

**FRP (PULTRUDED TYPE FIBER REINFORCED PLASTIC) GRATING FOR SCR REACTOR AS PER BHEL SPECIFICATION TSR 023 REV 01 FOR SCR REACTOR.**

**FOLLOWING ARE THE TECHNICAL DOCUMENTS.**

**TECHNICAL DETAILS:**

MODULE SIZE: 1758(+0/-2) X 1000 (mm X mm)

QTY: 192 NOS OF MODULE

MESH SIZE: 50 X 50 (mm X mm)

THICKNESS: 50 MM

CAPABLE TO WITH STAND LOAD: 300 KG/SQ-M.

LOAD BEARING LENGTH FOR GRATING (AVL.): 50 mm

SUPPLIED FRP GRATING SHALL MEET ABOVE TECHNICAL REQUIREMENT WITH ANTI SKID PROPERTIES.

FRP GRATING SHALL BE DESIGNED AND SUPPLIED IN SUCH A WAY THAT IT CAN BE HANDLED EASILY DURING ASSEMBLY AND DISASSEMBLY.

VENDOR TO PROVIDE THE NECESSARY FITTINGS AND FASTENERS IF ANY FOR THE PROPER FLOORING OF FRP IN SCR REACTOR

**ENCLOSURE:**

BHEL SPECIFICATION TSR 023 REV 01.

SCR REACTOR ARRANGEMENT 1-SR-000-00005 REV 00.

**VENDOR TO PROVIDE:**

1. MATERIAL TEST CERTIFICATE AND LOAD TEST REPORT.
2. PERFORMANCE TEST CERTIFICATE FOR INTENDED DUTY CONDITION.
3. VENDOR QUALITY PLAN SHALL BE SUBMITTED
4. THE VENDOR SHALL SUBMIT ALL THE SUPPORTING DOCUMENTS FOR OUR PQR REQUIREMENT.
5. ALL THE DOCUMENTS SHALL BE SUBMITTED AS PER OUR SPECIFICATION REQUIREMENT.
6. VENDOR SHALL OFFER GUARANTEE FOR THE PRODUCTS SUPPLIED FOR 18 months from the date on which the equipment / system is put into use (by the end user) or 24 months from the date of supply whichever is earlier.

# BHARAT HEAVY ELECTRICALS LIMITED

TIRUCHIRAPPALLI-620 014

Fuel Systems/PE(FB)



## Title Sheet

Technical Purchase Specification for

## FRP GRATINGS

Specification No.: **TSR: 023**

Revision No.: 01

|                 |                  |               |                        |                 |                |                   |
|-----------------|------------------|---------------|------------------------|-----------------|----------------|-------------------|
| 1               | 30.07.2021       | -             | Spec. general revision | Sankar G        | Noorul Fazil M | Srinivasu Arugula |
| <b>Rev. No.</b> | <b>Rev. Date</b> | <b>Clause</b> | <b>Description</b>     | <b>Prepared</b> | <b>Checked</b> | <b>Approved</b>   |

|                 | <b>Name</b>         | <b>Signature</b> | <b>Date</b> |
|-----------------|---------------------|------------------|-------------|
| <b>Prepared</b> | Saurabh Kumar Singh | -Sd-             | 10.05.2019  |
| <b>Checked</b>  | Srinivasu Arugula   | -Sd-             | 17.05.2019  |
| <b>Approved</b> | G. Saravanakumar    | -Sd-             | 17.05.2019  |



## Specification for **FRP GRATINGS**

**TSR : 023**  
**Rev : 01**

### **1.0 Intent of specification**

#### **1.1 Scope**

- This specification defines the minimum requirements for the design, manufacture, testing, preparation for shipment and delivery of materials, engineering documentation, technical direction for construction/installation for Fiberglass Reinforced Plastic (FRP) Grating, their auxiliaries and other accessories. The bidder is solely responsible for correct design, engineering, construction and installation of this scope of supply.
- In the event of conflicts between codes, standards, this specification and the customer specifications (if applicable), the more stringent requirements shall apply and the conflict between these shall be submitted to BHEL in writing. Bidder shall comply with all customer specifications (if applicable) unless BHEL approves the exceptions requested by bidder in writing.
- No deviation or exception from this specification shall be permitted without the written approval of BHEL. Intended deviations shall be separately listed by the bidder and supported by reasons for consideration of BHEL.
- Compliance with this specification shall not relieve the bidder of the responsibility of furnishing equipment and accessories of proper design, materials and workmanship to meet the specified operating conditions.
- The supplier scope shall involve the supply of FRP Gratings along with necessary fittings and fasteners, if any, for the purpose of proper flooring of the FRP grating in the SCR reactor.

#### **1.2 Intended application of the FRP gratings**

- FRP Gratings shall be used as temporary flooring to place catalyst inside reactor at a height of around 65 m to ensure a safe and trouble free movement of person for placing catalyst inside the Selective Catalyst Reduction (SCR) reactor.

### **2.0 Special Requirements**

- 2.1. Supplied FRP Gratings shall be used as temporary flooring purpose inside the SCR reactor.
- 2.2. The design of FRP grating shall be such that it can be easily dismantled and fixed again.
- 2.3. The FRP gratings shall be of light weight.
- 2.4. Supply of FRP gratings shall meet BS 4592-4:2006 or any other equivalent international standard.
- 2.5. FRP gratings shall be tested as per ASTM E-84.



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### 3.0 General Requirements

- 3.1. FRP Gratings shall be capable of withstanding a minimum rated load of 300 kg/sq. m. The load bearing length for the grating shall be 50 mm. Bidder shall refer to Sketch 01 in this regard.
- 3.2. The gratings shall be anti-skid to prevent skidding of personnel while working. For this purpose, the grating shall be manufactured with an integrally applied grit to the top surface of each bar providing maximum slip resistance.
- 3.3. The offered FRP gratings shall be of pultruded type of size 1758 (+0/-2) mm x 1000 (+0/-0) mm and shall be possible to easily cut to suit required size. Bidder shall refer to Sketch 01 in this regard
- 3.4. The depth of the grating shall be of 50.0 mm and the bearer bar pitch shall be less than or equal to 50 mm. Bidder shall refer to Sketch 01 in this regard.
- 3.5. The gratings shall be capable of easy dismantling and reassembling.
- 3.6. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All FRP fibres shall be well covered with resin to protect against their exposure due to wear or weathering
- 3.7. Suitable fasteners (like M-clip with fasteners as shown in Sketch 02) shall be provided by the vendor to attach the FRP gratings to the angle to ensure proper locking of the gratings. A typical representation of the FRP gratings is shown in Sketch 01.

### 4.0 Inspection and Delivery

- 4.1. All test certificates shall be furnished for BHEL's reference and records.
- 4.2. Load test report to be provided
- 4.3. The certificates and documents generated during inspection of above shall be furnished.
- 4.4. Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles

### 5.0 Guarantee

- 5.1. The offered system shall be guaranteed for 18 months from the date on which the equipment / system is put into use (by the end user) or 24 months from the date of supply whichever is earlier.

### 6.0 Documents to be submitted by the bidder along with offer

- 6.1. Along with the offer, the bidder shall submit a signed copy of this technical specification adhering to all clauses of the specification failing which the bidder will not be evaluated.



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- 6.2. The quality plan for the product under supply shall be furnished along with the offer.
- 6.3. Bidder to provide calculations to justify the load bearing capacity of the grating.
- 6.4. Bidder shall furnish the testing procedure for load testing in line with any international standard meeting the technical requirements.
- 6.5. GA drawing of the offered FRP grating indicating the overall size, mesh size and thickness shall be submitted along with the offer
- 6.6. Bidder shall indicate the value of maximum deflection of the FRP grating while bearing the load.

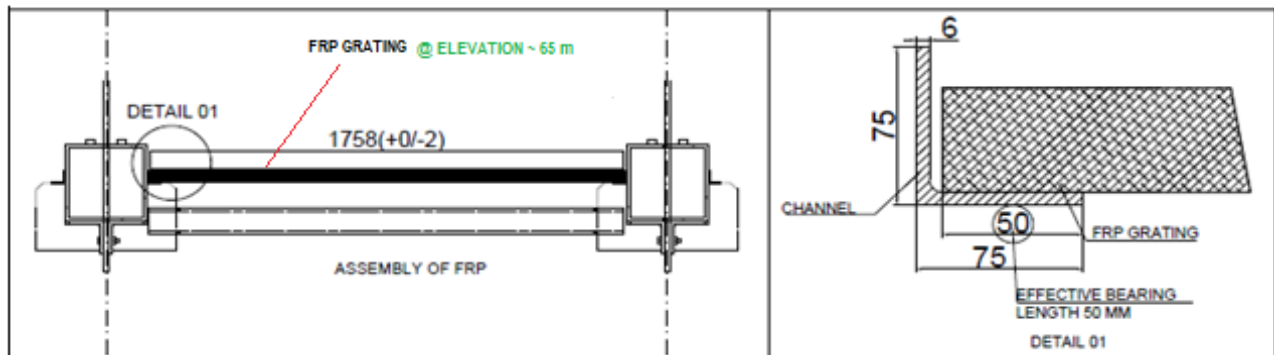
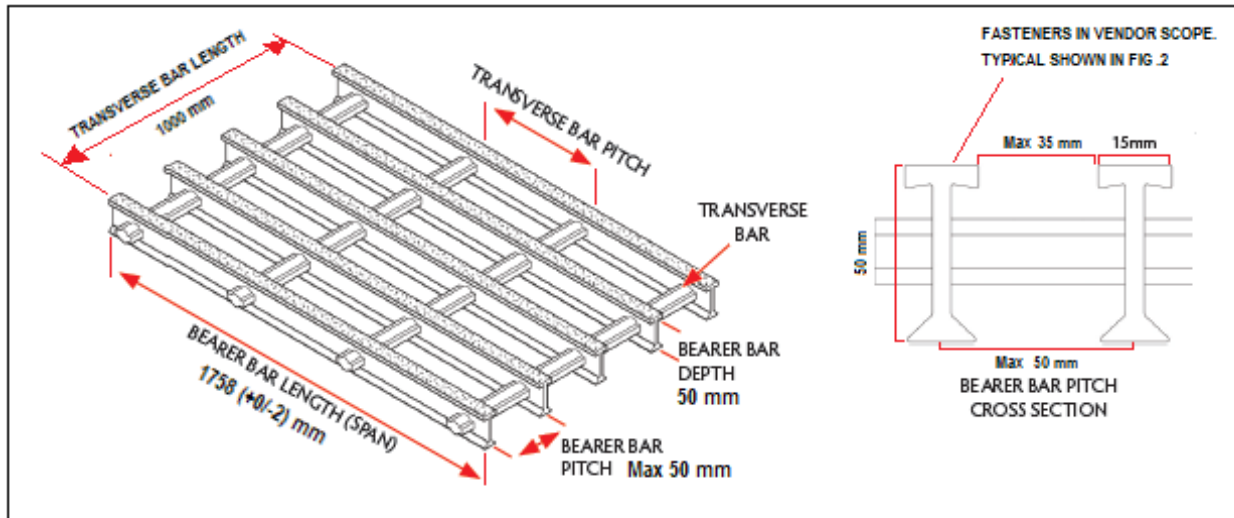
**7.0 Documents to be submitted by the bidder on placement of purchase order**

- 7.1. All documents submitted during the tendering stage, shall be resubmitted for BHEL's approval.
- 7.2. O&M Manual (detailing the operation and maintenance procedures) and Instruction Manual (detailing the Dos and Don'ts) of the equipment shall be provided.
- 7.3. Vendor shall furnish a write-up on preservation of the grating when not in use.
- 7.4. A safety compliance certificate for the components from the safety steward of the country of make shall be provided.
- 7.5. Test certificate for the following shall be furnished:
  - 7.5.1. Material test certificate for all the major components.
  - 7.5.2. Shop test certificates of load testing.
  - 7.5.3. Performance test certificate for the intended duty conditions



# Specification for FRP GRATINGS

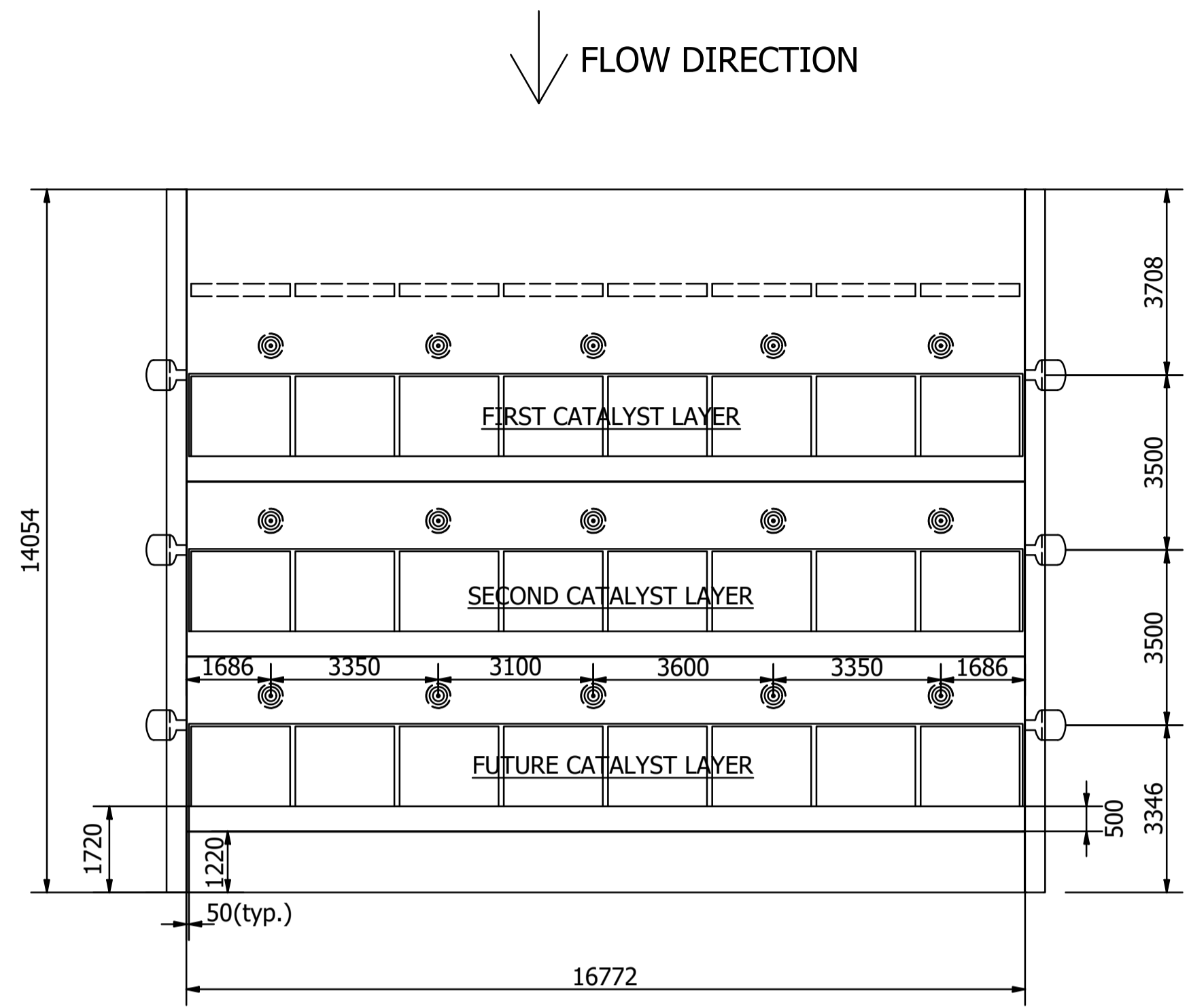
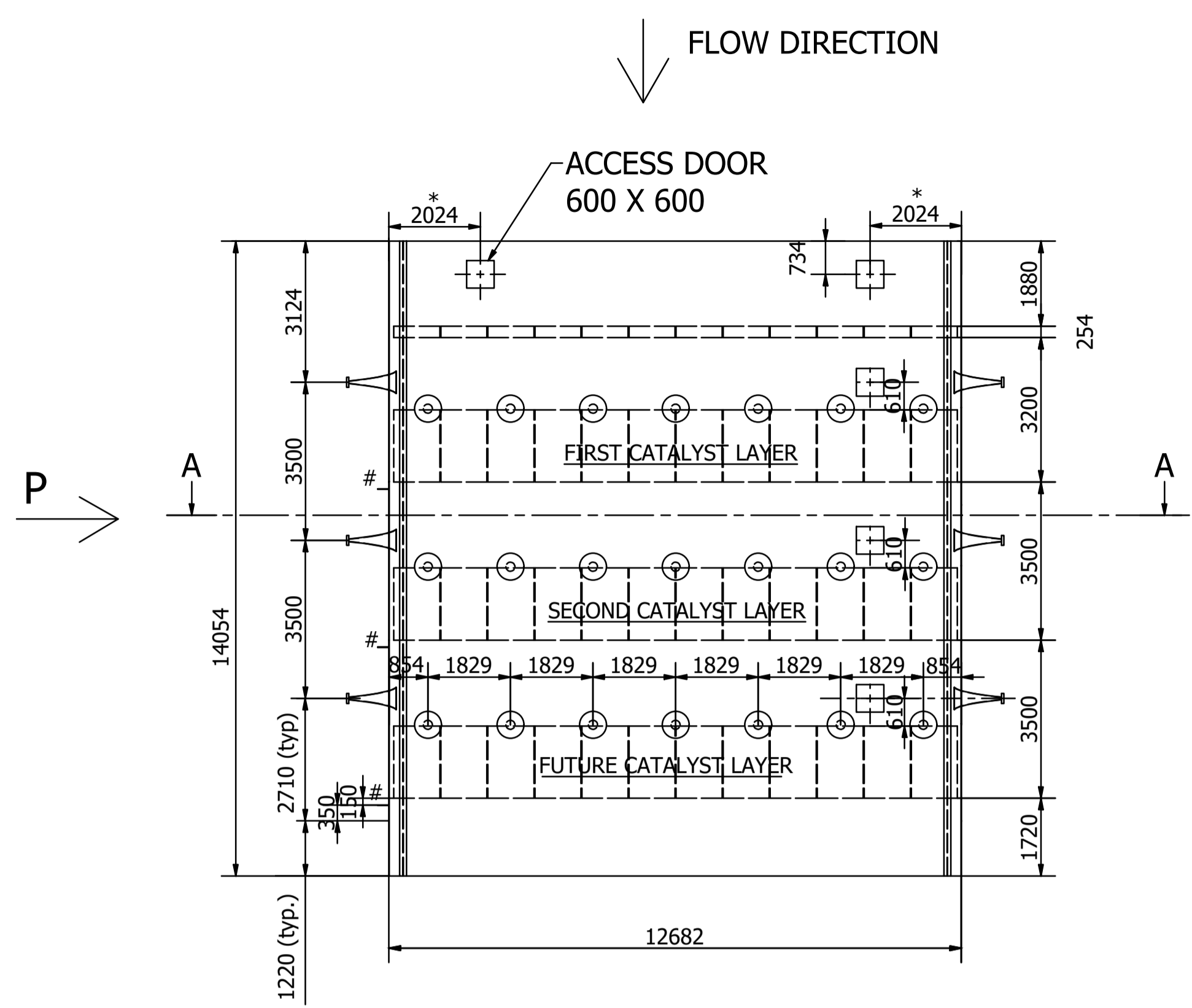
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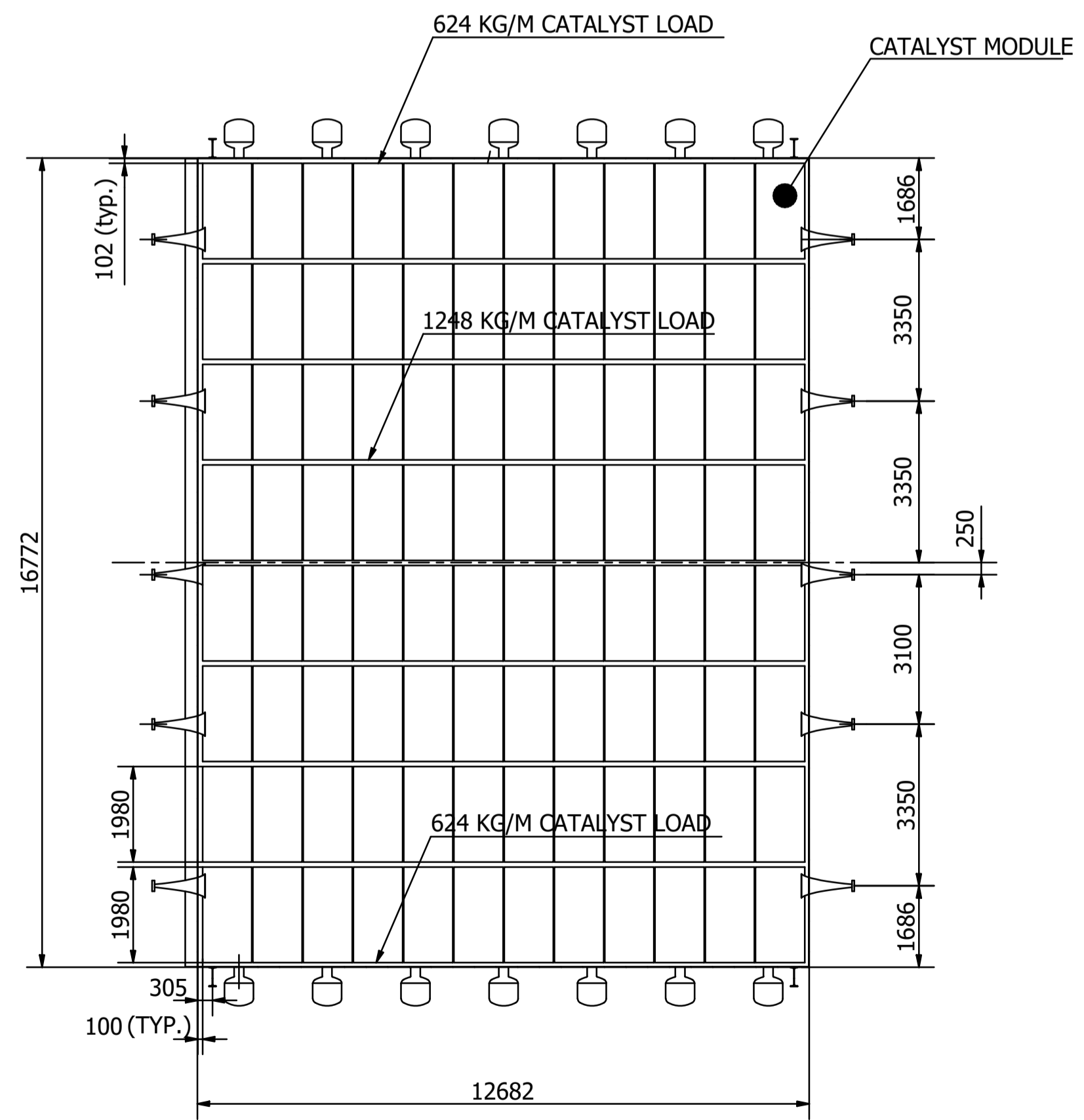
Sketch 01 A typical representation of FRP Grating details and its Assembly



Sketch 02 A typical fastener (M clip)



VIEW - P



SECTION-A-A ( 1 : 100 )

NOTES:

1. NUMBER OF REACTORS PER BOILER: 2
2. NUMBER OF CATALYST MODULE PER REACTOR: 96 (8W X 12D)
3. # CATALYST MODULE LOADING PLATFORM

4. LOAD TABLE:

| SL NO | DESCRIPTION           | LOAD (MT)/ REACTOR | LOAD (MT)/ BOILER |
|-------|-----------------------|--------------------|-------------------|
| 1.    | CATALYST LOAD         | 380                | 760               |
| 2.    | ASH LOAD IN REACTOR** | 560                | 1120              |
| 3.    | DEDUSTING LOAD        | 10                 | 20                |
| 4.    | RECTIFIER LOAD        | 40                 | 80                |

5. CATALYST LOAD AND ASH LOAD ARE TO BE CONSIDERED TO BE EQUALLY DISTRIBUTED AMONG ALL LAYERS. CONSIDER UDL FOR ASH LOAD.

6. REFERENCE DATA

- I. CPT-2201
- II. CPT-2601

7. \* ACCESS DOOR LOCATION SHOULD CLEAR STRAP IN REACTOR

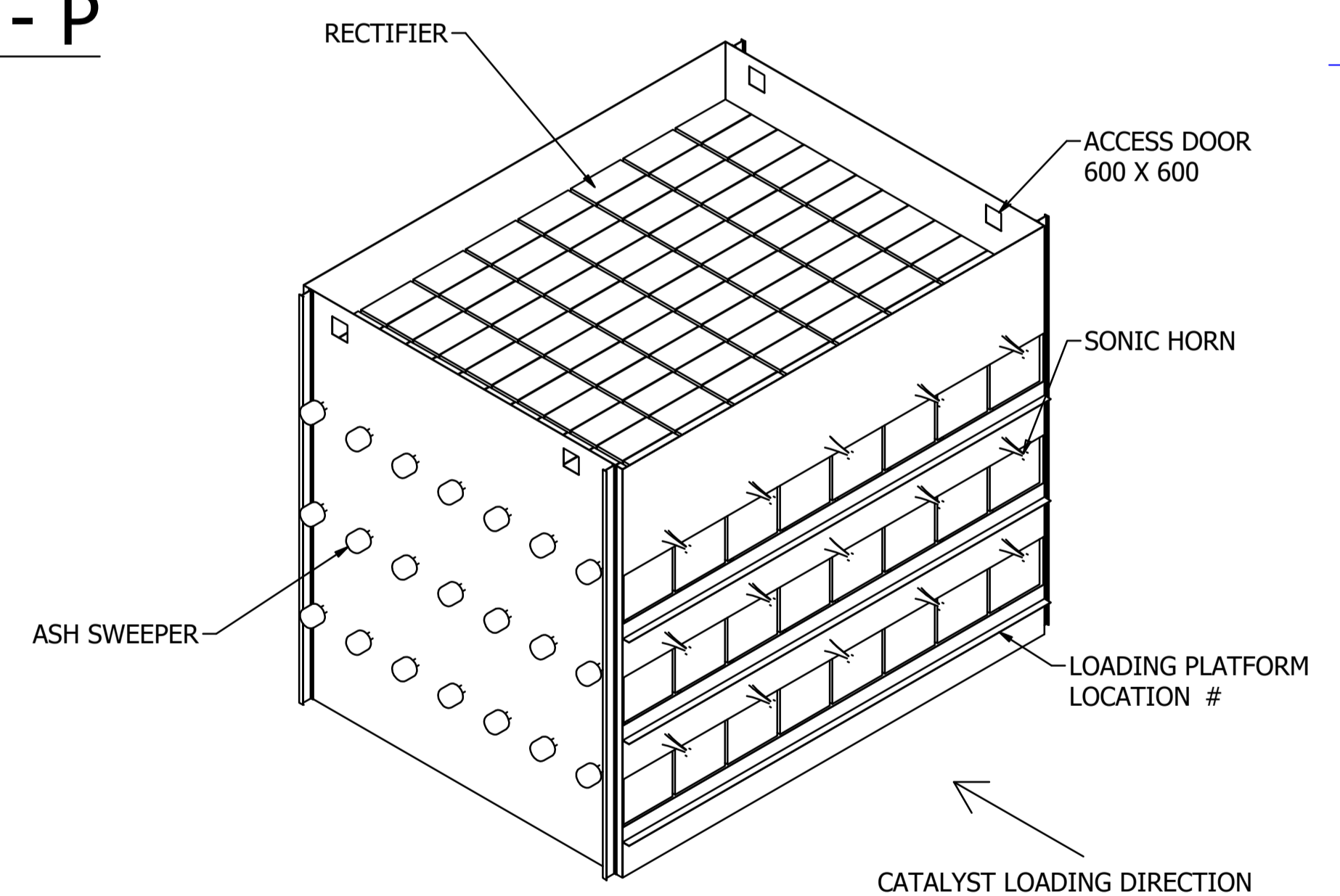
8. IMPACT LOAD DUE TO ASH SWEEPER OF 90 KG TO BE CONSIDERED IN X, Y, Z DIRECTIONS AS AN OPERATIONAL LOAD

☉ ASH SWEEPER, 56 NOS PER REACTOR, 112 NOS PER BOILER

☉ SONIC HORN, 40 NOS PER REACTOR, 80 NOS PER BOILER

\*\* ASH LOAD TABLE:

| SL NO | DESCRIPTION  | LOAD (MT)/ REACTOR | LOAD (MT)/ BOILER |
|-------|--|--------------------|-------------------|
| 1.    | UNIFORM ASH LOAD                                       |                    |                   |
|       | 1ST LAYER  | 110                | 220               |
|       | 2ND LAYER  | 30                 | 60                |
|       | FUTURE LAYER   | 30                 | 60                |
| 2.    | PERIMETER ASH LOAD EACH LAYER                          | 80                 | 160               |
| 3.    | PLUGGED ASH (DRAINABLE & NON DRAINABLE FOR EACH LAYER) | 50                 | 100               |



ISO. VIEW

| REV | DATE | ALTERED :    |
|-----|------|--------------|
| 01  |      | CHD & APPD : |

|                                      |  |                          |                |              |                    |                       |
|--------------------------------------|--|--------------------------|----------------|--------------|--------------------|-----------------------|
| DEPT FS<br>CODE 129                  |  | ALL DIMENSIONS ARE IN MM | PROJECTION<br> | SCALE<br>NTS | WEIGHT (Kg)<br>--- | REF TO ASSY / OLD DWG |
| TITLE <b>SCR REACTOR ARRANGEMENT</b> |  |                          |                |              |                    |                       |
| DRAWING NO : 1-SR-000-00005          |  |                          |                |              |                    | REV 00                |

CUST NO. 1727

TYPE OF PRODUCT MAHARASHTRA STATE POWER GENERATION CO.LTD.  
OR NAME OF CUSTOMER/PROJECT 1 X 660 MW TPS BHUSAWAL UNIT -6

| DRN  | NAME                | SIGNATURE | DATE       |
|------|---------------------|-----------|------------|
| CHD  | RAVI SHANKAR PRASAD |           | 03.06.2019 |
| APPD | SARAVAN KUMAR, C    |           | 03.06.2019 |

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## Technical Pre-Qualification Requirement (PQR) for

### FRP Grating

1. The vendor shall be an established **FRP grating** supplier and having adequate Engineering, Manufacturing, testing and servicing facilities and shall furnish technical backup documents in proof for above requirements.
2. The vendor shall have experience of having supplied **FRP grating** as per the technical specification for boiler/refinery/SCR/Process plants or application of similar severity. Supply reference list with details of PO, PO date, customer name.
3. The **FRP grating** offered shall be from the existing regular supply range of the vendor. Vendor shall provide the product catalogue.
4. Proven track record is required. Minimum One end user certificate for the satisfactory operational performance of their product supplied.  
(or)  
successfully executed two POs for same item, meeting the subject technical specification requirement mentioned in the enquiry.
5. In case of ordering, the Vendor shall have the responsibility for the following and same to be confirmed point wise.
  - i) Vendor should have the replacement responsibility in case of defect / failure.
  - ii) Experts from Vendor's side shall associate in commissioning activities at site, if required.
  - iii) Vendor should ensure the product performance during erection & commissioning and stand guarantee.
6. Backup document checklist to meet PQR:

| S. No | Document description   | Check list               |
|-------|--|--------------------------|
| 1     | Documents to meet clause(1)  | <input type="checkbox"/> |
| 2     | Supply reference document<br>(General reference list) to meet clause (2) | <input type="checkbox"/> |
| 3     | Product Catalogues to meet clause (3)                                    | <input type="checkbox"/> |
| 4     | Min. one end user certificate (or) Two POs<br>to meet clause (4)         | <input type="checkbox"/> |
| 5     | Confirmation to clause meet clause (5)                                   | <input type="checkbox"/> |