

**Government of India  
Bhabha Atomic Research Centre  
Pulsed Power & Electromagnetics Division**

Ref: BARC(V)/PP&EMD/2022-23/R&D71/MF/BGS/02

date: 12-04-2022

**Sub:** Fabrication and Supply of crane, fabrication and supply of fixtures, supports and assembling the electrical assembly with pressure chamber as per the enclosed drawings and specifications. Qty: 1 set

Dear Sir

- Quotations are invited for the minor fabrication job, as per the enclosed specification.
- Bidder shall quote for the fabrication with the mention of the components with materials. It should clearly indicate with details that it fulfils or not all our requirements as mentioned in our specifications.
- Taxes shall be quoted separately.
- The quotation must reach the Head, PP&EMD, BARC (V) by 25-04-2022 and must be sent in a sealed, printed envelope superscripted with reference number and the due date as is given above.
- The address of the envelop should read –

Head, PP&EMD

Kind attn: B Gowri Sankar, 08912832014

PEB-1

Bhabha Atomic Research Centre

Gajuwaka- Yellamanchali Road

Near Nagavaram Junction

Atchutapuram

Visakhapatnam – 531011

- The components for the fabrication work shall be subjected to inspection by our Engineer. The component shall not be dispatched prior to approval of our engineer at bidder's premises. Necessary inspection facilities should be provided to our engineer during inspection at bidder's premises.
- The bidder shall complete the work within 10 weeks from the date of work order issued to the bidder.
- Head, PP&EMD reserves the rights to accept/ reject any or all quotations without assigning any reasons.
- Delivery charges if any, must be clearly mentioned with the offer.
- Quotation must also indicate the validity of offer. Vendors are requested to give at least 60 days of validity for their quotations.
- Drawing / sketches must be returned along with the offer.
- Quotations are to be in printed letter-head / quotation format only.
- Quotation should consist of GST registration number & PAN number of the firm.

  
12-4-2022

**Head, PP&EMD**

**BARCF, Visakhapatnam**

डॉ. (श्रीमती) अर्चना शर्मा / ARCHANA SHARMA

निदेशक / Director

किरणपुंज प्रौद्योगिकी विकास वर्ग

Beam Technology Development Group

भारत सरकार / Government of India,

भा.प.अ. केंद्र / B. A. R.C.

ट्रॉम्बे, मुंबई / Trombay, Mumbai - 400 085.

Fabrication and Supply of crane, fabrication and supply of fixtures, supports and assembling the electrical assembly with pressure chamber as per the enclosed drawings and specifications.

1. Introduction:

The work consist fabrication and supply of crane, fixtures and supports as per the specifications. The assembly work mainly contains assembly of electrical assembly inside a pressure chamber. The electrical assembly has diameter ~2265mm and this unit has vacuum in its central portion. Outside the vacuum system of electrical assembly, there are capacitor units and spark gaps. In the operating condition, there will be vacuum inside and there will be pressure outside the electrical assembly. The assembly has to be in horizontal position and one end of the electrical assembly need to be assembled with torispherical dish end flange of pressure chamber and another end is connected to the other dish end via load chamber. It is necessary for the vendor to carefully understand the flanges at both ends of electrical assembly inside the pressure chamber. Special fixtures and arrangements may be required for assembly of these flanges. It is also necessary to understand the orientation of the electrical assembly inside the pressure vessel. One of the important points of the assembly is that the outside electrical components cannot support the load of electrical assembly. To understand the assembly the supplier can come and visit the electrical assembly, pressure chamber and the available space BARC, Visakhapatnam

2. Scope of the work:

- i) Design of the crane to suit the application as per the specifications
- ii) Fabrication of the crane
- iii) Testing of the crane
- iv) Supply and installation of the crane
- v) Design, fabrication and supply of lifting supports/fixtures for electrical assembly for lifting and moving the assembly with crane.
- vi) Material handling of the electrical assembly for assembly in the pressure chamber. This also includes making the assembly horizontal
- vii) Design of fixtures for resting electrical assembly in the horizontal position
- viii) Design of fixtures for movement of electrical assembly during the assembly in the pressure chamber

- ix) Design of fixtures for resting the electrical assembly inside the pressure chamber
- x) Fabrication of the fixtures
- xi) Assembly of the electrical assembly inside the pressure chamber

3. Specifications of the crane

3a. Detail scope of supply for crane

The scope of supply of 2.5Ton Gantry Crane (Qty: 1No.) will includes its design, manufacturing, assembly, testing & inspection at manufacturer's works, packing, dispatch, transportation, safe delivery at site, required assembly at site, installation, testing & commissioning, performance testing, final painting at site, if required and handing over to BARC. The Scope of supply shall also include but not be limited to the following, along with necessary fittings, fixtures and accessories.

- a. Bolted structure.
- b. Traveling mechanism for long travel.
- c. Wheels for the crane
- d. Hoisting mechanism
- e. Brake Mechanism separately travels (in-built)
- f. Control operation for the entire Gantry movement.
- g. Electrical motors, control gear and equipment

3b. Capability of the crane

The crane should be capable of:

- a. Hoisting
- b. Cross traveling
- c. Movement of entire gantry (motorized) at specified speeds in both loaded and unloaded conditions.

3c. The specifications of the crane are as per the following:

S.No.	Description	Value
1	Type of crane	Single Girder Gantry type
2	Capacity	2.5Ton
3	Free space along the width of the crane	6.8m

4	Free space under the crane	3.0m
5	Maximum height	4.0m
6	Girder type	Welded structure
7	Hoist type	Manual
8	Trolley type	Low head room
9	Number of wheels	Four
10	Static wheel load carrying capacity	40kN
11	Crane hoist	Manual
12	Gantry motion	Motorized, Speed-adjustable (~3m/min)
13	Motor power for Gantry	~2x1.2kW
14	Crane control	Throttle control
15	Input power	230V, 50Hz
16	Control voltage	~48V
17	Electrical cubicle protection	IP54
18	Motor protection	IP55
19	Weight of crane with hoist	~800kg
20	Crane location	Indoor
21	Ambient temperature	15-45°C
22	Gantry has to be pre positioned parallel to the already existing equipment axis at the customer site	

3d. following items are also included in bidder's scope

- a. Consumables like first fill of lubricating oils, grease etc. for the initial operation of the Equipment till handing over.
- b. Commissioning spares and start-up spare parts.
- c. Special tools & tackles, if any required.
- d. Recommended spare parts for two years trouble free operation and maintenance.
- e. All drawings / documents along with operation and maintenance manuals.
- f. Getting approval of design/drawings related to the equipment from BARC.
- g. Carrying out any modifications/ deletions /additions / alteration in design drawings/ documents as required for proper execution of works at site till completion and handing over of the equipment to the purchaser.
- h. Lifting attachment for the Electrical Assembly.
- i. Relevant Belt slings of rated capacity, with Test Certificate.
- j. Relevant rigging items, with Test Certificate.

- k. All crane and component warning signs
- l. Horn
- m. Emergency stop

### 3e. Design

The crane shall be designed, manufactured, erected and tested in accordance with the following or their latest versions of IS Codes

- a. IS:3177-1999 - Indian Standard Code of Practice for electric overhead traveling cranes.
- b. IS:807- 2006 - Indian Standard Code of Practice for design, manufacture, erection and testing (structural portion) of cranes and hoists.
- c. IS 13834 (Part 1) Cranes: General
- d. IS 5749 Specification for Forged Ramshorn hooks
- e. ISO 12488-1, Cranes-Tolerance for wheels and travel and traversing tracks.
- f. IS 800-2007, Design of steel structures.

### 3f. Rigidity, control & safety

- a. The crane should be rigid, robust and of sturdy construction
- b. Crane controls should be conveniently located. Various controls should be suitably interlocked to prevent accidental movement of the crane.
- c. Suitable buffers should be provided to prevent over travel of the crane mechanism.
- d. Suitable guards or enclosures should be provided on the crane to prevent inadvertent contact with exposed electrical conductors and cables.
- e. The crane should comply with the relevant safety regulations under the Factories Act, and other statutory regulations as applicable.

### 3g. Maintainability

- a. Safe accesses for maintenance and removal of all mechanical, electrical and structural components must be ensured.
- b. All parts requiring replacement, inspection and lubrication should easily be accessible without the need of dismantling other equipment or components.
- c. All electrical cables should be so laid that they are not liable to damage and can be easily inspected and maintained.
- d. Materials used for equipment and structural equipment should be free from cracks, blow holes, laminations, pitting etc. Except for areas where a superior grade of materials is required, steel class should be as per IS: 2062.
- e. A tool box containing all tools required for the maintenance of the crane should be supplied with the crane.

- f. Fasteners for pedestal blocks, gear boxes, etc., should be easily removable for the purpose of maintenance

### 3h. Structural details

- a. The crane bridge should be of girder type.
- b. All welded subassemblies of the girder should be stress relieved before final welding.
- c. In the main bridge girders, in addition to the required full length diaphragms, short diaphragms should be inserted wherever required to transmit the trolley wheel load to the web plates and to limit the maximum stress in the trolley rail to safe permissible limits. All diaphragms must bear against the top flange. Steel plates used for bridge girders and diaphragms should be as per IS:2062.
- d. All fasteners should be hot dip galvanized/stainless steel. All load bearing fasteners should be of high tensile grade, and it should be of reputed make (Unbrako/TVS).
- e. The bridge girders should be connected to the end carriages by large gusset plates. Ground tight fit bolts in reamed holes should be used for bolted connections.
- f. All welds should be subjected to Magna flux or Dye Penetration test.
- g. The girders should be so constructed as to eliminate any possibility of accumulation of water or oil inside them.

### 3i. Trolley frame

- a. The trolley frame should be a rolled steel section, designed to transmit the load to the bridge rails without undue deflection. It should be made rigid by providing suitable diaphragms. The material used should be steel as per IS: 2062
- b. The trolley wheels should be suitable for crane rails. The bearing housing should be designed for easy removal of wheels and bearings for maintenance.
- c. All the mechanical and electrical equipment should be placed above the trolley top plate as far as practicable. For any parts placed below the trolley top plate, access for maintenance, repairs and replacement should be provided.

### 3j. Other important notes for crane

- a. The supplier can also propose crane design to suit all material handling requirements as per this tender document. In such case motorized gantry movement can be replaced with motorized overhead travel along the length of the crane. The supplier should take approval from the purchaser for the

design proposal, detail design calculations, all fabrication and assembly drawings before the fabrication.

- b. Mobile Gantry Crane is used mainly for loading-unloading of Electric Assembly into pressure Chamber. It is also used to handle different components, vacuum chambers etc. of the system
- c. In place of 2.5Ton, a 3Ton hoisting can also be used if 2.5Ton is not available
- d. The crane design should prevent jerks or swing of the load during the operation.
- e. The crane should be compact and easily movable.
- f. The load should be counterbalanced/properly balanced while it is being inserted into the pressure chamber.
- g. Lifting and rigging arrangements should be provided for the electrical assembly along with the crane.
- h. Training programs for operators and maintenance engineers should be provided by the supplier.
- i. Provision should be given to dismantle and safely store it when not in use.
- j. Precise forward-reverse movement should be motorized.
- k. All material and load test certificates should be submitted.

#### 4. Material Handling:

The electrical assembly:

- i) Required to be made in horizontal position
- ii) Required supports have to be generated from the portions where the assembly can take load. i.e in the S.S. flanges as per the orientation specified
- iii) The electrical assembly has to be moved to the required position inside the pressure vessel
- iv) The electrical assembly has to be assembled inside the pressure vessel

#### 5. Important notes:

- i) Electrical assembly has components such as spark gaps, Aluminium return path sheets etc. which cannot take load. Proper arrangement has to be made to protect these components during the material handling
- ii) Perspex (Acrylic) sheets are used in between the vacuum chambers of electrical assembly. The load transmitted to these sheets must be restricted
- iii) There is a specified orientation of electrical assembly inside the pressure chamber. The orientation has to be maintained.

- iv) Requirement of optimization for proper functioning: The fixture supports provided for moving should have smooth movement while assembly. Some of the supports need to be removed after the assembly. The fixture supports provided for the assembly during rest must be able to carry the load. The optimisation has to be done for these fixtures for proper functioning
- v) Re-work: Different support fixtures, moving fixtures, fixtures for resting, assembly fixtures etc. may need to be re-worked as per the handling and assembly conditions to best suit the assembly

6. Acceptance criteria:

- i) Fabrication, supply, testing and installation of 2.5Ton crane as per the specifications
- ii) Successful performance demonstration of the 2.5Ton crane for lifting and movement of electrical assembly
- iii) Fabrication and supply of fixtures for moving, fixtures for rest, supports for lifting.
- iv) Successful performance demonstration of these fixtures and supports
- v) Complete assembly of electrical assembly with the pressure chamber

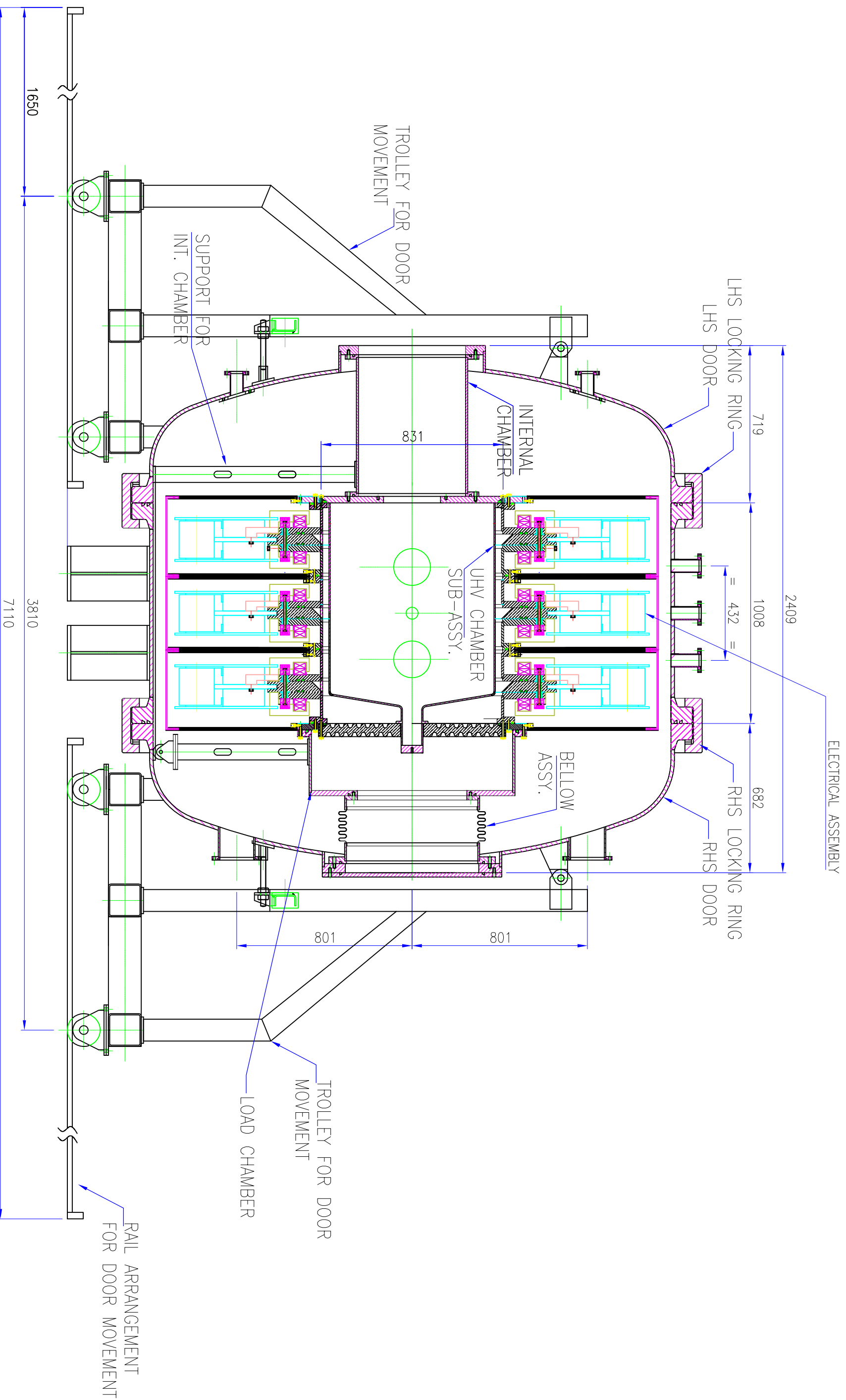


**Check list for the supplier.**

The supplier has to fill this check list and send with the quotation

S.No.	Description	Value (To be filled by supplier)	Suppliers Remarks with Yes or No
1	Design of 2.5Ton crane to fit the space		
	Free space along the width of the crane as given		
	Height of the hook from ground as given		
	Maximum height of crane		
	Hoist for 2.5Ton		
	Crane capacity 2.5Ton		
	Able to move load across the width of the crane		
	Mounting of crane on wheels		
	Gantry Motorized movement along the length. Fine motion along the length of the crane		
	Supply of crane drawings for approval		
	Testing of crane as per the relevant standards		
	Capability of crane to handle electrical assembly		
	Fabrication and supply of fixtures to lift electrical assembly		
	Making of electrical assembly orientation as horizontal		
	Design and fabrication of fixtures for resting the electrical assembly at horizontal position		
	Assembly of central shaft in the electrical assembly in horizontal position		
	Moving the electrical assembly in to the position to assemble with dish end		
	Arranging the proper support fixtures (it includes design and fabrication) while assembly with dish end		
	Dismantling the Aluminium sheets and bricks of cavity-1 for easy assembly of electrical assembly with dish end. Again assembling the cavity-1		

	Assembling the end support and diagnostic chamber with electrical assembly		
	Arranging proper support to electrical assembly while moving inside		
	Design of fixtures for support inside the pressure chamber. These fixtures will have the combination of non-metal and metal. They should properly support and the electrical assembly should be able to move freely inside the pressure chamber		
	Assembly of electrical cables, diagnostics with the pressure chamber		
	Making the Aluminium support plates, similar to existing design at cavity-3 to suit the new length		
	Assembly at RHS dish end		
	Repeating the assembly, dismantling procedures 2-3 times to make suitable for running		
	The vendor has understood the complete mechanical assembly of the existing system. The work will be carried out under the supervision of Department.		



ASSEMBLY OF ELECTRICAL ASSEMBLY WITH PRESSURE CHAMBER