

Technical Specifications (In-Cash Procurement)

CFE - Remote refurbishment of diagnostic integrated ports and tenants

The objective of this engineering contract is to provide the study for the remote refurbishment of port-based diagnostic systems, including common structures such as integrated port plugs and diagnostic racks, as well as diagnostic systems, Disruption Mitigation System, Glow Discharge Cleaning System and services hosted by the port plugs. The ports and their systems have to be integrated within tokamak complex. In-port plug components (which operate inside primary vacuum) have to be replaced, ...

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1 Purpose

The objective of this engineering contract is to provide the study for the remote refurbishment of port-based diagnostic systems, including common structures such as integrated port plugs and diagnostic racks, as well as diagnostic systems, Disruption Mitigation System, Glow Discharge Cleaning System and services hosted by the port plugs. The ports and their systems have to be integrated within tokamak complex. In-port plug components (which operate inside primary vacuum) have to be replaced, to be maintained and to withstand the operational and maintenance loads, and to minimize worker's exposure and refurbishment time during maintenance period by introduction of dedicated remote maintenance tools.

2 Scope

The work involves the support the ITER Diagnostic Team in definition of remote refurbishment tasks for in-port diagnostic components, as well as DMS system, including tooling design for Remote Handling end-effector equipment.

3 Definitions

CM	Configuration Model
DA	Domestic Agency
DM	Detailed Model
FDR	Final Design Review
RH	Remote Handling
IDM	ITER Document Management
IO	ITER Organization
IO-TRO	ITER Organization Technical Responsible Officer
PBS	Plant Breakdown Structure
PDR	Preliminary Design Review

For a complete list of ITER abbreviations see: [ITER Abbreviations \(ITER_D_2MU6W5\)](#).

4 References

[1] V.S. Udintsev et al, "Final Design of the Generic Equatorial Port Plug Structure for ITER Diagnostic Systems", [Fusion Engineering and Design](#) 2015

5 Estimated Duration

The duration shall be for 12 months from the starting date of the task order. Services are to be provided at about 50% time at the IO work site, with visits on-site for meeting as and when necessary and requested by IO. No provisions for travel are necessary.

6 Work Description

During ITER operation, the in-vacuum parts of Diagnostic Ports are removed from the tokamak and delivered to the Hot Cell Facility for refurbishment using the Remote Handling Cask System. After cleaning, it is then passed on a trolley into the maintenance area to either a

refurbishment station or a buffer storage area. This is a “red” zone, where no human access is allowed due to the high contamination (Tritium and Beryllium) and radiation levels. Port plug maintenance will generally consist of replacement of damaged or malfunctioning components plus simple operations, such as cleaning, adjustment, and minor refurbishment. The Diagnostic Shield Module/ Diagnostic First Wall assembly (see Fig. 1) is taken off the Port Plug structure in the vertical orientation by a crane operated remotely. After refurbishment, Port Plug is delivered to the Port Plug Test Facility for environmental and functional tests [1].

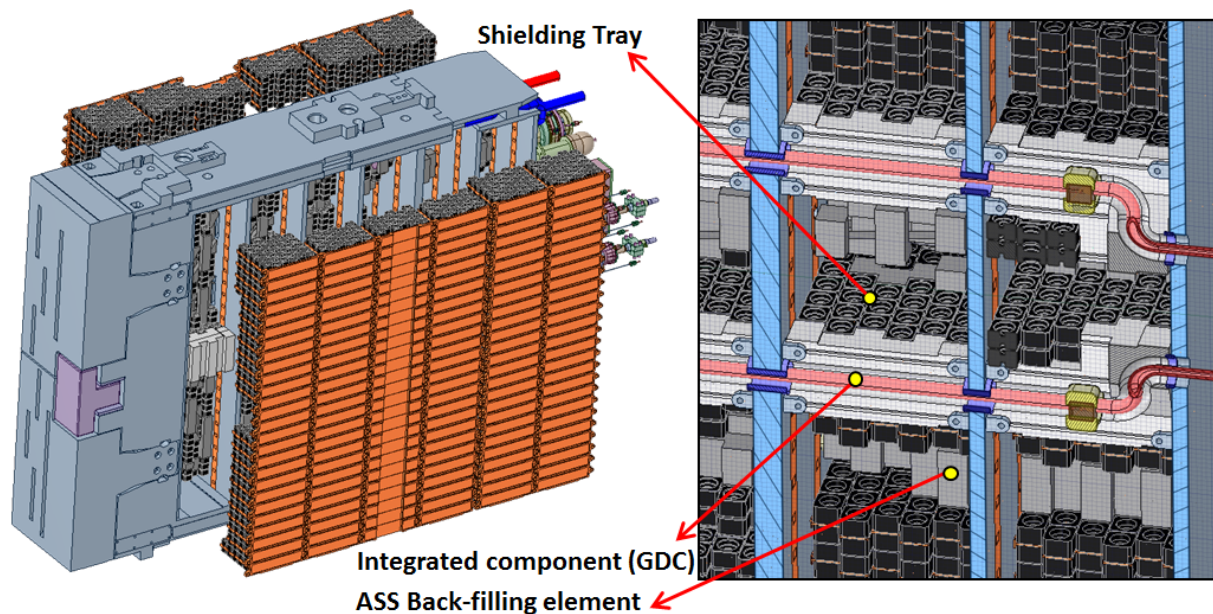


Figure 1. General layout of assembled port plug (and a drawer) in Equatorial Port #12.

The following sub-tasks are foreseen:

- Develop integrated diagnostic port remote refurbishment strategy which requires identification of tasks, proposals for tooling, remote operations assessment, and time to perform all necessary maintenance tasks.
- Propose and justify maintenance and handling schemes by analysis for port-based diagnostics, taking into account the needs of the integrated ports, as well as individual systems integrated within the given ports and their specific requirements.
- Remote maintenance of Disruption Mitigation System and Glow Discharge Cleaning System located in diagnostic ports.
- Propose, in close collaboration with IO-CT maintenance experts, design of remote tools required to service diagnostic systems which would satisfy quick and reliable refurbishment of systems in the Hot Cell.
- Follow-up and prepare (together with DAs) the input packages for upcoming Design Reviews of diagnostic port following Staged Approach.

7 Responsibilities

7.1 Contractor's Responsibilities

In order to successfully perform the tasks in these Technical Specifications, the Contractor shall:

- Strictly implement the IO procedures, instructions and use templates;
- Provide experienced and trained resources to perform the tasks;
- Contractor's personnel shall possess the qualifications, professional competence and experience to carry out services in accordance with IO rules and procedures;
- Contractor's personnel shall be bound by the rules and regulations governing the IO ethics, safety and security IO rules.

7.2 IO's Responsibilities

The IO shall:

- Nominate the Responsible Officer to manage the Contract;
- Organise a monthly meeting(s) on work performed;
- Provide offices at IO premises.

8 List of Deliverables and due dates

The main deliverables are provided as follows:

D #	Description	Due Dates
D01	Update RHCA documentation and supportive remote maintenance analysis for systems located in Equatorial Port #17, for the closure of its PDR. Discuss them with experts and put in the IDM for review/ approval. Prepare the proper input package for the FDR. The reviewers of the report need to be coherent with the ITER_D_2EXFXU - Sign-Off Authority for Project Documents .	T0 + 3 months
D02	Prepare RHCA documentation and supportive remote maintenance analysis for systems located in Equatorial Port #8 in preparation for EP#8 FDR#2. Discuss them with experts and put in the IDM for review/ approval. Prepare the proper input package for the FDR#2. The reviewers of the report need to be coherent with the ITER_D_2EXFXU - Sign-Off Authority for Project Documents .	T0 + 9 months
D03	Develop, together with the port integrators of diagnostic ports and tenants therein, specifications for RH tooling required to	T0 + 12 months

	<p>perform the refurbishment in the Hot Cell dedicated area. Discuss with RH experts at IO. Identify potential R&D activities needed. Prepare reports, upload them into IDM and get them approved.</p> <p>The reviewers of the report need to be coherent with the ITER_D 2EXFXU - Sign-Off Authority for Project Documents.</p>	
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9 Acceptance Criteria

The deliverables will be posted in the Contractor's dedicated folder in IDM, and the acceptance by the IO will be recorded by their approval by the designated IO TRO. These criteria shall be the basis of acceptance by IO following the successful completion of the services. These will be in the form of reports as indicated in section 8, Table of deliverables.

10 Specific requirements and conditions

- Experience in mechanical engineering;
- Experience in Remote Handling/ maintenance;
- Experience in application of French Nuclear Safety regulations;
- Experience in interface management;
- Schematics definition;
- Design organization;
- Technical document generation;
- System requirements management;
- Technical risk analysis.

11 Work Monitoring / Work Monitoring / Meeting Schedule

Work is monitored through reports (see List of Deliverables section).

12 Delivery time breakdown

See Section 8 "List Deliverables section and due dates".

13 Quality Assurance (QA) requirements

The organisation conducting these activities should have an ITER approved QA Program or an ISO 9001 accredited quality system.

The general requirements are detailed in [ITER Procurement Quality Requirements \(ITER_D_22MFG4\)](#).

Prior to commencement of the task, a Quality Plan must be submitted for IO approval giving evidence of the above and describing the organisation for this task; the skill of workers involved in the study; any anticipated sub-contractors; and giving details of who will be the independent checker of the activities (see [Procurement Requirements for Producing a Quality Plan \(ITER_D_22MFMW\)](#)).

Documentation developed as the result of this task shall be retained by the performer of the task or the DA organization for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as

analysis and/or modelling, etc. shall be reviewed and approved by the IO prior to its use, in accordance with [Software qualification policy \(ITER_D_KTU8HH\)](#).

14 CAD Design Requirements (if applicable)

For the contracts where CAD design tasks are involved, the following shall apply:

The Supplier shall provide a Design Plan to be approved by the IO. Such plan shall identify all design activities and design deliverables to be provided by the Contractor as part of the contract.

The Supplier shall ensure that all designs, CAD data and drawings delivered to IO comply with the Procedure for the Usage of the ITER CAD Manual ([2F6FTX](#)), and with the Procedure for the Management of CAD Work & CAD Data (Models and Drawings [2DWU2M](#)).

The reference scheme is for the Supplier to work in a fully synchronous manner on the ITER CAD platform (see detailed information about synchronous collaboration in the ITER [GNJX6A](#) - Specification for CAD data production in ITER Contracts.). This implies the usage of the CAD software versions as indicated in CAD Manual 07 - CAD Fact Sheet ([249WUL](#)) and the connection to one of the ITER project CAD data-bases. Any deviation against this requirement shall be defined in a Design Collaboration Implementation Form (DCIF) prepared and approved by DO and included in the call-for-tender package. Any cost or labour resulting from a deviation or non-conformance of the Supplier with regards to the CAD collaboration requirement shall be incurred by the Supplier.

15 Safety requirements

ITER is a Nuclear Facility identified in France by the number-INB-174 (“Installation Nucléaire de Base”).

For Protection Important Components and in particular Safety Important Class components (SIC), the French Nuclear Regulation must be observed, in application of the Article 14 of the ITER Agreement.

In such case the Suppliers and Subcontractors must be informed that:

- The Order 7th February 2012 applies to all the components important for the protection (PIC) and the activities important for the protection (PIA).
- The compliance with the INB-order must be demonstrated in the chain of external contractors.
- In application of article II.2.5.4 of the Order 7th February 2012, contracted activities for supervision purposes are also subject to a supervision done by the Nuclear Operator.

For the Protection Important Components, structures and systems of the nuclear facility, and Protection Important Activities the contractor shall ensure that a specific management system is implemented for his own activities and for the activities done by any Supplier and Subcontractor following the requirements of the Order 7th February 2012 ([PRELIMINARY ANALYSIS OF THE IMPACT OF THE INB ORDER - 7TH FEBRUARY 2012 \(AW6JSB v1.0\)](#)).

Compliance with [Defined requirements for PBS 55 - Diagnostics \(NPEVB6 v2.0\)](#) or its flowed down requirements in [SRD-55 \(Diagnostics\) from DOORS \(28B39L v5.2\)](#) is mandatory.

This task is PIA.

The supplier must comply with the all requirements expressed in “Provisions for implementation of the generic safety requirements by the external actors/intervenors” (ITER_D_SBSTBM).