**Enquiry and Specification for Tender No IADD/SVS/2020/OPA/120754 due on 11/12/2020**

**To,**

**Subject: Minor fabrication and supply of RF coupler test stand**

Dear Sir,
Please let us have your competitive rate for *Minor fabrication and supply of RF coupler test stand*

1. The scope of work involves:
    - Supply of RF coupler test stand as per the technical specifications, detailed scope of work and acceptance criteria given in Annexure I and drawings given in Annexure II.
    - Safe packaging and transport to the Purchasers site.
2. The supplier shall prepare the detailed fabrication drawings and must submit the drawings to undersigned for approval before starting the fabrication. Digital copies of the 3D model and drawings shall be provided to the indenter, along with hard copy of the drawings.
3. The material manufacturers are eligible to bid if they operate under a quality management system ISO 9001 or equivalent with material manufacturing (stainless steel) in the scope of the certificate. The bidder shall attach a valid certificate to this effect with their bid. Preferably, they shall have their own sales office in India.
4. Please specify the complete details of the original manufacturer of the offered material and give complete contact details (name, phone, email, web address, fax, postal address). It is mandatory to specify original manufacturer of the material.
5. The bidder should have supplied fabricated waveguide and other accelerator components any government research unit like BARC/RRCAT/DRDO/ISRO at least on one previous occasion. All the copies of earlier work orders or purchase orders that demonstrate the required experience should be attached with the quotations. **If the supplier is unable to demonstrate suitable experience indicated above, the offer is liable to be rejected.**
6. All the fabricated components will be part of a single RF coupler test stand. So, the bidder has to quote for all the components together. Incomplete/partial quotations will not be accepted.
7. Pan no., VAT no., Tin no. of the bidder should be mentioned clearly on the quotation.

**Rights and Privileges:**

Indenter reserves the right to inspect any machinery or material or equipment furnished or used by vendor or to reject any, which is found defective in workmanship, quality, and design or otherwise unsuitable for use which is not in accordance with the specification.

**<u>Note:</u> In case any further clarification is required, the bidders may contact the undersigned at phone no. 022-2559-1475.**

Your quotation duly filled in the prescribed format, addressed to "Head, IADD, Van-de-Graff Bldg, BARC, Trombay, Mumbai – 400085" in a sealed envelope quoting tender number and due date, must reach on or before **11/12/2020** date by 3 PM **through speed post only**. On top of envelop it must also be written "kind attention to Sonal Sharma, IADD".

Sonal Sharma
SO/E, IADD

**Enclosures:**

**Specifications (Annexure I)**
**Drawings (Annexure II)**

## Annexure I

## Technical specifications

### 1. Technical requirement:

This specification describes the requirements for manufacturing and supply of RF coupler test stand as per enclosed sketches and technical details (refer Annexure II). All the fabricated components will be part of RF coupler thigh power test setup being developed at BARC. Precise machining of all the components is important. These components will be used in vacuum. Some of these components will be used in cryogenic environment.

### 2. Scope of work:

1. The supplier has to deliver items as per details mentioned in table 1.
2. The supplier has to prepare final manufacturing drawings as per preliminary drawings of Annexure II and send it for approval in soft and hard copy format. Approval of drawings does not relieve supplier from responsibility of meeting factory acceptance test.
3. The supplier will procure raw material and will send all its test reports for approval.
4. After manufacturing of components as per approved drawings, the supplier will prepare dimensional inspection report of all manufactured components.
5. The components to be supplied shall be free from surface cracks, porosity and other internal flaws.
6. Knife edges and sealing surfaces should not have any scratch/dent mark.
7. All surfaces should be chemically clean, free of dirt, grease, oil and chips and look aesthetically good. Surfaces shall be visibly inspected and wiped down with a white cloth. In order to be considered free of contamination, no discoloration should appear on the white cloth.
8. Packaging and shipment should be such that final component does not undergo shocks, deformations, surface damages, moisture or anything having negative effects on its design and operation intent.

3. **Deliverables**

Table 1: list of deliverable

| | Component name | Quantity | remarks |
|---|---|---|---|
| 1. | Test stand/guide rail cart | 2 | Fig 2 |
| 2. | Waveguide reflector | 2 | |
| 3. | RF cavity (between couplers) | 2 | Fig 3 |
| 4. | Waveguide sections | 6 | different lengths waveguide are required (λ/8, λ/4, 3λ/8) (47mm, 94mm; 188mm) |
| 5. | Waveguide directional coupler | 2 | Fig 4,5,6 |

**4. Pre-dispatch inspection:**

- Pre-dispatch inspection will be carried out at supplier's place by the purchaser or its representative.
- Supplier will keep all test certificates, dimensional inspection reports, instruments etc. and packaging ready at the time of PDI.

**5. Acceptance Criteria:**

- The supplier will send final manufacturing drawings for approval. After getting these drawings approved, the supplier will commence manufacturing.
- The chemical composition test certificates and ultrasonic test certificates as per ASTM standard of all raw materials should be submitted by the suppler for approval before commencement of manufacturing. The test certificate should be issued of government of India certified laboratory.
- In case of Original manufacturer's mill test certificate, the batch number on mill test certificate shall be traceable on each pieces of the manufactured component.
- Material found to satisfy and qualify the relevant ASTM standard shall be accepted. Clearance for manufacturing will be issued after marking/stamping of the accepted lot.
- The supplier has to start manufacturing after clearance of raw material and its accepted lot from purchaser.
- After completion of manufacturing, the supplier should provide dimensional inspection report for approval.
- The supplier has to fulfill all the scope of work mentioned in point 2, failing which the components may be rejected at any stage.
- Purchaser may reject offers which do not offer manufacturer's certificates. All such testing will be on account of the supplier and the test samples/ coupons shall be prepared from material of same lot, as intended to be supplied here. Purchaser reserves right for inspection for all above tests, to confirm results specified in mill test certificate.

## 6. MANDATORY TECHNICAL QUESTIONNAIRE

(TO BE FILLED IN BY THE BIDDER & SUBMITTED ALONGWITH THE OFFER)

Instruction-1 ***Table A.1, Table A.2 and A.3:*** *The rightmost column should be filled in by the Bidder.*

Instruction-2 ***Failure to submit a fully completed, duly signed and stamped questionnaire will result in the rejection of the offer.***

Instruction-3 *Wherever, the response is Yes/No, please strike out the inapplicable response*

**Table-A.1: General Information**

**Qualification of the vendor**

| | | |
|---|---|---|
| A.1.1. | Name of the vendor | |
| A.1.2. | Contact details of the vendor (Give full address, email, phone and fax numbers.) | |
| A.1.3. | Does the vendor have his own corporate office in India? (Give full address, email, phone and fax numbers.) | **Yes/No**. |
| A.1.4 | Do you have ISO 9001 or equivalent certification? | **Yes/No** |

**Table-A.2: Technical Information**

| **S.No.** | **Question** | **Response** |
|---|---|---|
| A.2.1. | Have you offered fully fabricated waveguidesor couplers or any accelerator related components to BARC? | **Yes/No** |
| A.2.2. | Whether you will provide test certificate issued by an approved lab? | **Yes/No** |
| A.2.3. | Do you have testing facility required for testing material as specified in the specifications? If not where do you propose to do these tests? | **Yes/No**<br>If no then provide name, address and contact details of the material testing lab. |
| A.2.4. composition, | Will you provide certificates for Chemical, Mechanical properties, Ultrasonic Examination and Intergranular corrosion test? | **Yes/No** |

## Annexure II

This RF test stand will be used to test high power RF couplers. The photo of the full test setup is given in fig 1 to give a better picture.

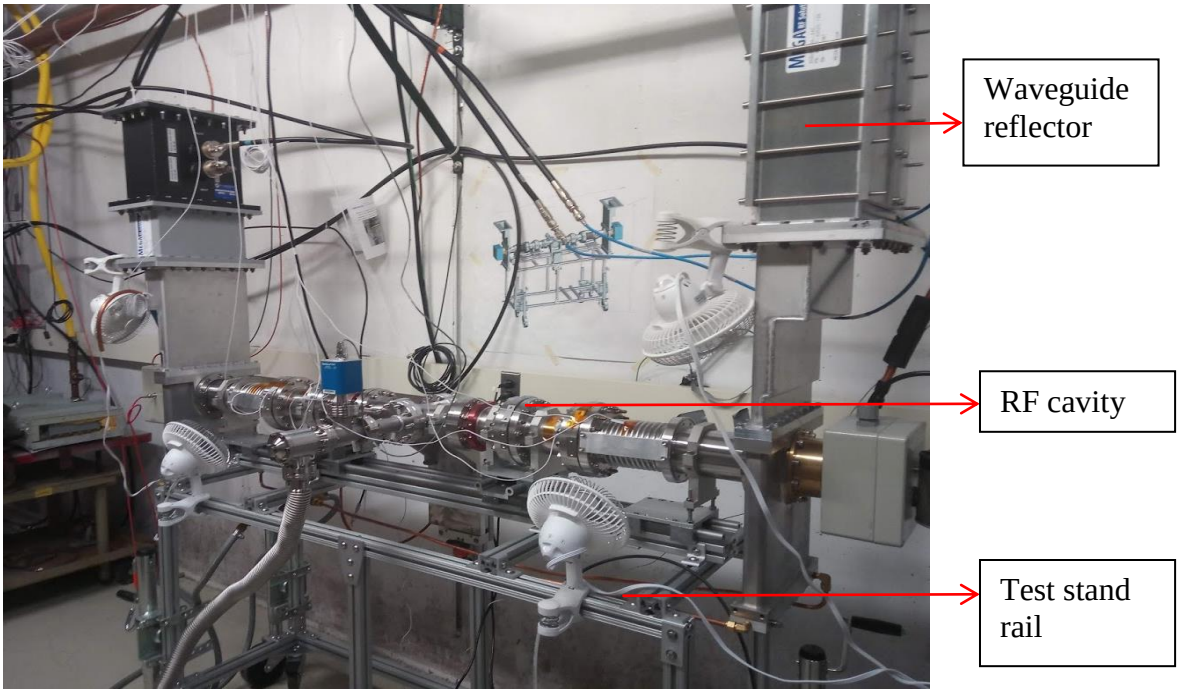
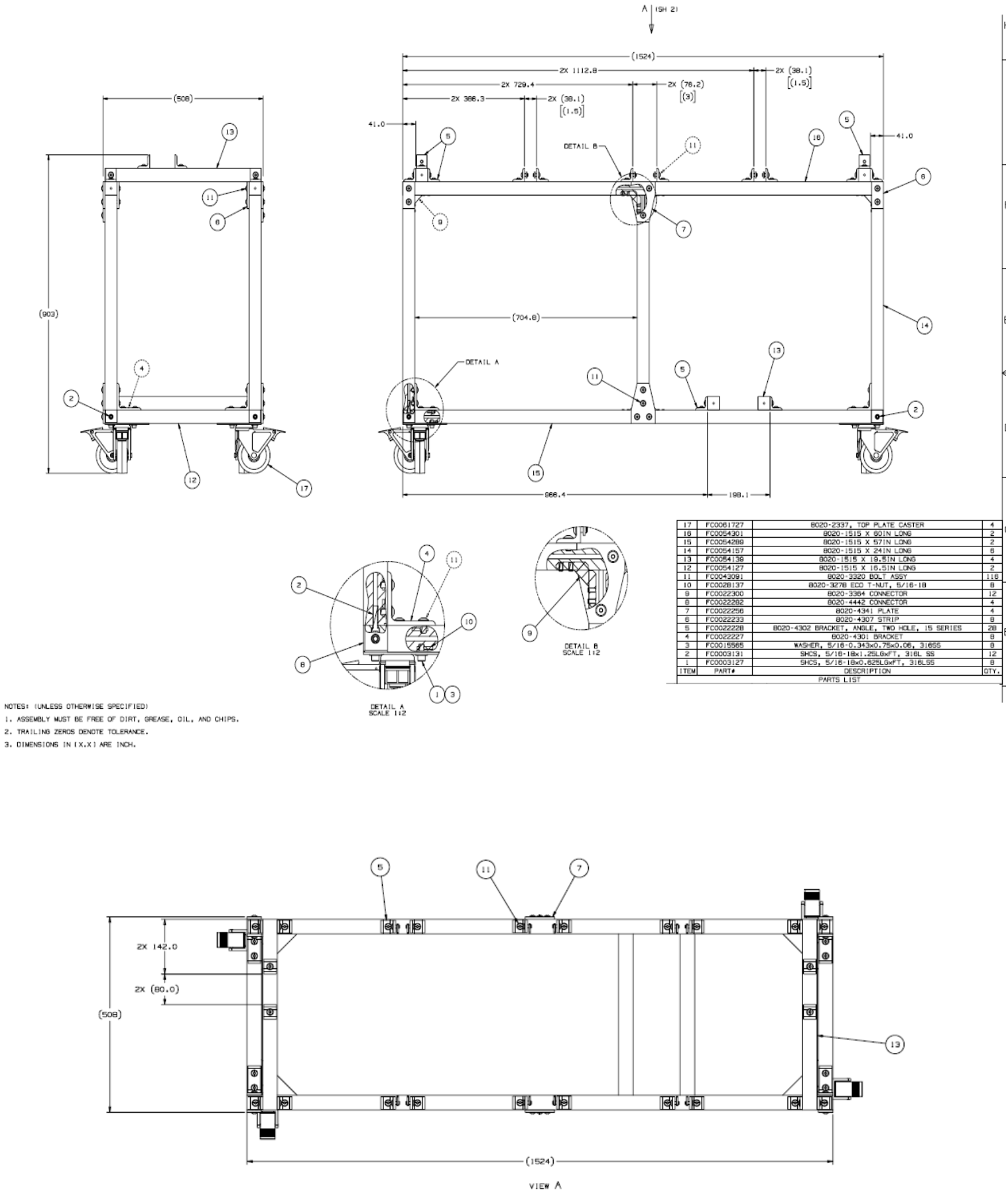



Fig 1

1. **Test stand rail**: It is stand on which RF couplers will be put for testing. Details are given in fig 2.



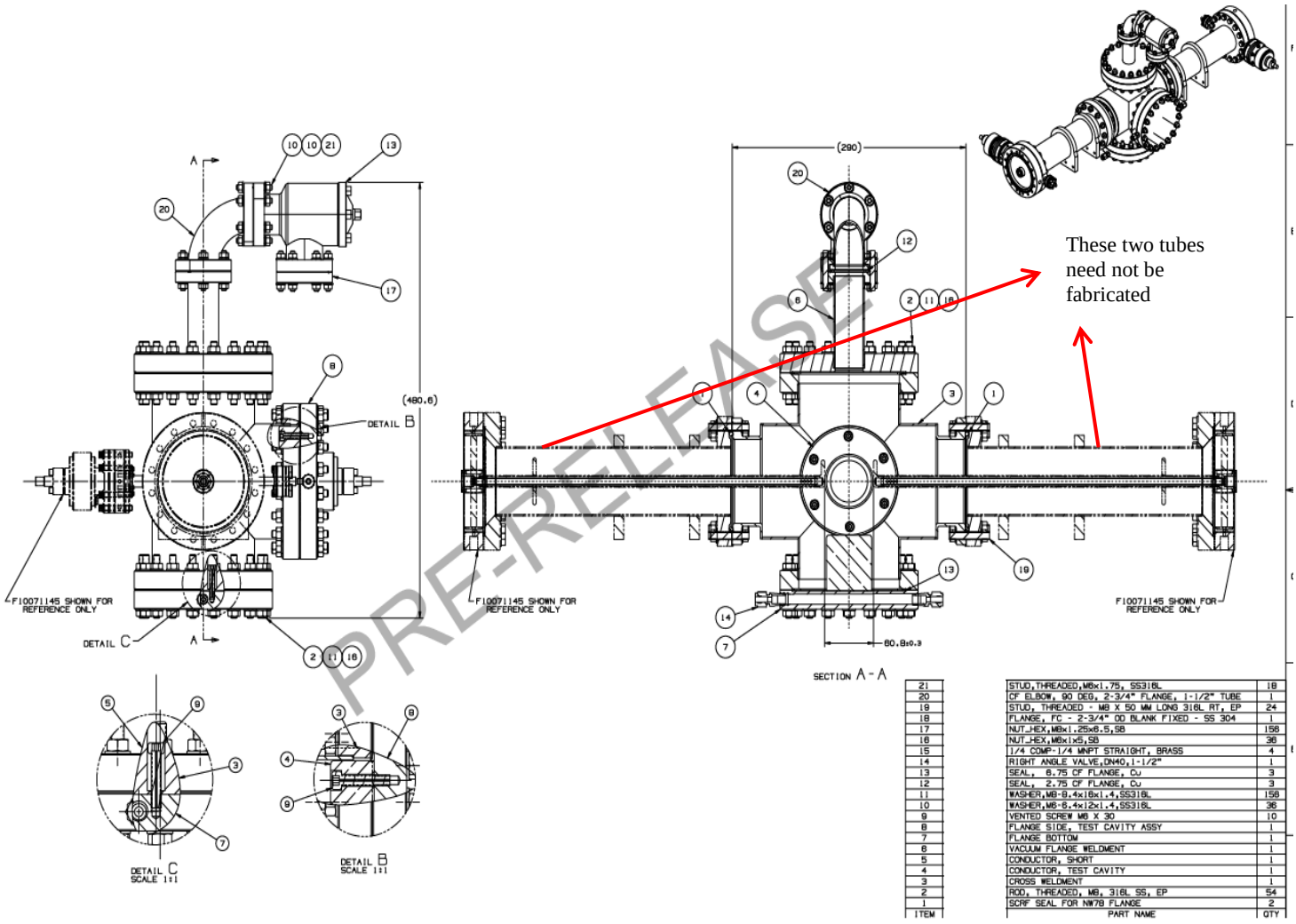

| ITEM | PART# | DESCRIPTION | QTY. |
|---|---|---|---|
| | | PARTS LIST | |
| 17 | FC0081727 | 8020-2337, TOP PLATE CASTER | 4 |
| 16 | FC0054301 | 8020-1515 X 80IN LONG | 2 |
| 15 | FC0054289 | 8020-1515 X 57IN LONG | 2 |
| 14 | FC0054157 | 8020-1515 X 24IN LONG | 6 |
| 13 | FC0054138 | 8020-1515 X 18.5IN LONG | 4 |
| 12 | FC0054127 | 8020-1515 X 16.5IN LONG | 2 |
| 11 | FC0043091 | 8020-3320 BOLT ASSY | 118 |
| 10 | FC0028137 | 8020-3276 ECO T-NUT, 5/16-18 | 8 |
| 9 | FC0022300 | 8020-3364 CONNECTOR | 12 |
| 8 | FC0022282 | 8020-4442 CONNECTOR | 4 |
| 7 | FC0022256 | 8020-4341 PLATE | 4 |
| 6 | FC0022233 | 8020-4307 STRIP | 8 |
| 5 | FC0022228 | 8020-4302 BRACKET, ANGLE, TWO HOLE, 15 SERIES | 28 |
| 4 | FC0022227 | 8020-4301 BRACKET | 8 |
| 3 | FC0015585 | WASHER, 5/16-0.343x0.75x0.06, 31655 | 8 |
| 2 | FC0003131 | SHCS, 5/16-18x1.25LGxFT, 316L SS | 12 |
| 1 | FC0003127 | SHCS, 5/16-18x0.625LGxFT, 316LSS | 8 |




Fig 2: Test stand rail

2. **Waveguide reflector**:
   Waveguide reflector is shown in fig 1. It's a WR1150 half height std. waveguide with a movable copper disc inside. Mechanical provision has to be provided on the narrow wall of waveguide so as to move the copper disc inside the waveguide along the length.
   Length: 711.2 mm

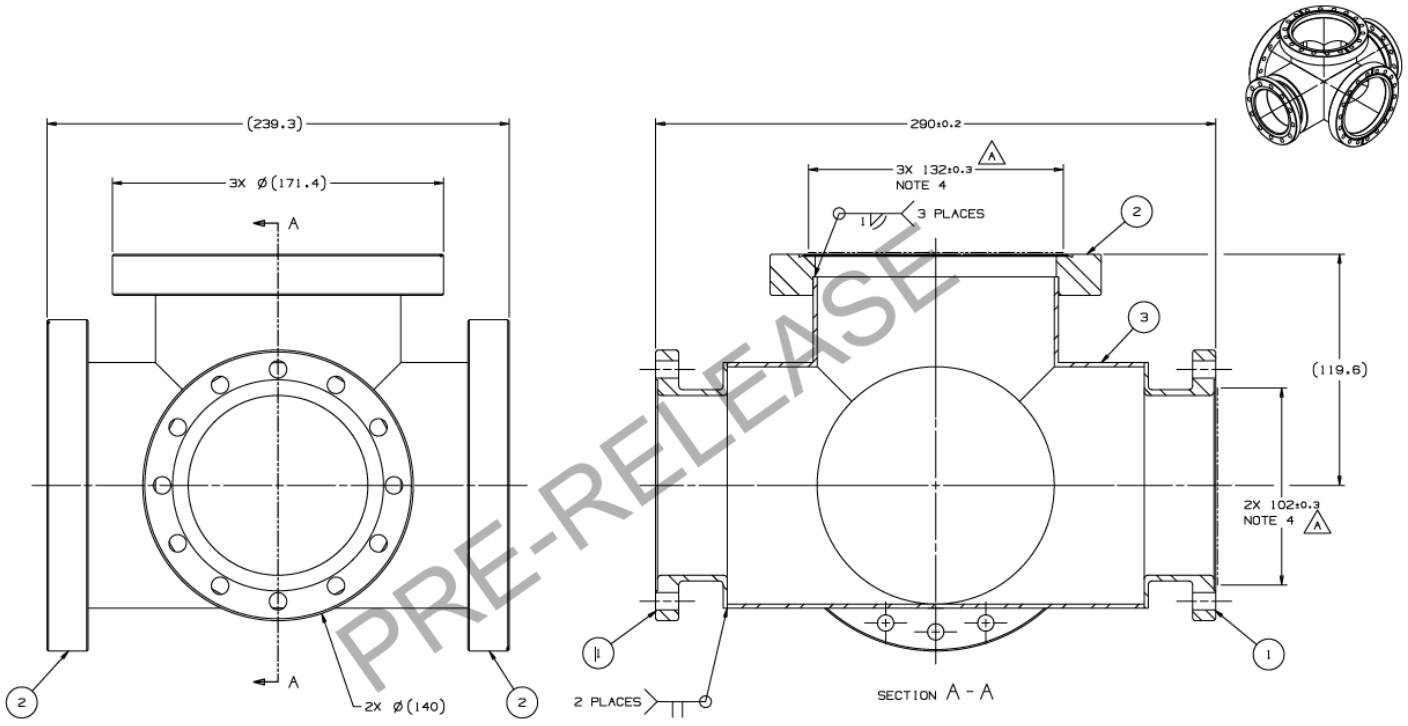
3. **RF cavity**:
   Most of the parts are made from stainless steel. The copper tubes shown on both side of SS cavity doesn't need to be fabricated. Drawing is shown in fig 3.






| ITEM | PART NAME | QTY |
|---|---|---|
| 21 | STUD,THREADED,M6x1.75, SS316L | 18 |
| 20 | CF ELBOW, 90 DEG, 2-3/4" FLANGE, 1-1/2" TUBE | 1 |
| 19 | STUD, THREADED - M8 X 50 MM LONG 316L RT, EP | 24 |
| 18 | FLANGE, FC - 2-3/4" OD BLANK FIXED - SS 304 | 1 |
| 17 | NUT_HEX,M8x1.25x8.5,SB | 158 |
| 16 | NUT_HEX,M6x1x5,SB | 36 |
| 15 | 1/4 COMP-1/4 MNPT STRAIGHT, BRASS | 4 |
| 14 | RIGHT ANGLE VALVE,DN40,1-1/2" | 1 |
| 13 | SEAL, 6.75 CF FLANGE, Cu | 3 |
| 12 | SEAL, 2.75 CF FLANGE, Cu | 3 |
| 11 | WASHER,M8-8.4x16x1.4,SS316L | 158 |
| 10 | WASHER,M6-6.4x12x1.4,SS316L | 36 |
| 9 | VENTED SCREW M8 X 30 | 10 |
| 8 | FLANGE SIDE, TEST CAVITY ASSY | 1 |
| 7 | FLANGE BOTTOM | 1 |
| 6 | VACUUM FLANGE WELDMENT | 1 |
| 5 | CONDUCTOR, SHORT | 1 |
| 4 | CONDUCTOR, TEST CAVITY | 1 |
| 3 | CROSS WELDMENT | 1 |
| 2 | ROD, THREADED, M8, 316L SS, EP | 54 |
| 1 | SCRF SEAL FOR NW78 FLANGE | 2 |

NOTES: (UNLESS OTHERWISE SPECIFIED)
1. ASSEMBLY MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
2. ASSEMBLY TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.




NOTES (UNLESS OTHERWISE SPECIFIED):

1. WELDMENT MUST BE FREE OF DIRT, GREASE, OIL, AND CHIPS.
2. WELDMENT TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
3. LEAK CHECK. NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF $2 \times 10^{-10}$ MBAR X LITER/SEC. THE VACUUM LEVEL DURING THE LEAK CHECK SHALL BE LESS THAN $1 \times 10^{-9}$ TORR.
4. PLATE 40±10 MICRONS OF COPPER ON INTERNAL SURFACES, MASK SEALING SURFACES ON FLANGES .

| ITEM | PART NAME | | QTY |
|---|---|---|---|
| 3 | FC0075809 | 5.0"OD x .8" WALL, 5-WAY CROSS, 304SS | 1 |
| 2 | FC0042257 | FLANGE-CF, 6.75x5 TUBE,NR,C,SS304 | 3 |
| 1 | F10126958 | FLANGE, CROSS WELDMENT | 2 |

Fig 3: RF SS cavity (material SS 304)

4. **Waveguide sections with standard flanges**:
   Three standard **WR 1150** waveguide sections with standard flanges at both ends are required
   Waveguide 1: length = 47mm,
   Waveguide 2: length = 94mm
   Waveguide 3: length = 188mm

5. **Waveguide directional coupler**:

- The materials used for fabrication are Aluminium 6061 T6 and ETP copper 99.9% pure.
- The design includes a single half height waveguide WR1150 (made of aluminium 6061 T6) with two holes, one at top and another at bottom. Overall structure is shown in Fig 4.
- The thickness of the waveguide is 6.35mm
- The length of waveguide is 300 mm, internal height is 73.02 and internal width is 292.1 mm.
- Two loop couplers with details given in Fig 5 are to be mounted over the two holes on the waveguide. These two couplers are also made of aluminium
- Inside view of coupler is given in Fig5
- The detailed drawings and their dimensions are given in Fig 4 and 5 below
- Two waveguide flanges are required at input and output. Flange drawing is given in Fig 7.

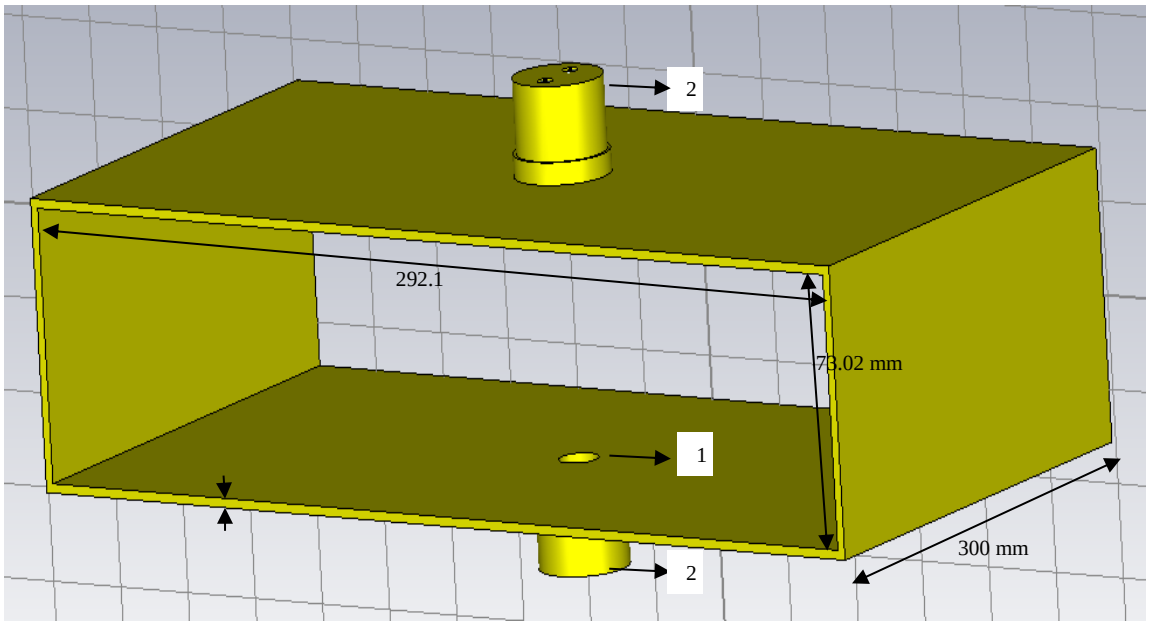



Fig 4. Overall view of half height directional couplers with two loop couplers

1. Holes on top and bottom with diameter 45 mm

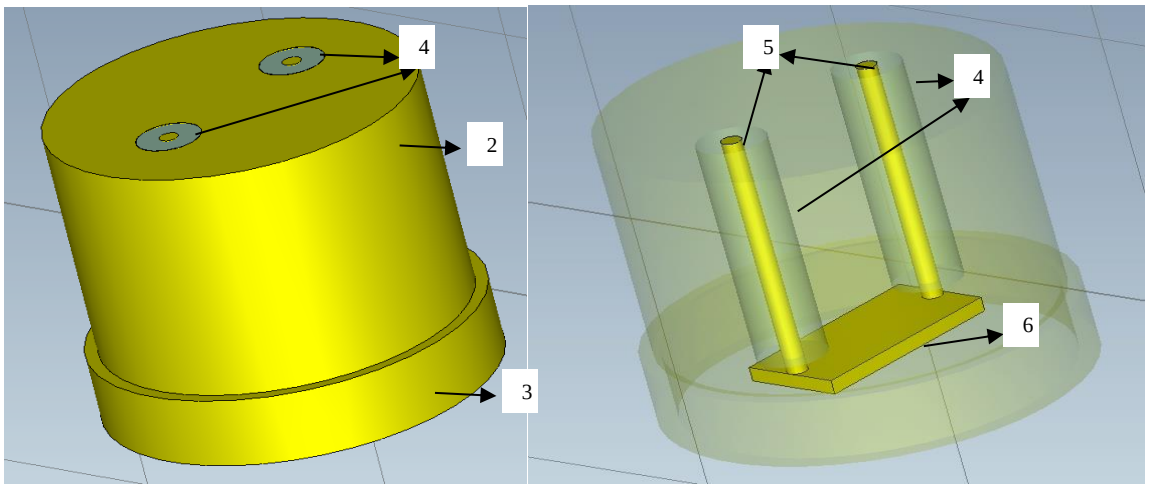



Fig 5

2. This is cylindrical loop type coupler on top and bottom of waveguide surface. Both couplers are made of solid aluminium. This coupler has diameter of 77 mm and length of 53 mm from top surface of waveguide.
3. An aluminium disc holds the coupler. It has outer diameter of 81mm and inner diameter of 75 mm. Height is 15 mm from top surface of waveguide (this height can be increased to hold the coupler firmly)
4. Inside the coupler two Teflon cylinders are inserted with distance of 51.5 mm between their centres. These Teflon cylinders have outer dia of 10 mm, inner dia of 3mm and length of 40 mm

5. Inside each Teflon cylinder there is a solid rod made of **copper** with dia 3mm and length of 43 mm. Distance between centre of the two copper rods is 50 mm. On the top of these two copper rods two N type connectors will be connected. So, length can be adjusted accordingly.
6. The end of above mentioned copper rods are connected by a rectangular strip made of **copper.** Length this strip is 53 mm, width 14 mm and thickness of 2.5 mm. Please note that the rods mentioned in 5 and rectangular strip are all made of copper.

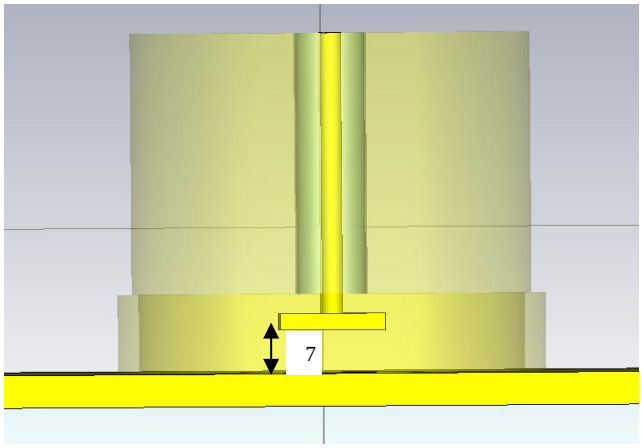



Fig 6

7. The distance of the bottom of rectangular strip from the hole on the waveguide surface is 9.5 mm. This is shown in Fig 6.

For further details please contact:
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