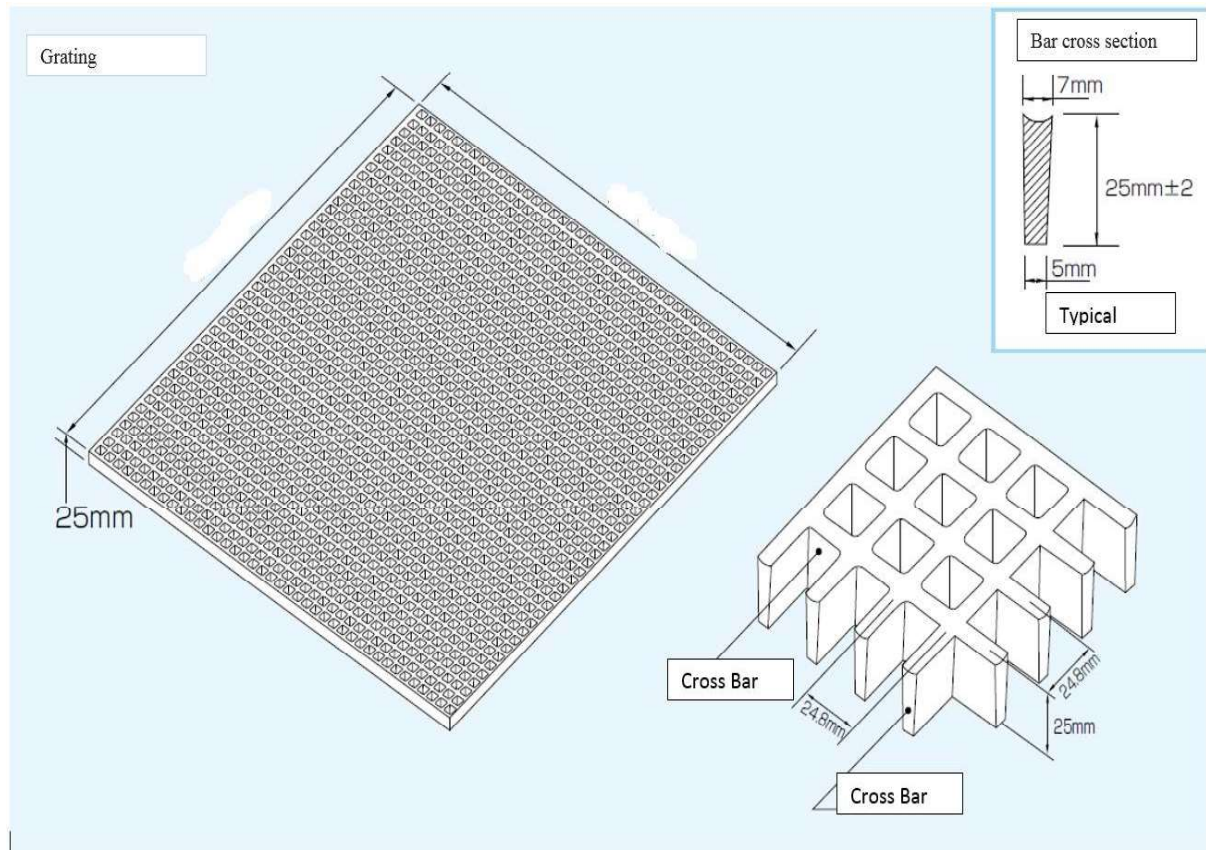
Bidder sign & seal:

Designation:

Date:

Anexure III

Grating profile



The size of the grating shall be as per the drawing no : 3-FW-000-00789. Each tiny element has to be as 24.8 X 24.8 X 25 (all in mm) . Bar cross section has to be as per the drawing above.

Bidder sign & seal:

Designation:

Date:

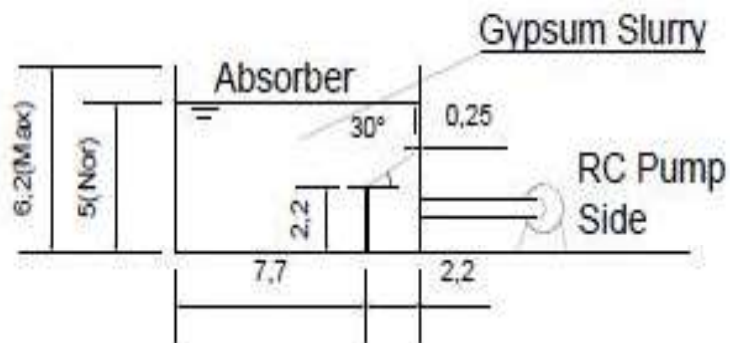
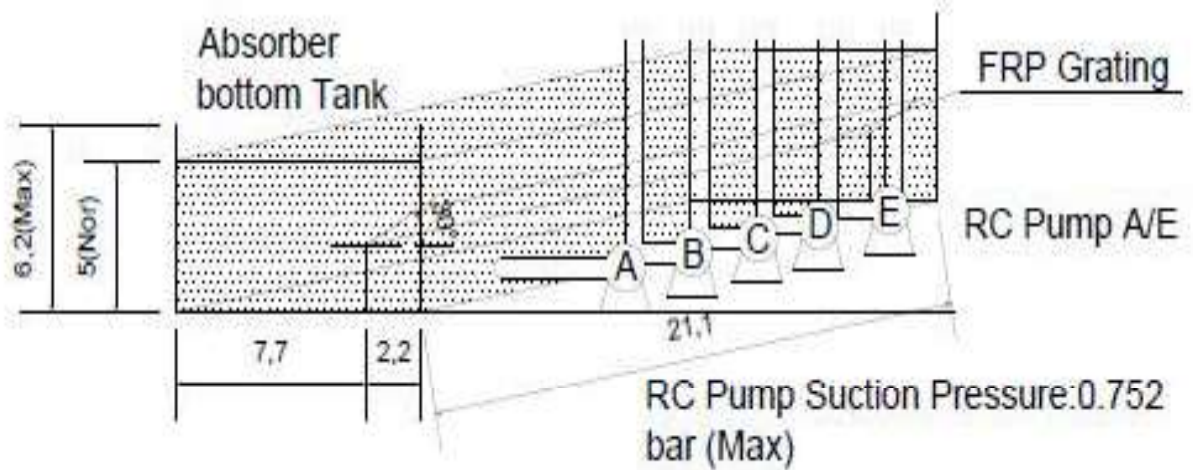
Annexure IV

Sea worthy packing (applicable for all shipments as this is export order)

Bidder sign & seal:

Designation:

Date:

ANNEXURE-IV ARRAGEMENT OF THE GRATINGS AND RECIRCULATION PUMPS IN THE ABSORBER


All units are in m