TECHNICAL SUMMARY

Call For Nomination

IO/19/CFT/70000476LLJ

Diagnostics First Wall Manufacture

1 Scope

A key aspect of the research program of ITER is the diagnosis of the plasma and the first-wall, e.g. the plasma temperature, density, radiative properties, first-wall resilience, etc. For this purpose, a large number of different types of diagnostic equipment peer into the ITER vacuum vessel from many different vantage points.

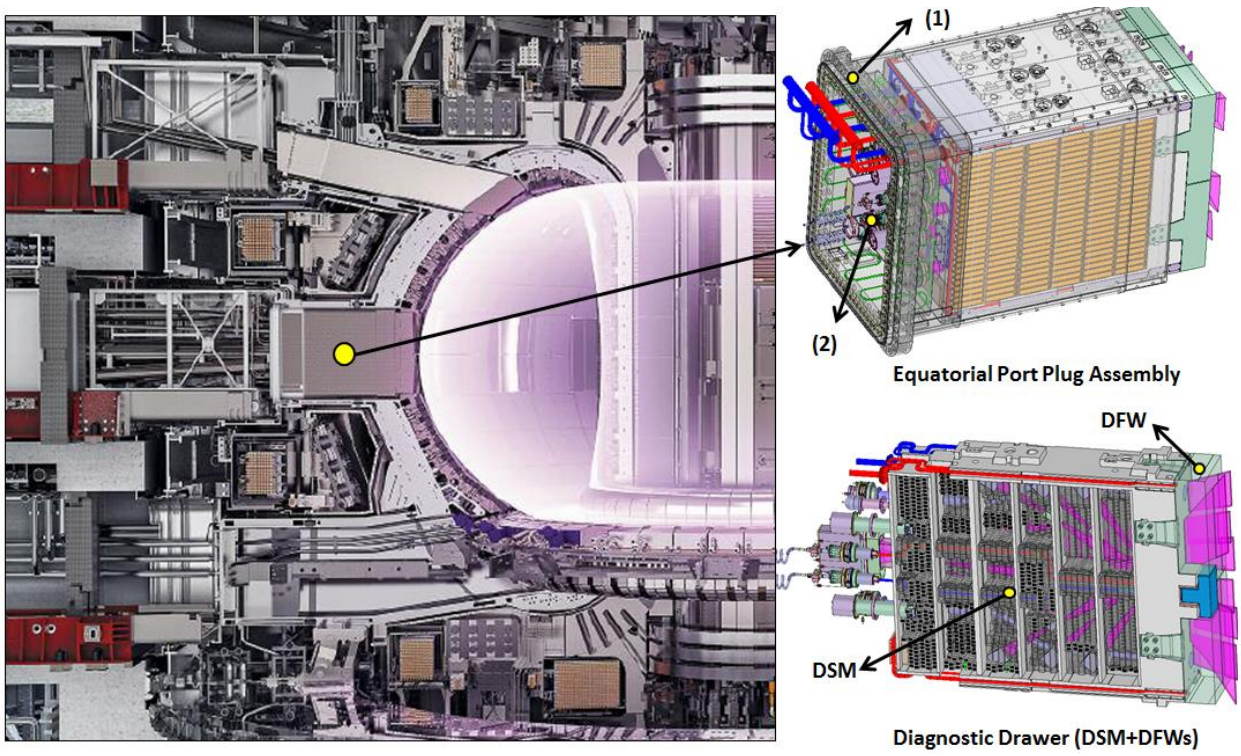

Figure 1: Location of Diagnostic Port Plug in the ITER Tokamak Machine.

In ITER many diagnostics are inserted through port plug (Figure 1) for diagnose the plasma temperature, density, radiative properties, first-wall resilience, etc. The diagnostic instruments and components are sensitive for high heat load, neutron damage, transient electromagnetic field, coating by dust and metallic vapour deposition, etc. For this purpose, on each port plug a DFW is installed for protecting diagnostic instruments and components from heat load, high plasma disruption loads, neutrons and deposits.

The scope of this contract is the manufacturing and supply of Diagnostic First Walls for all Diagnostic Equatorial (including 1 extra set for a port for the Disruption Mitigation System) and Upper port plugs installed in the ITER Tokamak.

2 Estimated Duration

The Contract is scheduled to come into force in the 2nd quarter of 2020. The procurement is foreseen in 4 several batches until mid-2024. The Framework Contract will cover a fixed term of 4 years with an option of extension of 2 years.

A tentative time table of the contract award is outlined as follows:

Call for Nomination release	23 July 2019
Receipt of nominations	15 of August, 2019
Issue of Pre-Qualification Questionnaire	**End of August, 2019**
Clarification questions related to the PQQ (if any)	
Response to Questions from ITER Organization	
Receipt of Prequalification Application	End of September, 2019
Notification of Prequalification results	End of October, 2019
Issue of Call for Tender	**Beginning of November, 2019**
Clarification questions related to this Call for Tender	
Response to Questions from ITER Organization	
Tender Proposals Due Date:	**Beginning of January, 2020**
Tender Evaluation & Notification of results	Beginning of April, 2020
Estimated Contract Award Date:	**Beginning of May, 2020**
Estimated Contract Start Date:	**Beginning of June 2020**

3 Work Description

3.1 Description of the system

The diagnostic Equatorial Port Plugs (EPP), see Figure 2, are components which serve as common platforms for a variety of diagnostics systems. Diagnostic equipment and shielding are integrated together into three cassettes known as “Diagnostic Shielding Modules” (DSM) which, in turn, are attached to the EPP structure that is part of the ITER VV confinement barrier. Diagnostic Shielding Modules are protected from plasma effects by the Diagnostic First Walls, the subject of this contract.

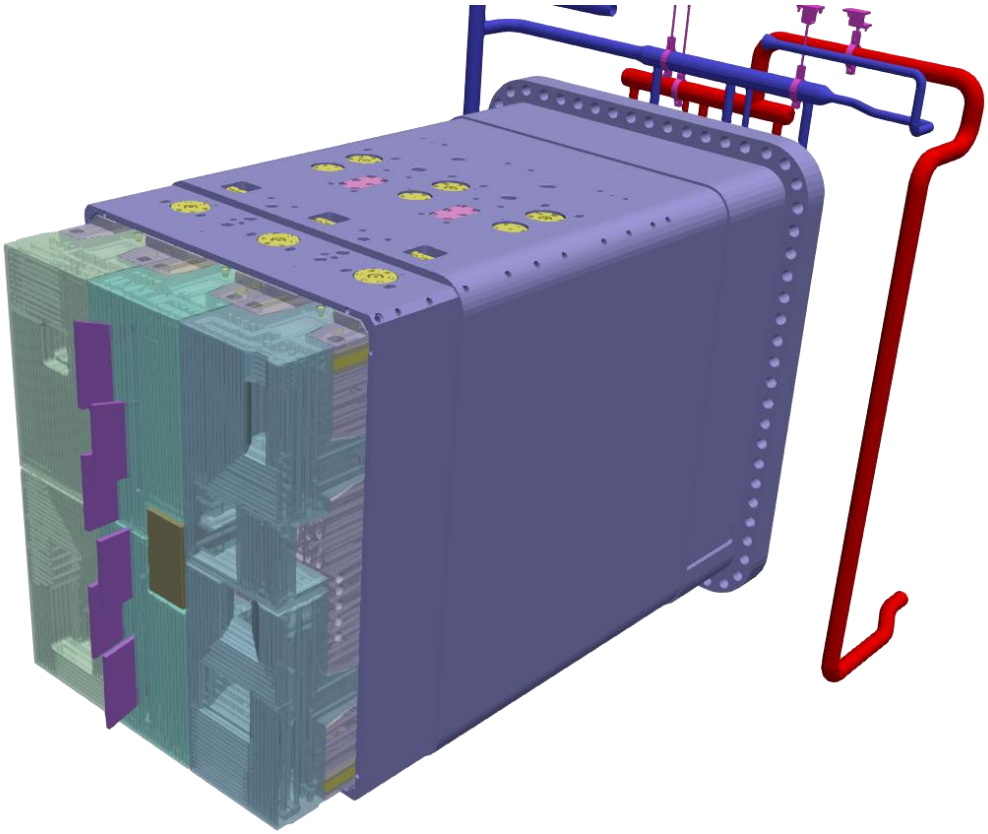

Figure 2: Typical configuration of a Diagnostic Equatorial Port Plug (DFWs in the front part).

DFWs are basically forged blocks made of austenitic stainless steel grade 319L with low content of Co and other impurities critical to the activation due to neutron flux. Since they are elements exposed to the high temperatures derived from the interaction with the plasma, they incorporate an extensive cooling network made of drilled channels configuring the cooling circuit with one inlet and one outlet.

The internal cooling circuit is implemented by drilling from the outside of the shield block; therefore, a number of water boxes and welded plugs are required for completing the circuit. As part of the manufacturing assessment of the component completed during the design stage, the feasibility of specific welding procedures based on TIG (Tungsten Inert Gas Welding) and PAW (Plasma Arc Welding) has been demonstrated.

DFWs are attached to the DSMs through three tabs that are bolted to the front part of the DSM.

Attachment tabs are actively cooled as well which in general will require that part of the tab is welded to the DFW body.

Finally, the inlet and outlet stubs for the cooling pipes are connected to the DFW cooling pipes which are considered as part of the scope as well.

The typical (dry) weight of an EDFW is between 650 and 850 kg depending on the level of customization. UDFWs weight is in general about 1.5 more than EDFWs.

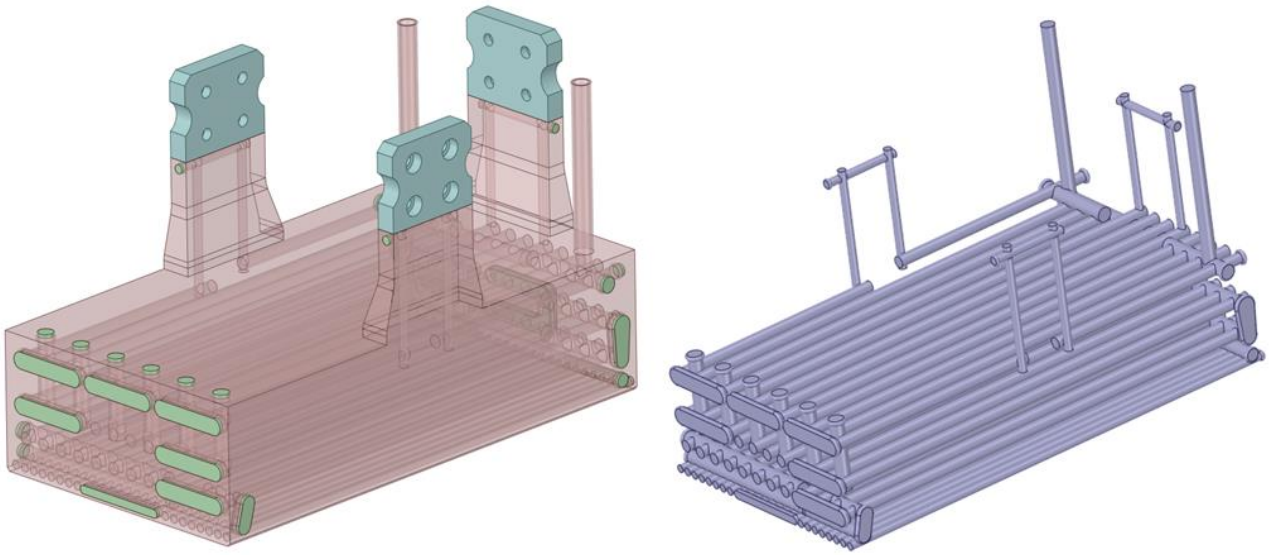

Figure 3: Generic Equatorial DFW and cooling circuit inside (actual items will be customized including penetrations and cut-out for the different diagnostic systems).

Figure 4: Manufacturing techniques successfully developed.

3.2 Details of expected output

This framework contract covers the manufacturing and supply of 76 customized DFWs for diagnostic systems (48 EDFWs and 28 UDFWs). Each EPP has 6 DFW blocks and each UPP has 2 DFW blocks. It shall cover:

- The manufacturing design of all the items (82 DFWs) in the scope
- The manufacturing of the DFWs

- The Factory Acceptance Tests (including pressure, flow, draining/drying, dimensional and hot-cold He leak testing).
- Shipment to Port Integrators premises.

4 Specific requirements and conditions

The acceptance criteria for the selection of the tender cover a broad range as listed below.

- Experience in the following areas shall be demonstrated by the supplier.
  - Precision stainless steel construction and fabrication,
  - Machining of big stainless steel components including gun-drilling,
  - Welding stainless steel (manual and automatic);TIG, PAW (Electron beam advisable),
  - Non-Destructive Testing and examination (Visual, die-penetrant, X-Ray and Ultrasonic testing),
  - Capability to conduct acceptance testing of final components (Pressure, draining/drying, flow, hot/cold helium leak testing),
  - Manufacturing under pressure vessel codes and standards,
  - Manufacturing under tight cleaning requirements (vacuum and ultra-high vacuum components).

- The bidder shall provide customer reference world-wide, where he has executed similar tasks in the past. Customer references & Purchase orders shall be attached along with the bid.
- Management of the quality assurance: The contractor shall demonstrate the ability to implement a quality plan relevant with respect to the manufacture of nuclear equipment.
- Manufacture and testing facilities: The contractor shall have manufacture and testing facilities relevant for the manufacture of large structures intended for use in very high vacuum conditions.
- Bidder should demonstrate adequate video conferencing facility at their site for remote meetings/discussions.
- As the working language of ITER Organization is English so all deliverables shall be provided in English language only. The bidders shall have English speaking persons who should involve in this task who can discuss/communicate in English in various periodic meetings.

The CV of the persons, who will be later involved in the execution of the task orders, may be requested with the tender.