

PRIOR INFORMATION NOTICE (PIN)

IO/22/OT/10024325/LLU

Cryostat electrical feedthrough final design and manufacture

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Abstract.

The purpose of this PIN is to provide prior notification of the IO's intention to launch a competitive Open Tender process in the coming weeks. This PIN provides some basic information about the ITER Organisation (the "IO"), the technical scope for this tender, and details of the tender process.

1 Introduction

This Prior Information Notice (PIN) is the first step of an Open Tender Procedure leading to the award and execution of a services and supply Contract.

The purpose of this document is to provide a basic summary of the technical content in terms of the scope of work, and the tendering process.

2 Background

The ITER project is an international research and development project jointly funded by its seven Members being, the European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA. ITER is being constructed in Europe at St. Paul–Lez–Durance in southern France, which is also the location of the headquarters (HQ) of the ITER Organization (IO).

For a complete description of the ITER Project, covering both organizational and technical aspects of the Project, visit www.iter.org.

3 Scope of Service

3.1 Introduction to the Cryostat Electrical Feedthroughs

Diagnostics are a critical part of the operation of ITER. They provide the means to observe, control and sustain the plasma performance over long timescales. ITER will operate with a plasma current in the region of 15 MA and toroidal fields of 5 T. The pulse lengths will be in the region of 500 s typically and will extend up to several thousand seconds during more advanced operation. A key objective of this device is $Q=10$ operation. This means that a typical fusion power of 500 MW will be provided for 50 MW input.

The ITER load assembly requires instrumentation for monitoring all aspects of the performance of the plant and to ensure that the goals of the experiment are met and quantified accurately and verifiably. Diagnostic transducers monitoring the plasma parameters and the state of the load assembly are distributed inside the Vacuum Vessel and on its outer surface, inside the cryostat. The exterior of the ITER Vacuum Vessel includes various magnetic steady-state sensors, pick up coils and flux loops for the measurement of plasma performance. The signals from these sensors are transmitted through the cryostat vacuum boundary via Electrical Feedthroughs (EFTs) adjacent to each of the vessel's 9 sectors.

A simplified breakdown of the functions which shall be satisfied by each EFT is presented in Figure 1 (note that *F.xxx* corresponds to the function or sub-function identifier).

- F.1 To connect Ex-vessel magnetic diagnostic components to Ex-Vessel services
 - F.10 To connect the sensors to Ex-Vessel
 - F.100 To ensure good contacts (cable-to-cable, cable-to-sensor tail)
 - F.101 To provide technical characteristics given by the customer
 - F.102 To minimize EM nuisances
 - F.11 To maintain the integrity of signals
 - F.110 To protect the connectors from mechanical contact of other In-Cryostat components
 - F.111 To establish good thermal conduction path to the Cryostat skin
 - F.112 To ensure good mechanical anchoring to the Feedthrough body
 - F.12 To maintain structural integrity
 - F.120 To withstand In-Cryostat environmental conditions
 - F.121 To withstand thermal, EM, nuclear, seismic and gravity loads
 - F.122 To withstand VV displacements, both thermal and dynamic
 - F.13 To seal the primary vacuum at Lower Cryostat
 - F.131 To close Cryostat Vacuum from Interspace atmosphere
 - F.132 To interface with Lower Cryostat
 - F.133 To interface to the Service Vacuum monitoring System (SVS) in order to identify any leaks

Figure 1 Simplified functional breakdown to be satisfied by each EFT

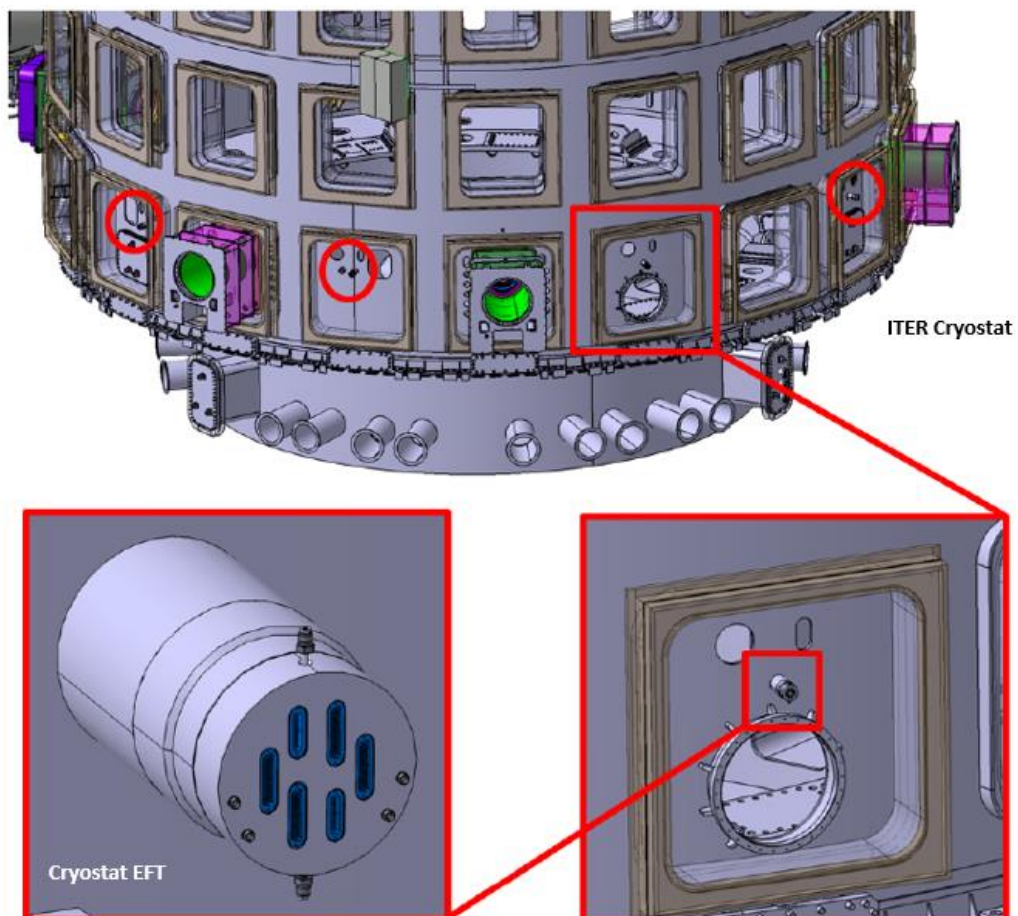


Figure 2 Overview of the ITER Cryostat and the Cryostat Electrical Feedthroughs

The key features of the preliminary design include:

- A fully welded 304L stainless steel containment based around standard plate where possible, welded to the cryostat stub (DN 200 Schedule 80 pipe stub).
- A double vacuum boundary, leak tight to 1×10^{-9} Pa.m³.s⁻¹ air equivalent (or 2.69×10^{-9} Pa.m³.s⁻¹ He equivalent), with an interspace connected to the Service Vacuum monitoring System.
- Commercially available sealed UHV vacuum feedthrough elements (based on the sub-D international standards in the preliminary design), will be used to provide the electrical connections to the diagnostic systems.
- For cable connections to the feedthroughs metal bodied plugs will be used including spring latch lock fixings to allow rapid connection/disconnection. All conductors will be crimped to female pins and mounted in PEEK insulated bodies.
- N-Type feedthroughs are required for thermocouple signals to ensure the required accuracy.
- The internal wiring is commercially available polyimide insulated wires/cables, with screens.
- A full penetration butt weld is required for installation of EFT to the cryostat stub, for which proper weld preparation and subsequent inspection/Non-Destructive Testing is needed.

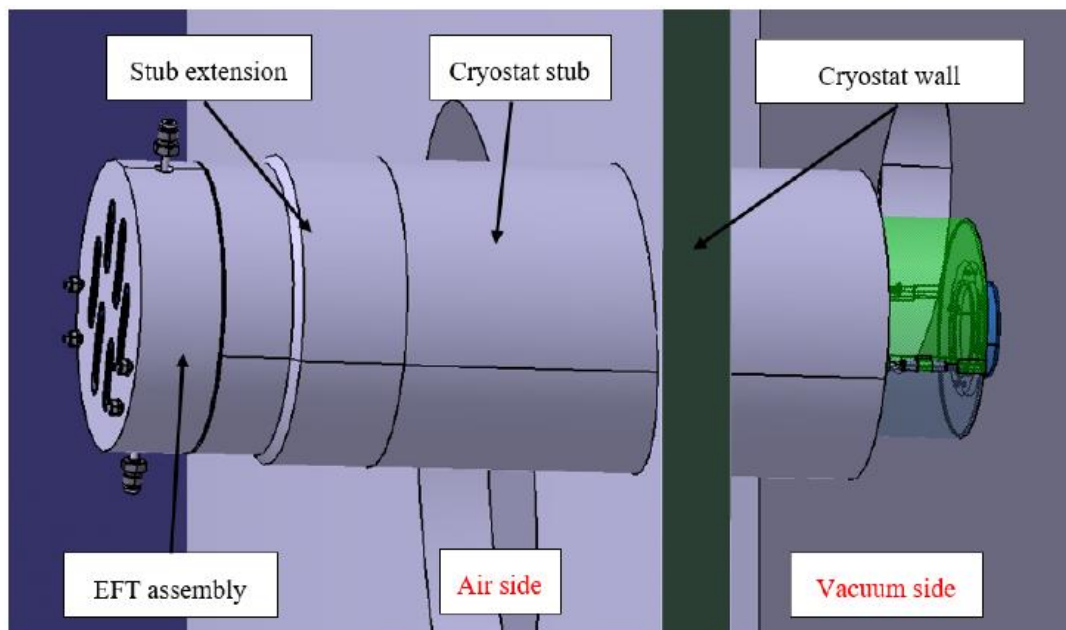


Figure 3 Side view of the Cryostat Electrical Feedthrough (as installed)

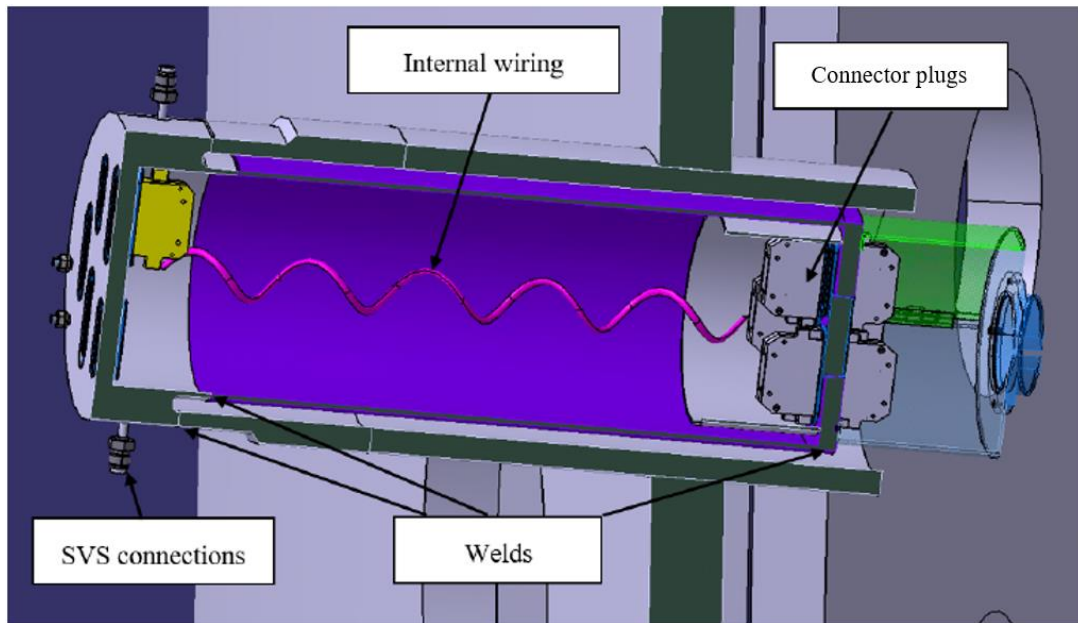


Figure 4 Section view of the Cryostat Electrical Feedthrough (as installed)

3.2 Scope of this contract

The scope of this Contract titled “Cryostat electrical feedthrough final design and manufacture” relates to the Electrical Feedthroughs (EFT) on the Cryostat boundary.

The design presented at the Preliminary Design Review (PDR) needs to be further developed and constructability studies need to be performed leading to a Final Design Review which will endorse the design. This will be followed by the manufacturing and delivery to IO of 10 (ten) EFT units.

In summary, the Contract includes three main phases:

- Final Design development and review, including assessment of the input technical requirements, development of a design solution meeting those requirements, modification/creation of 3D models and documentation as input to the Final Design Review (FDR)
- Prototyping and testing of the proposed final design, to gain feedback and inform subsequent design modifications if required
- Manufacturing of the EFT units, based on the design endorsed at the FDR

The ITER Organization will prepare a Technical Specification for the work to be performed, which will include the detailed requirements, specific scope, the organization of the task and a description of the deliverables.

4 Procurement Objective & Process

The objective is to award a Contract through a competitive bidding process.

The procedure is comprised of the following four main steps:

- Step 1- Prior Information Notice (PIN) to be published on the IO Webpage and that of the DAs

The Prior Information Notice is the first stage of the process. The IO formally invites interested candidate companies to indicate their interest in the competitive process,

within **10 working days**, by returning to the Procurement officer in charge the following information by the date indicated under paragraph 5 below:

- Name of candidate company
- Country of registration
- Point of contact name, email, title, and phone number.

Special attention:

Interested candidate companies are kindly requested to register in the IO Ariba e-procurement tool called “IPROC”, if not so done yet. The process for how to do this is described at the following link: <https://www.iter.org/fr/proc/overview>.

When registering in Ariba (IPROC), candidate suppliers are kindly requested to register at least one contact person. This contact person will be receiving the notification of publication of the Request for Proposal and will then be able to forward the tender documents to colleagues if deemed necessary.

➤ Step 2 - Request for Proposals

After the full registration of interested candidate companies, the Request for Proposals (RFP) will be published in “IPROC”. This stage allows interested candidate companies who have indicated their interest to the Procurement Officer in charge AND who have registered in IPROC to receive the notification that the RFP is published. They will then prepare and submit their proposals in accordance with the tender instructions detailed in the RFP.

Only companies registered in this tool will be invited to the tender and a registered company can only submit a proposal in their name or as the leading entity of a consortium for this tender.

➤ Step 3 – Tender Evaluation Process

Tenderers proposals will be evaluated by an impartial evaluation committee of the IO. Tenderers must provide details demonstrating their technical compliance to perform the work in line with the technical scope and in accordance with the particular criteria listed in the RFP.

➤ Step 4 – Contract Award

The award will be done on the basis of best value for money or lowest price technically compliant offer as described in the published RFP.

5 Procurement Timetable

The tentative timetable is as follows:

Milestone	Date
Publication of the Prior Indicative Notice (PIN) on the IO Webpage and communications with DAs	2 September 2022
Deadline for Submission of expression of interest form	16 September 2022
Request for Proposals (RFP) publishing on IPROC	30 September 2022
Tender Submission in IPROC	11 November 2022
Tender Evaluation & Contract Award	09 December 2022
Contract Signature	End of December 2022
Contract Commencement	January 2023

6 Contract Duration and Execution

The estimated contract duration shall be 36 months.

7 Experience

The tenderers shall demonstrate their knowledge, experience and capabilities in the implementation of Services and Supplies in accordance with the IO technical requirements in English.

The working language of ITER is English, and a fluent professional level is required (spoken and written).

8 Candidature

Participation is open to all legal entities participating either individually or in a grouping/consortium. A legal entity is a company or organization that has legal rights and obligations and is established within an ITER Member State.

Legal entities cannot participate individually or as a consortium partner in more than one application or tender of the same contract. A consortium may be a permanent, legally established grouping, or a grouping which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization.

In order for a consortium to be acceptable, the individual legal entities included therein shall have nominated a leader with authority to bind each member of the consortium, and this leader shall be authorised to incur liabilities and receive instructions for and on behalf of each member of the consortium.

It is expected that the designated consortium leader will explain the composition of the consortium members in its offer. Following this, the Candidate's composition must not be modified without notifying the ITER Organization of any changes. Evidence of any such authorisation shall be submitted to the IO in due course in the form of a power of attorney signed by legally authorised signatories of all the consortium members.

Any consortium member shall be registered in IPROC.

9 Sub-contracting Rules

Subcontracting means that the Contractor has entered into a contract with a third party to execute a specified portion of the scope of this tender. Procurement of raw materials and/or off the-shelf products will not be considered as subcontracting.

The maximum percentage of sub-contracting is 30 % of the total contract price.

All sub-contractors who will be taken on by the Contractor shall be declared with the tender submission in IPROC. Each sub-contractor will be required to complete and sign forms including technical and administrative information which shall be submitted to the IO by the tenderer as part of its tender.

The IO reserves the right to approve (or disapprove) any sub-contractor which was not notified in the tender and request a copy of the sub-contracting agreement between the tenderer and its subcontractor(s). Rules on sub-contracting are indicated in the RFP itself.