



सत्यमेव जयते

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भारत सरकार  
GOVERNMENT OF INDIA  
भाभा परमाणु अनुसंधान केन्द्र  
BHABHA ATOMIC RESEARCH CENTRE  
प्रगत भारी पानी रिएक्टर प्रभाग  
ADVANCED HEAVY WATER REACTOR DIVISION

ट्रॉम्बे,  
मुंबई - 400 085,  
HALL No. 7,  
TROMBAY,  
MUMBAI - 400 085

Ref: AHWRD/AK/MF/2022/P42411

29 April , 2022

To,  
All Parties Concerned

**Sub: Minor Fabrication - Invitation to quote**

Dear Sirs,

1. Sealed quotations are invited by undersigned for and on behalf of the President of India for the work as per the requirements given in the Scope of Supply, details listed in this document and Technical Specification (enclosed)
2. The quotation must reach Head, Advanced Heavy Water Reactor Division (AHWRD), BARC Mumbai at given address latest by **19/05/2022**. The quotation should be send by speed post or registered post only through **Indian Postal Services only**. The sealed envelope should be super scribed as shown below

**“Minor Fabrication-Renovation of Moderator Exp”**

**Office Ref. No. AHWRD/AK/MF/2022/P42411 dated 29 April 2022**

**Due date:- 19 May 2022**

**Address:-**

Head, AHWRD,  
Engineering Hall No.7,  
Bhabha Atomic Research Centre (BARC)  
Trombay, Mumbai 400085

(Kind attention: Dr. Anuj Kumar Kansal, AHWRD, Tel no. 2559 6430)

3. It is highly recommended that vendor should visit the site, to assess the exact scope of work for any technical clarifications. (Contact Dr. Anuj Kumar Kansal, SO/G, AHWRD, 107H, CFB, BARC, Trombay, Mumbai 400 085. Ph-022-25596430, [akansal@barc.gov.in](mailto:akansal@barc.gov.in).)

## 1.0 Scope of the work:

The scope of work involves the supply of duplex basket strainer, hex cap bolts, solenoid valves and thermocouples etc. and installation of duplex basket strainer, tubes, acrylic flange and sealing arrangement etc., Technical Specification (enclosed).

## 2.0 Free issue materials:

No free issue materials for this work order.

## 3.0 Duration of work:

The entire work is to be completed within **four months** reckoned from the 5th day after the date of issue of the work order. This period should be strictly adhered to.

## 4.0 General Instructions:

- a. In this document, the agency/supplier on whom the work order will be placed is referred to as the “Contractor”. The agency executing/issuing this work order will be referred to as the “Client”.
- b. The bidders should quote in a modular way, rate wise, for work listed sheet wise, as per the table in the scope of supply. Lump-Sum quotations will not be considered.**
- c. GST: Since the goods are to be supplied against the work order meant for research purpose of a research organization under DAE, Govt. of India, the applicable GST for such cases shall apply. These should be quoted separately.
- d. Taxes, duties, if any, applicable should be indicated separately.
- e. Where, the prices quoted are inclusive of excise duty, the percentage/quantum of excise duty included in the quoted price should be specifically indicated in the tender.
- f. Place of work: Hall-7, BARC, Trombay, Mumbai-400085.**
- g. The contractor shall have to maintain the area assigned to him for the work very clean and shall follow the instructions of Engineer in-charge from the Client side in this regard. All equipment/tools etc. are to be removed and clean the area after the end of the day's work.
- h. In case any extension in the job completion period is required, the contractor has to write to the Client, giving proper justification for the delay. The decision to approve the extension rests with the Client. No extra cost will be paid to the Contractor for this extension of time.
- i. With the offer, bidders should please furnish the detailed information regarding whether an ex-employee of BARC is working in your organisation or whether any of your relatives is working in DAE/BARC or you are an ex-employee of DAE/BARC. In absence of such information or wrong information, the quotation or contract is likely to be rejected/cancelled.
- j. The offer shall be kept valid for a period of 60 days from the date of opening of the tender.

- k. The Client reserves the right to alter the quantity while placing the order.
- l. The Client reserves the right to accept or reject any or all the quotations received without assigning any reasons whatsoever.

#### **5.0 Commercial Terms:**

- a. **Payment will be made at the end of the completion of the full scope of work i.e. after all the documents have been delivered and found acceptable after the final stage of review or after “Duration of work” reckoned from the 5th day after the date of issue of the work order, whichever is earlier.**
- b. Release of advance or interim payment cannot be considered.
- c. Payment will be made by ECS after satisfactory completion of the work as per Government rules.
- d. **At the time of settlement of claims, the Contractor has to submit bills/Invoice in triplicate, advanced stamped receipt, work completion certificate from the Client and Bank Details of the contractor to the Client.**
- e. In the event that the full scope of supply has not been completed by the Contractor for any reason, on the expiry of the term of contract i.e. after 2 months reckoned from the 5th day after the issue of the work order, the payment shall be made on a pro-rata basis for the work carried out for fully completed, reviewed and accepted documents only. Payment will not be made for work which has not been fully completed or found unacceptable by the client.
- f. Taxes: Income tax @ 2% and applicable surcharge will be deducted from your bill. TDS certificate to that effect will be issued by BARC, if so desired.
- g. Bidder should note that BARC is final consumer of the goods/services procured and does not intend to make any outward supply. BARC will not avail the benefits of input tax credit and hence, the good can be supplied without quoting the GSTIN of BARC, Mumbai on invoice. The invoices taxed under GST, as per rates applicable under the GST schedule of rates, will be admitted for payment.
- h. GSTN Invoice: The invoice raised by the registered supplier of taxable goods/services along with other details specifically indicating: GSTN, PAN, Location of supply, tax component to be separately indicated.
- i. An undertaking shall be furnished by the registered supplier that the GST has been promptly deposited with the authorities.
- j. Recovery of TDS @2% on GST in case of payment of invoices for supply under contract exceeding Rs.2.50Lakhs.
- k. Any delay which is attributable to the contractor is liable for penalty @ 0.5% per week (maximum 10%) to be imposed on the contractor.

#### **6.0 Option:**

**After the placement of the work-order, the Client reserves the right to terminate the contract by giving a notice of one month and without any financial obligation on the part of the client. In**

the event of cancellation of the contract for any reason, the payment for work carried out will be on the basis of work that has been fully completed. Payment will not be made for work which has not been fully completed and found un-acceptable after review by the client.

### **7.0 Confidentiality:**

- a. No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as proprietary in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party. This clause shall apply to the sub contractors, consultants, advisers or the employees engaged by the party with equal force.
- b. Restricted information categories under section 18 of the Atomic Energy Act, 1962 and "Official Secrets" under section 5 of the official secret act, 1923: Any contravention of the above mentioned provisions by any contractor, sub-contractor, consultant, adviser or the employees of a contractor will invite penal consequences under the aforesaid legislation.
- c. Prohibition against use of BARC's name without permission for publicity purposes: The contractor or sub contractor, consultant, adviser or the employees engaged by the contractor shall not use BARC's name for any publicity purpose through any public media like press, radio, T.V. or Internet without prior approval of BARC.

### **8.0 Intellectual Property & Copyright:**

All work covered in the scope of supply, shall remain as an intellectual property of the client. The contractor shall not make any claim for copyright or intellectual property right at any point of time.

### **9.0 Safety:**

- a. All the persons deployed by the contractor at site shall be physically and mentally fit.
- b. All applicable industrial & safety precautions shall be taken by the contractor in respect of their personnel working at site.
- c. Above work calls for adherence to safe work practice. BARC shall not be responsible for any damage, injury, death etc of any contractor's personnel under any circumstances. No compensation claim shall be admitted in this regard.

### **10.0 Guarantee:**

The work pertaining to the design shall be guaranteed against any defects/faulty workmanship for a period of six months from the date of acceptance. During the above period if the items become defective, bidder will be responsible for making arrangements for repairing at free of charge. Contractor will issue the guarantee certificate at the time of commissioning/acceptance by department, mentioning the contents of the guarantee clause as mentioned above.

## **11.0 Security Instructions:**

- a. The bidder should note that entry inside BARC is restricted and it is compulsory for contractor to get police clearance (*as prescribed by security section of BARC*) for all his staff who will be entering BARC for work.
- b. The contractor has to follow strictly the security regulations prevailing in BARC from time to time especially in regard to working hours, movement of materials and entry permits.
- c. Vetting of the firm will be carried out by the security section of BARC.
- d. Identity cards for the contractor and contractor's persons (employees/consultants) will be issued after verification of their antecedents.
- e. It will be the responsibility of the contractor to produce police verification certificate (from commissioner's office) for his persons before seeking permission to commence any work inside BARC premises.
- f. Police verification certificate submitted with respect to an individual will be treated valid only for one year from the date of issue and on expiry of one-year period; a fresh police verification certificate will have to be arranged by the Contractor. Entry of personnel without valid PVC is not permissible.
- g. Local address (Mumbai) is required for preparation of photo identity cards at BARC.
- h. For working on weekends and late hours even though permission will be accorded by Engineer-In-Charge of the Client, the contractor will have to make application to the BARC security also and keep them informed well in advance.
- i. The work can be carried out on all working days (Monday to Friday) between 9.00 hrs to 18.00 hrs excluding Govt. declared holidays.

### **Enclosures:**

- 1) Technical Specifications no. AKK/MFB/2204



**(Anuj Kumar Kansal)**  
**SOG, AHWRD**

**TECHNICAL SPECIFICATION NO. AKK/MFB/2204**

**PART-I**

**Scope of work:**

The supply of duplex basket strainer, hex cap bolts and thermocouples etc. and installation of duplex basket strainer, tubes, acrylic flange and sealing arrangement etc. at Hall-7, BARC per details in Table 1

**Table 1**

<b>Item No.</b>	<b>Work</b>	<b>No/ size</b>
1	Supply of strainers (frame with screen) for duplex basket strainer, size 8" x 700 mm, SS 316 U S mesh size 150 supported by SS perforated plate from both side	4 No.
2	Installation strainer(frame with screen) in Basket strainers	2 No.
3	Supply of hex cap M10 bolt of SS 304/316 with full thread having length 30mm	1100 No.
4	Installation of tubes with M10 bolt and connectors in acrylic tube sheet (Figure 5)	500 No.
5	Installation of Acrylic flange to close the tank (1.2 m diameter) with top and bottom with supplied nut bolts. Gasket is in vendor scope. (Figure 5)	1 No.
6	Supply of K-type thermocouple (length 3 m) diameter 1.0 mm	42 No.
7	Supply of Heat shrinkable sleeve (a) 0.5 mm thermocouple 20 m (b) 1.0 mm thermocouple 20 m (c) 28mm OD rod -30 m each	1 No.
8	Supply of 28 mm diameter rod of Electrolytic grade tough pitched (Cu-ETP) annealed copper (Grade: C 101)	5 m
9	Fabrication and installation: Anchoring Thermocouple tube (7 number) from bottom, by providing hole in acrylic bottom and in thermocouple tube	1 No
10	Supply, Fabrication and installation: Sealing of copper electrical rod using EPDM O-ring as per attached drawings (Figure 1 and 2).	12 No.
11	Supply, Fabrication and installation: Sealing of Thermocouple tube using EPDM O-ring as per attached drawings. (Figure 3 and 4).	7 No.
12	Supply of 3/2 Festo make Solenoid Valve (model MCH-3-1/8)	3 No
13	Supply of Festo make Half inch Brass angle seat valve (VZXF-L-M22C-M-A-G12-120-M1-H3B1T-50-16)	2 No

## PART-II

### **Technical Specifications:**

#### **1. Introduction:**

The scope of supply includes items given in Table 1 of Part-I and drawing of the existing experimental setup is shown in Figure 1.

Calandria shell (TK-1) has height of 900mm, 1150mm ID and 10 mm thk and made up of SS304. Calandria shell has seven acrylic windows for flow visualization at two elevations. Shell has acrylic flanges of thickness 30mm at top and bottom location. 16 no. of straight inlet are provided at the bottom of vessel of size 32NB which is connected by hose pipe with supply line. Setup has ~505 SS tubes as shown in Fig. 1. The heat generation will be done by direct heating of SS tubes. The high amperage alternating current was passed via the tubes to generate heat in SS tubes (450 No.s out of 505 tubes). The other tubes are used for tube bundle support and mounting thermocouples. The tubes used for heat generation purpose are divided into six banks. The tubes in each bank (~75 No.s) are connected in series by copper strips. Six banks are divided into two groups, each getting power supply from two independent transformers placed at ground floor. Three banks are arranged in star to get power supply from transformer.

At present, setup is in open condition i.e. top and bottom flanges, all tubes are removed. Vendor should study all the drawings in detail. It is highly recommended that bidder should visit the site, to assess the exact scope of work. (Contact Dr. Anuj Kumar Kansal, SO/G, 107H, CFB, BARC, Trombay, Mumbai 400 085. Ph-022-25596430, akansal@barc.gov.in.

#### **Modifications to carried out in Existing Experimental Setup:**

##### **i) SS Strainers**

Water Supply line has duplex basket type strainer. Strainers (frame with screen) inside basket are damaged and need to be replaced with new one. Vendor should supply four strainers (Item 1 of table 1) and install two strainers in basket type strainer (Item 2 of table 1). Vendor should note that each duplex basket type strainer has two strainers, and vendor has to supply total four strainers. Mesh should be supported by perforated plates from both sides of mesh.

##### **ii) Sealing of thermocouple tubes and copper rods:**

About 505 tubes are connected in series through the copper strip connectors to work as electrical heaters. They are divided into two groups. Each group is fed by separate 3 phase power supply. Hence, six terminals exist in each group. These

terminals are copper rods and thus 6 copper rods exist per group. There are total of 12 copper rods as shown in Figure 1. For temperature measurement 7 tubes are provided having thermocouples. Vendor has to provide sealing arrangement as shown in Figure 2 to 5 for thermocouple tubes and copper rods (Item 10, 11 of Table 1). At present thermocouple tubes are loose at bottom, and sealing is not possible with loose end. Hence vendor has to anchor Thermocouple tube (7 numbers) from bottom, by providing hole in acrylic bottom plate and in thermocouple tube (Item 9 in Table 1). All material as shown in Figure 2 to 5 are in scope of vendor except acrylic flange, thermocouple tube, copper rod.

iii) Work on heater tubes:

Vendor has to arrange heater tubes in series on the existing inner perforated acrylic sheet (Item 4 of Table 1). After this, vendor has to close outer acrylic flanges to SS tank using gasket (Item 5 in table 1).

Other items given in Table -1 are mainly in scope of supply.

**2. Modification and fabrication shall follow the guidelines given below:**

- i. All sharp corners and edges shall be removed.
- ii. Vendor has to retouch/repair/repaint the wall due to shifting/changing/transferring installation of items in Table 1 of part-I.
- iii. Shifting of material for above work and returning it back is in the scope of work.
- iv. Necessary raw material/ items and manpower required for this work will be in the scope of work

**3. Inspection and Testing:**

Items in Table 1 of part-I will be accepted only after final inspection.

**Part III**

**General Requirements:**

Six months warranty for all the items from the date of acceptance. During the above period if the items become defective, bidder will be responsible for making arrangements for repairing at free of charge. Contractor will issue the guarantee certificate at the time of commissioning/acceptance by department, mentioning the contents of the guarantee clause as mentioned above.



## Part IV

### **Note to bidders:**

1. All the materials required for items in Table 1 of part-I shall be purchased by supplier.
2. It is highly recommended that bidder should visit the site, to assess the exact scope of work. (Contact Dr. Anuj Kumar Kansal, SO/G, 107H, CFB, BARC, Trombay, Mumbai 400 085. Ph-022-25596430, akansal@barc.gov.in.
3. Bidder should give cost against each item in Table 1 of part-I and should list separately all the relevant taxes applicable as shown in Table 2.
4. The item has to be delivered to Hall-7, BARC, Trombay, Mumbai 400 085, India.
5. The purchaser or his authorized representative shall subject the item to inspection, testing, evaluation and discussion/clarification of technical requirement.
6. The supplier should confirm the items offered vis. a vis. the requirements specified. Any deviation from the requirements mentioned in this specification should be highlighted in the quotation.
7. The supplier should indicate the **time frame** in which they can finish the job after the receipt of the work order.
8. A brief list of similar jobs executed if any, and name of the organization for which such job was carried out should be furnished with the quotation.
9. BARC will not provide any machine tool or instrument required for this job. A list of machine tools and testing inspection instruments, in connection to the job, available with the supplier should be provided.
10. Purchaser reserves the right to accept/reject any or all the quotations received without assigning any reason whatsoever.
11. Incomplete quotation will not be considered for evaluation.

**Table 2: Cost Estimation Sheet (To be filled by Vendor)**

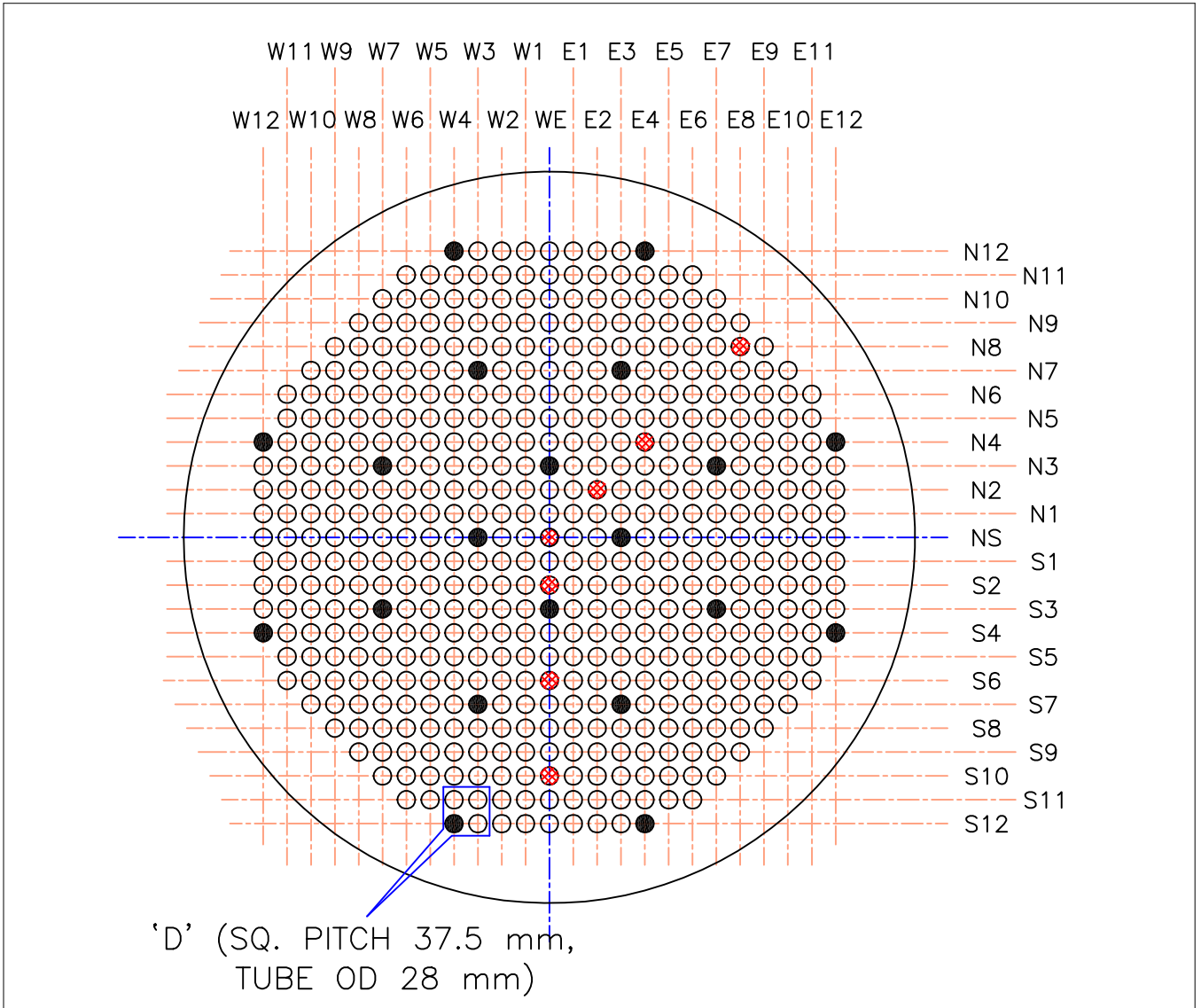
1	2	3	4	5	6	7	8
Item No.	Work	No/ size	Base Cost/unit	GST%	Total base cost (3x4)	Total GST (3X4x5/100)	Total cost (6+7)
1	Supply of strainers for duplex basket strainer, size 8” x 700 mm, SS 316 U S mesh size 150 supported by SS perforated plate from both side	4 No.					
2	Installation strainer in Basket strainers	2 No.					
3	Supply of hex cap M10 bolt of SS 304/316 with full thread having length 30mm	1100 No.					
4	Installation of tubes with M10 bolt and connectors in acrylic tube sheet (Figure 5)	500 No.					
5	Installation of Acrylic flange to close the tank (1.2 m diameter) with top and bottom with supplied nut bolts. Gasket is in vendor scope. (Figure 1)	1 No.					
6	Supply of K-type thermocouple (length 3 m) diameter 1.0 mm	42 No.					
7	Supply of Heat shrinkable sleeve (a) 0.5 mm thermocouple 20 m (b) 1.0 mm thermocouple 20 m (c) 28mm OD rod -30 m each	1 No.					
8	Supply of 28 mm diameter rod of Electrolytic grade tough pitched (Cu-ETP) annealed	5 m					

	copper (Grade: C 101)						
9	Fabrication and installation: Anchoring Thermocouple tube (7 number) from bottom, by providing hole in acrylic bottom and in thermocouple tube	1 No					
10	Supply: Sealing of copper electrical rod using EPDM O-ring as per attached drawings (Figure 3 and 4).	12 No.					
11	Fabrication and installation: Sealing of copper electrical rod using EPDM O-ring as per attached drawings (Figure 3 and 4).	12 No.					
12	Supply: Sealing of Thermocouple tube using EPDM O-ring as per attached drawings. (Figure 5 and 6).	7 No.					
13	Fabrication and installation: Sealing of Thermocouple tube using EPDM O-ring as per attached drawings. (Figure 5 and 6).	7 No.					
14	Supply of 3/2 Festo make Solenoid Valve (model MCH-3-1/8)	3 No					
15	Supply of Festo make Half inch Brass angle seat valve (VZXF-L-M22C-M-A-G12-120-M1-H3B1T-50-16)	2 No					
	<b>Total</b>						

Transportation =  
Others =

Final cost = total cost + Transportation + others =

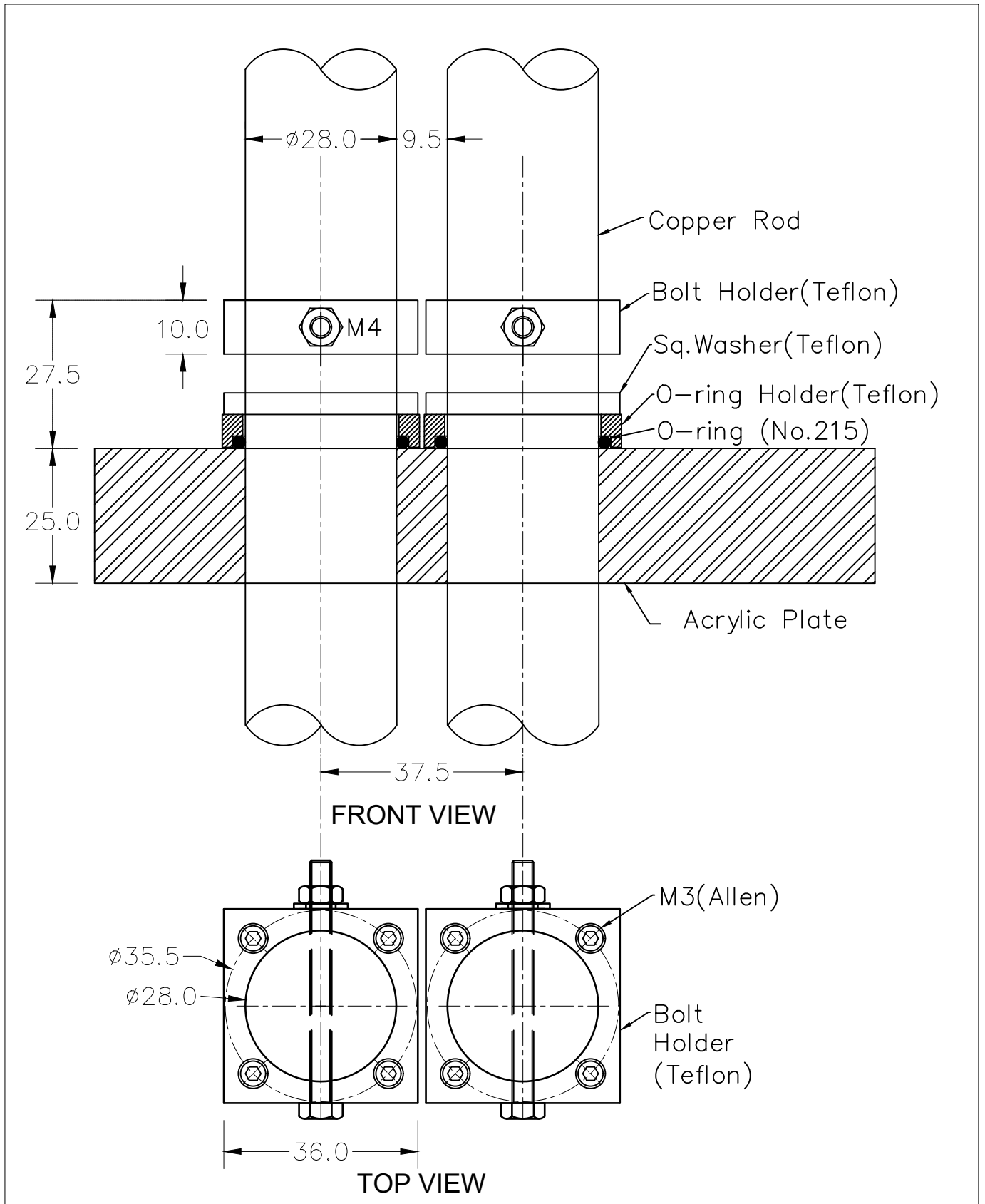




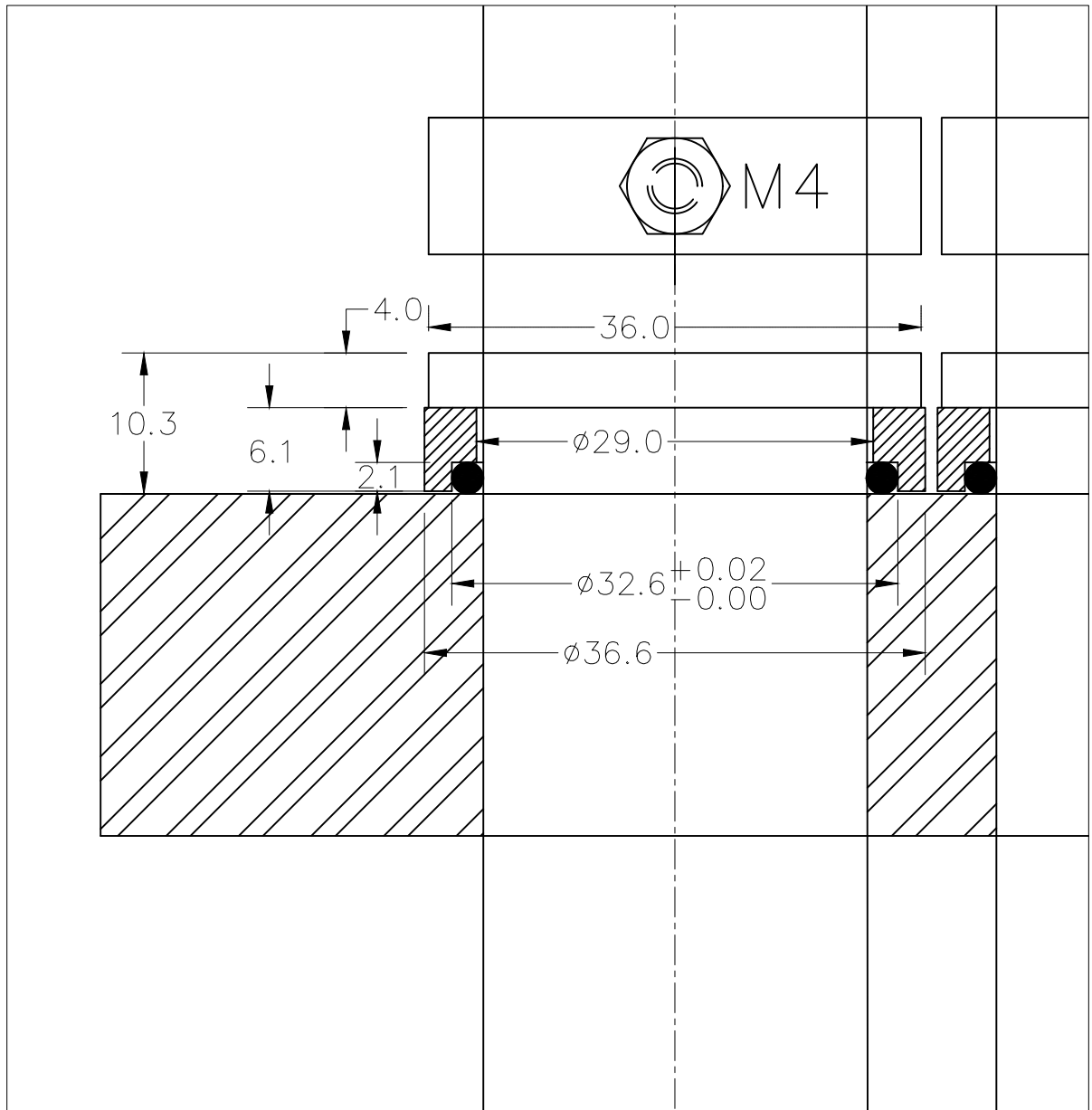
	TUBE	FOR	No.s	REMARKS	
		A	LOCATION FOR THERMOCOUPLE	7	-THROUGH WALL HOLE IN TTS -BLIND HOLE IN BTS (DETAIL-C)
		B	LOCATION FOR FIXED TUBE	20	-TTS (DETAIL-A) -BTS (DETAIL-B)
		C	LOCATION FOR HEATER	478 (MAX.)	-TTS (THROUGH WALL HOLE) -BTS (THROUGH WALL HOLE)

TTS - TOP TUBE SHEET  
BTS - BOTTOM TUBE SHEET

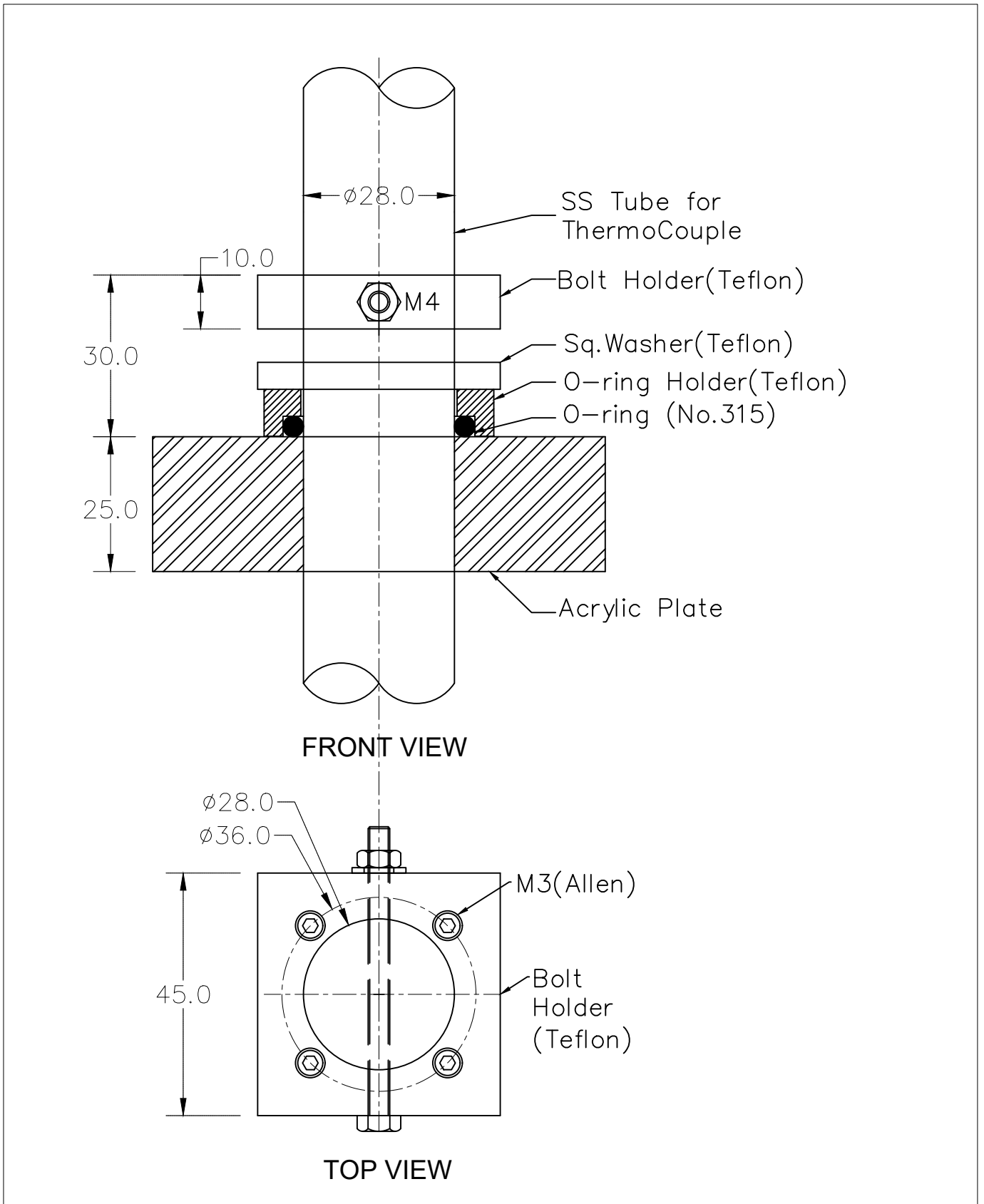
FIG 1b. CALANDRIA TUBES DETAILS INSIDE CALANDRIA SHELL



Details of O-Ring Arrangement in Copper Rod (Electrical)



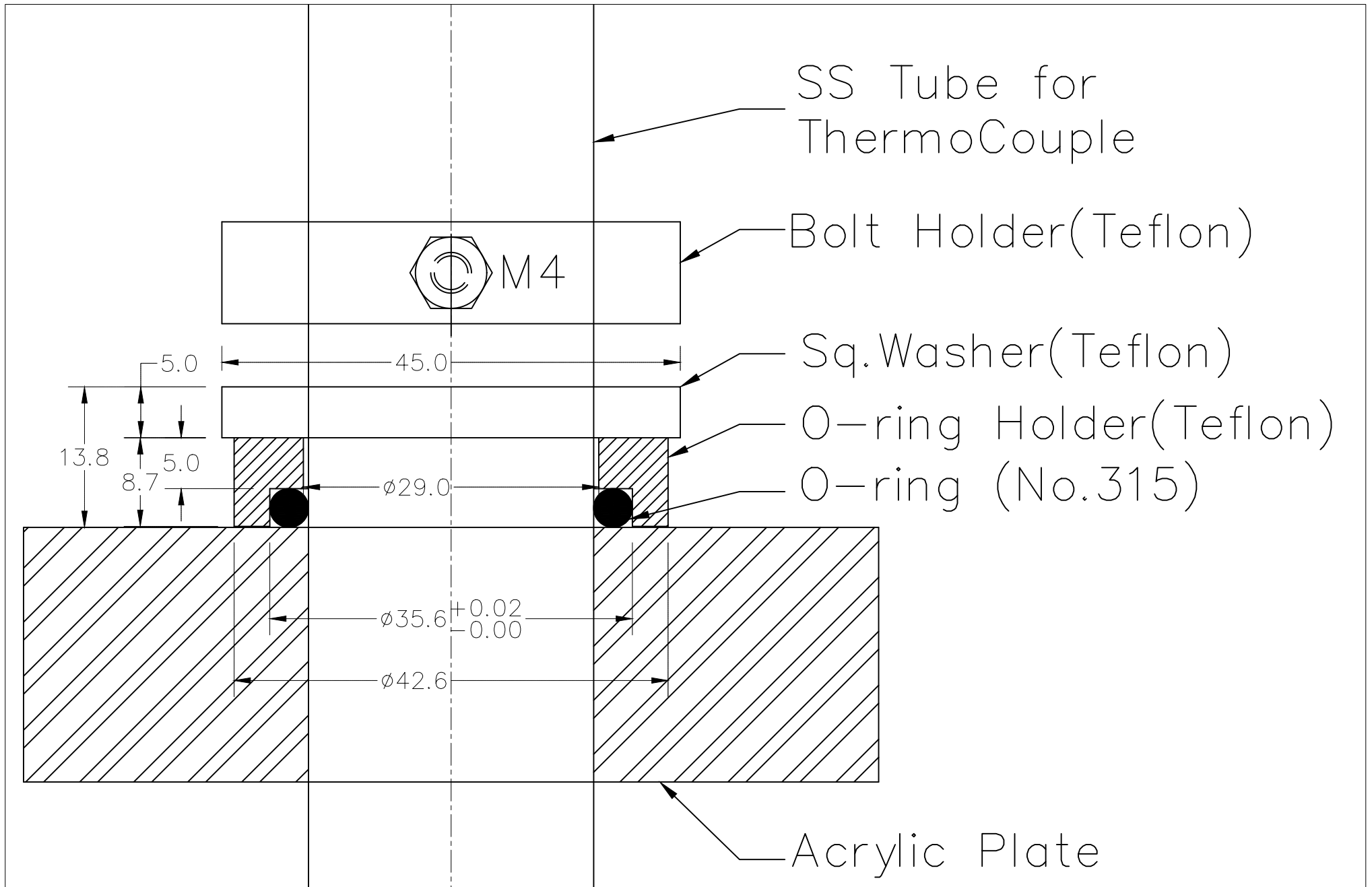
Details of O-Ring Arrangement (Zoom) in Copper Rod (Electrical)



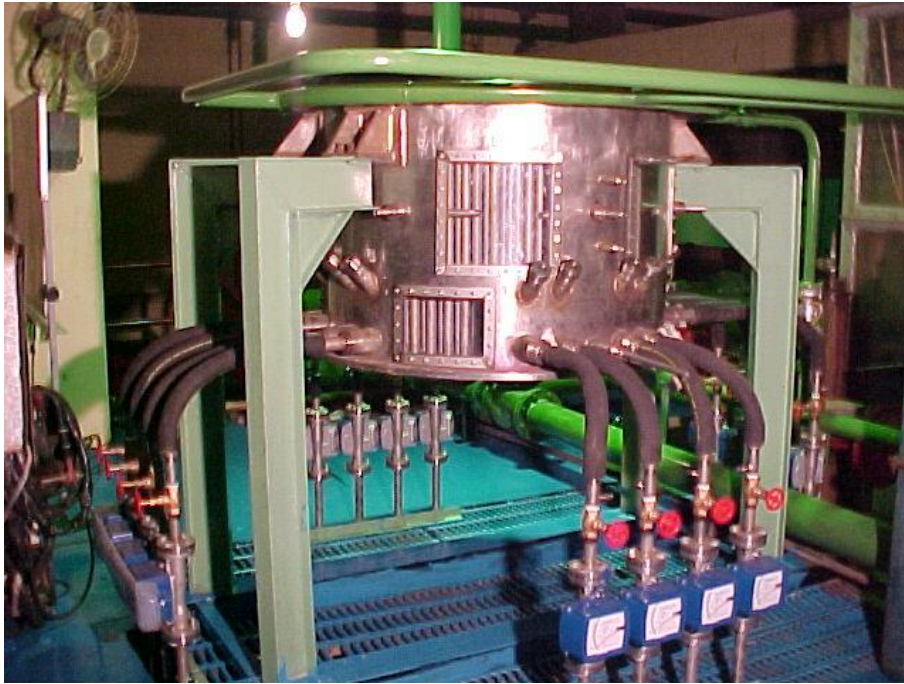
Details of O-Ring Arrangement in SS tube for Thermocouples

Figure-4

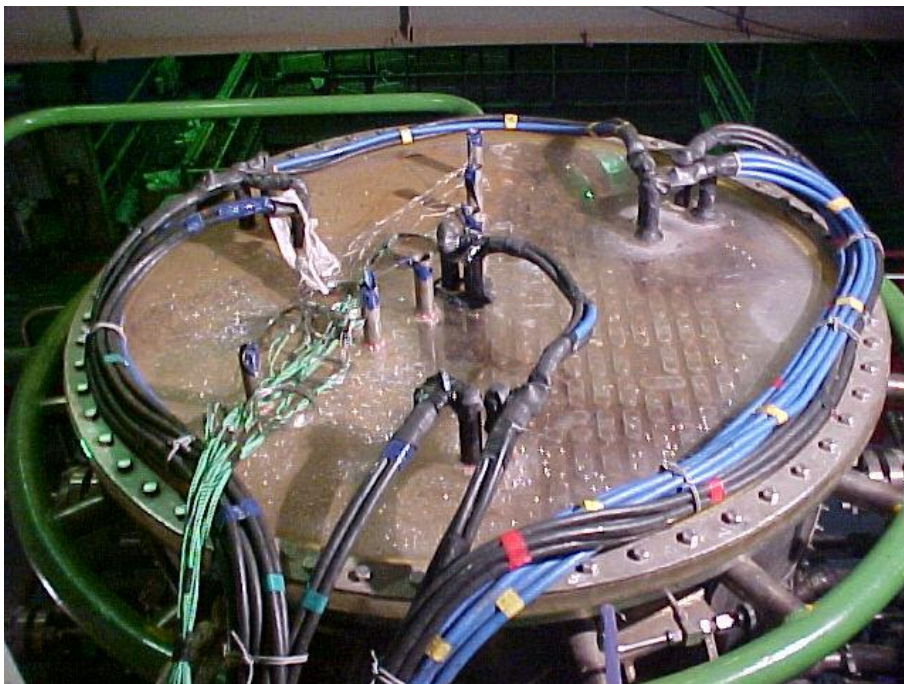




Details of O-Ring Arrangement (Zoom) in SS tubes for Thermocouples



**Figure 6 a: Vessel/Tank with support**



(at present in dismantle condition)

**Figure 6b: Electrical and thermocouple connection from top flange**