

INSTITUTE FOR PLASMA RESEARCH

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MINOR FABRICATION WORKS ENQUIRY

Office Copy

ENQUIRY NO :IPR/MFW/19-20/54

Date : 16-10-2019

Due Date : 31-10-2019 13:00 IST

Please send your offer in sealed envelope specifying Inquiry No, Date & Due Date, ALONG WITH your credentials for the following items:

Important Note:

Please note that e-mail quotations are not acceptable however you may send your queries (if any) to **doshi@ipr.res.in**

Please Ensure that your sealed quotation reaches this office not later than above mentioned due date and time.

Kindly go through the following document properly before Quoting which are available on the IPR web portal i.e., <http://www.ipr.res.in/documents/tenders.html/> attached here with.

1. Technical specification as enclosed.
2. Instruction to the bidders & terms and Condition (refer Form NO:**IPR-MFW-01-V1**)
3. Bidding format(refer Biddingformat MFW-Bid.pdf)

GST fro Goods and Services (IGST/CGST/SGST TAX BENEFITS): PLEASE REFER clause no:8 of Form No:**IPR-MFW-01-V1**

QUOTATION SHOULD BE ADDRESSED TO **B. R. DOSHI** ONLY.

Sr.No.	Description	Quantity	Rate
1	Work contract for integration of PF#3 current leads and associated sub-system with current feeder chamber at IPR site, as per IPR specifications.	1	No.

Free Issue Material

Sr.No.	Description	Quantity	Unit	Value
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Note : Please quote with complete technical details (Technical Compliance sheet and product data sheet)

Encl:As per attachment

Sd/-
B. R. DOSHI
Scientific Officer-G

Work contract for integration of PF#3 current leads and associated sub-system with current feeder chamber at IPR site, as per IPR specifications.

Contents:

- 1.0 Introduction**
- 2.0 Scope of Works**
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- 5.0 Inspection/Testing/Acceptance Criteria**
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- 7.0 Hardware/ material requirements**
- 8.0 Annexures and applicable drawings:**

01. INTRODUCTION:

The current feeder system (CFS) of SST-1 is a vacuum chamber to house current leads of superconducting Toroidal and Poloidal field (TF&PF) magnets. In addition to the existing one pair of TF current leads, it is planned to integrate two pair of current leads for top and bottom PF#3 coils. In order to carry out this task, top and bottom PF ducts ends in CFS chamber requires to be modified. These modifications are required to connect PF#3 coils current leads with its terminal bus-bars and necessary interconnecting pips, tubes fitting, welding, leak testing, insulation and installation of necessary supports. These connections will facilitate the electrical charging of PF#3 coils. This work contract includes cutting of existing PF ducts ends tubes, integration current leads bus-bars, new tubes fitting, welding, leak testing, insulation and installation of current leads supports inside the current feeder chamber at IPR cryogenic hall site, as per the drawings, instructions and supervision by IPR engineer-in charge.

02. SCOPE OF WORK:

The contractor will execute the job at IPR site under the strict supervision of IPR engineer-in charge. Contractor is completely responsible to execute the job within the contract period. Contractor shall provide adequate trained and qualified manpower (welder/s, Fitters, helpers etc.) along with all the equipment, tools and tackles necessary to complete the tasks. The major scope of works includes the following:

1. Removal of electrical connections, electrical feed through from top and bottom duct as shown in figure 1 of annexure-1 and 2.
2. Separation of PF#3 and PF#5 hydraulics connections at appropriate location as shown in figure 2 of annexure-1 and 2. Removal of feed through along with PF#3 and PF#5 hydraulics.
3. Removal of both front caps of the ducts. (Task involve lifting and handling work, necessary lifting and handling arrangement shall be made by contractor) as shown in figure 2 of annexure-1 and 2.
4. Removal of both (top/bottom) middle ducts as shown in figure 3 of annexure-1 and 2.
5. Removal of G-10 supports from the middle part of the duct as shown in figure 4 of annexure-1 and 2.
6. Identification of PF#3 CICC inside the duct and assessment for joint preparation as shown in figure 5 of annexure-1 and 2.
7. Removal of PF#3 hydraulics and preparation of PF#3 CICC for making joints. Separate bottom container of LHe section of PF#3 current lead to facilities insertion of duct parts after completion of joints.

8. Bending of CICC in the required profile, preparation of joints terminations as shown in figure 6 of annexure-1 and 2, and preparation of 2 pairs of joints for PF#3 top and bottom. Installation of joint's voltage taps and sensors. (This task will be executed by IPR)
9. After making of PF#3 joints, middle of the ducts needs to be installed (may need some modification or replacement with another bigger diameter chamber).
10. Removal of end plate of end cap to facilities insertion. Insert end cap without plate in position.
11. At end plate, necessary provision shall be made for PF#3 CICC to come out at bus duct cap. Shearing/cutting of the end plate in two halves to facilities insertion of plate after joint has been made. Welding of end plate at desired orientation.
12. Installation of vacuum break (which was inserted on CICC at current leads end before making of joints) in between cap and CICC and feed through for PF#3 magnets.
13. Welding of current lead bottom container (may be with new cylinder) with respective current lead. Electrical and hydraulic connection of PF#3 top and bottom terminals with respective current leads.
14. Re-connection of PF#5 hydraulics along with Johnston feed through within the current lead chamber.
15. Hydraulic connection of current leads with existing PF#3 lines inside current lead chamber.
16. Compatible PS and layout / connections at the top of the current lead chamber.
17. Welding of GHe return network with RT electrical breaks, flow meters, EP valves, hand valves and DPT tubes as shown in figure 7 of annexure-2.
18. Contractor will also assist IPR representatives during electrical insulation of bus-bars and current leads.

Note:

1. **The work executed by the contractor will be tested for its qualification like Helium leak testing, electrical isolation testing etc. at different stages. The accessories required for the testing will be prepared by the contractor as per guidelines provided by the IPR Engineer in charge. Contractor will also assist during leak and electrical testing.**
2. **IPR will provide the filler rods only for welding associated with cryogenic temperature, rest all TIG welding with (308L) filler rod should be provided by contractor.**

Instructions to Contractor:

- Above listed tasks (indicative) of the works are to be carried out by contractor as per technical specifications under strict IPR's supervision and guidance.
- Any equipment, tools, fixtures, jigs, temporary supports etc., required for executing the above-mentioned works, would be designed/fabricated by contractor.
- Contractor is responsible to carry out all the activities like cutting, bending (minimum ovality, wrinkle free pipe/tube bends), layout of pipe within available space, TIG welding, cleaning, buffing etc. The required machines (e.g. TIG welding, cutting, bending, grinding etc.), tools (e.g. spanners, hacksaw etc.), consumables (e.g. gases, cutting wheels etc.) etc. will be provided by the contractor only. IPR will not provide any machines, consumables, tools etc.
- Contractor shall perform the zero defect weld joints, however if joint fails in leak testing, contractor shall rework the joint with removal of the defective joints up to the root and re do the joint and ensure that it passes in leak testing.
- Contractor has to carry out few minor works like welding of small pipes etc., which are required to execute the job.
- The contractor should appoint one supervisor who will interact with IPR Engineer in charge, to properly manage and guide the manpower as per the guidelines. The supervisor should be capable to understand the technical specifications, drawings etc.
- Contractor is advised to have some spare machines and consumables to maintain the continuity in case some equipment/machine fails.
- Welder's qualification will be done by IPR Quality engineer before starting welding work.

03. WORKS PROCEDURE /GUIDELINES

- List of defined works to be carried out by contractor as per technical detail & drawings/sketches and under IPR's supervision and guidance
- Contractor should provide required manpower, machine tools, and equipment services at IPR.
- Contractor will discuss with IPR authority for the fabrication methodology, and will give complete breakup of activities, facilities to be used and time schedule. For any required deviation from this established procedure, prior permission of IPR is a must.
- Necessary precautions shall be taken to ensure the safety of the equipment and personnel working on the task

4.0 PERIOD OF WORK COMPLETION

The present task is very critical for the SST1 project schedule. Timely completion of the contract is very much essential. The period of completion for the work contract is within **three months** from the date of work order (Early completion is preferred). The contractor is responsible to provide sufficient manpower (e.g. welder, fitter etc.) with all the machinery to execute within the time period as mentioned. All necessary arrangements should be made to guarantee the execution in defined time period.

5.0 ACCEPTANCE CRITERIA

Different kinds of tests will be done by IPR personnel to qualify the work executed, in the presence of contractor. The tests may be

- Visual inspection of components for any defects, flaws etc.
- Helium leak testing for welded, flange joints (All joints must be helium leak tested for the sensitivity of $\leq 5 \times 10^{-6}$ mbar liter/sec under Sniffer mode at 300 K at service condition)
- Thermal & Electrical Isolation/shorting checks (multi-meter, megger testing up to 5 kV) of related sub-systems/components

6.0 FACILITIES AVAILABLE AT SITE

1. Water / compressed air / electric power supply
2. Overhead crane in Cryogenic Hall.
3. Helium leak detector
4. Megger & multi-meter for electrical isolation tests

7.0 HARDWARE/ MATERIAL REQUIREMENTS

All the hardware/materials required for hydraulic connections for current leads, flanges and top and bottom ducts etc. will be provided by IPR.

8.0 ANNEXURES AND APPLICABLE DRAWINGS:

Annexure -1

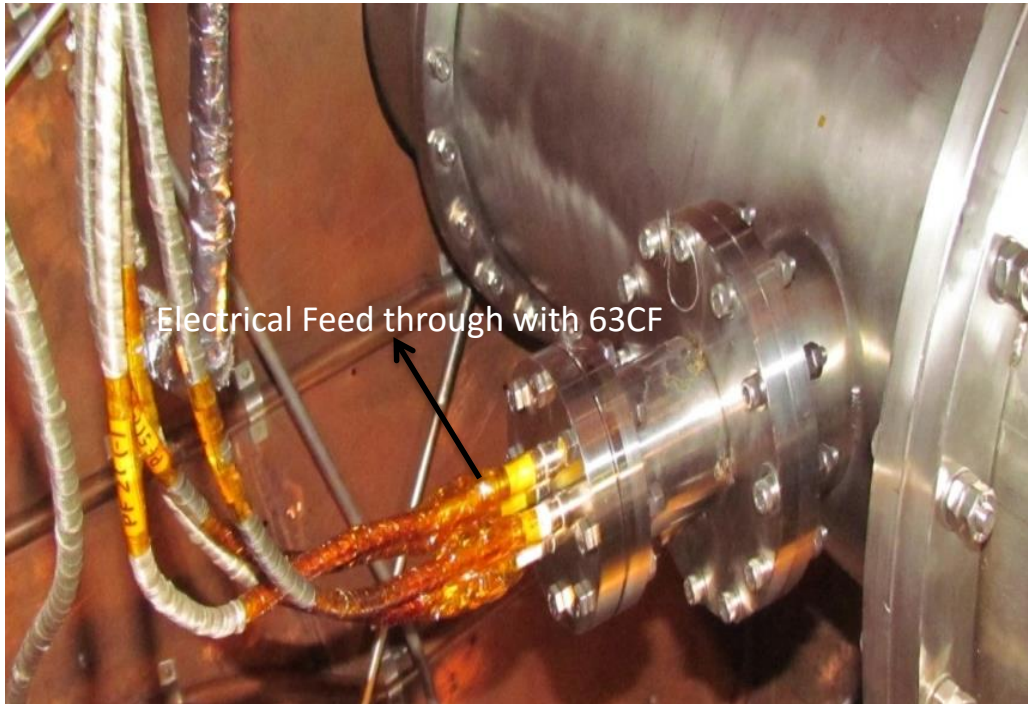


Figure-1 Electrical feed through with 63 CF extended connector at bottom duct

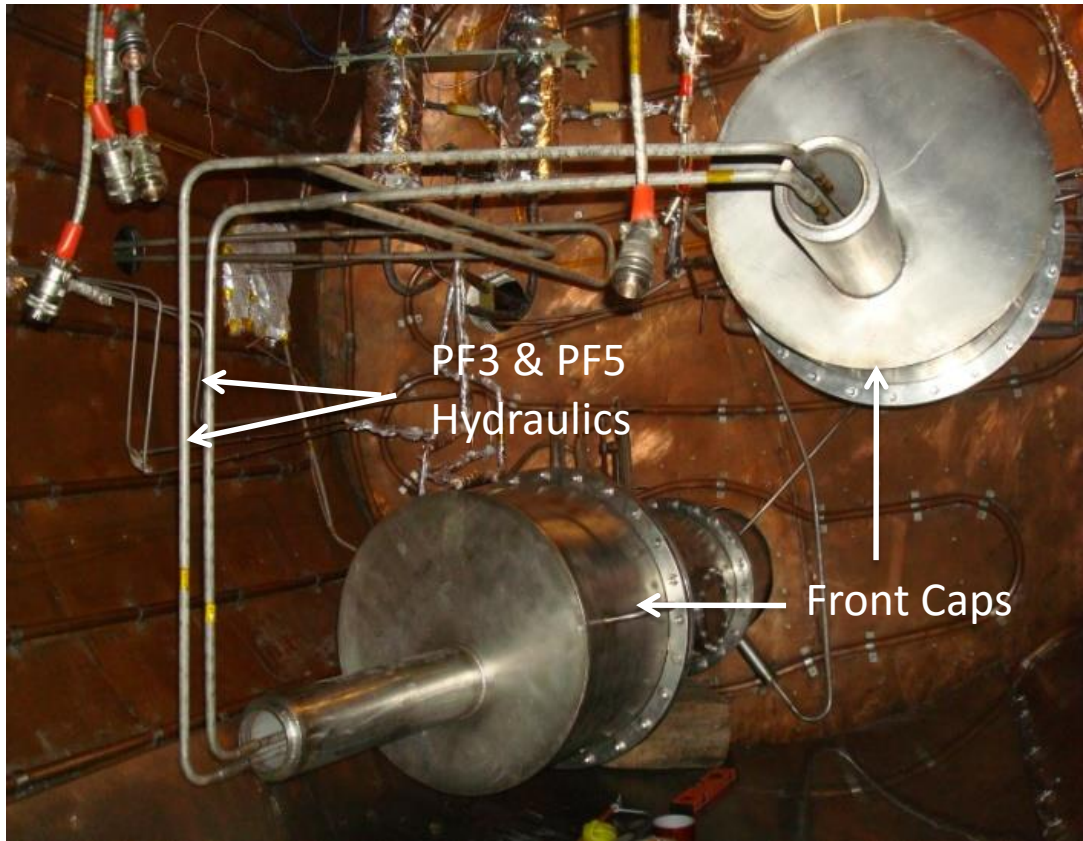


Figure-2 Hydraulic connections of PF#3and 5 with front side caps



Figure-3 Top and bottom middle ducts inside CFS chamber



Figure-4 Separation of PF hydraulic paths using G10 supports

Annexure -2

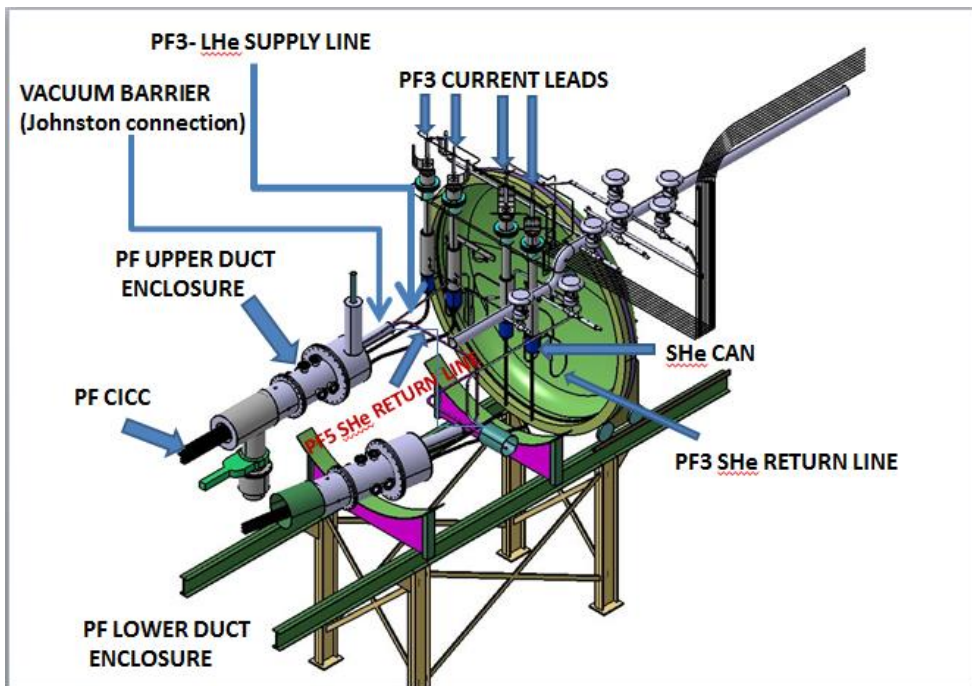


Figure-5 Planned inside view of current feeder

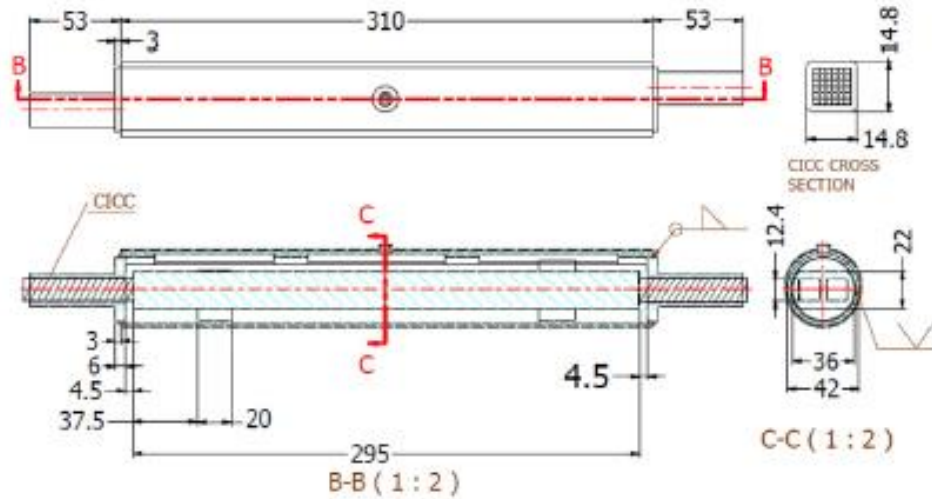


Figure-6 Shake hand type PF#3 bus-bar joints

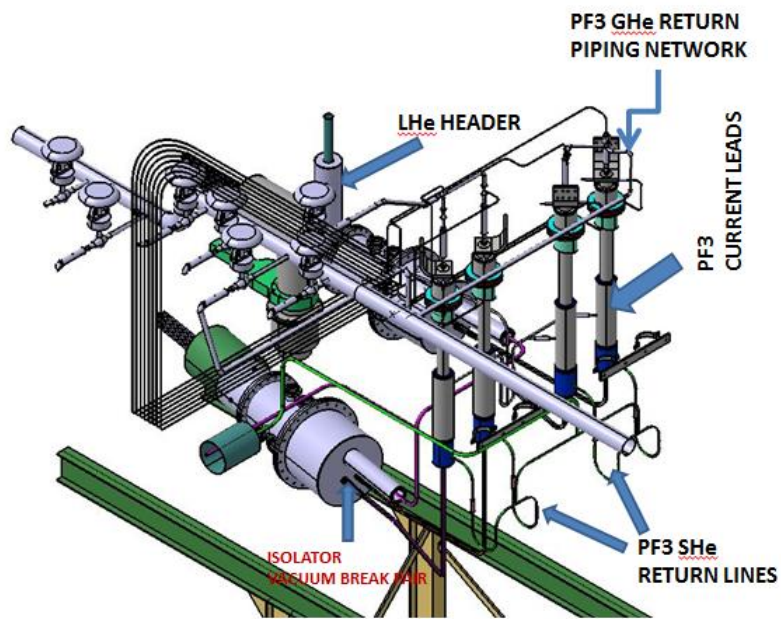


Figure-7 Piping network of PF#3TB bus-bars and current leads

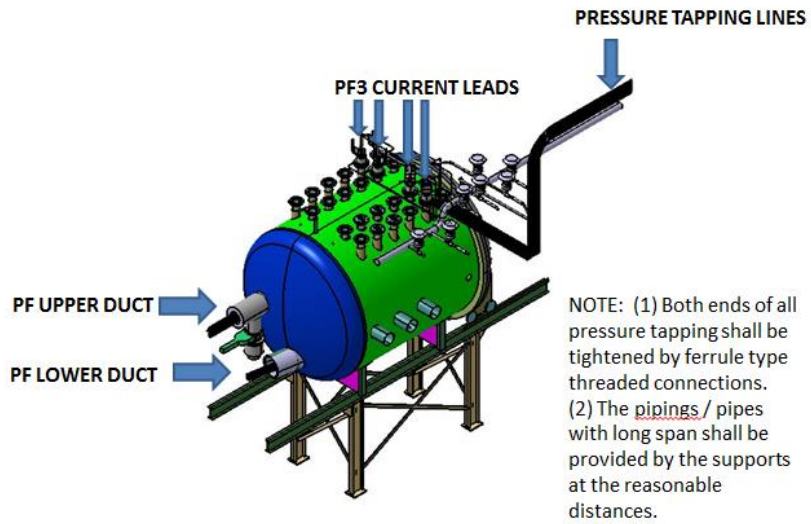


Figure-8 External tubing connections