

Technical Specifications (In-Cash Procurement)

**Engineering contract to provide the analysis to the
integrated diagnostic system designs**

New role to cover the above work

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1 Purpose

The objective of this engineering contract is to provide the analysis to the integrated diagnostic system designs, with particular emphasis in the areas of diagnostic integration within ports and in the buildings. The diagnostics have to be integrated within tokamak complex. Transmission lines, cables and cubicles will be located in different places across the tokamak complex and have to be designed and integrated to withstand the loads, to ensure confinement and to provide functionality to the diagnostic systems.

2 Scope

The scope of work for this task order will be the following Diagnostics development activities: **Advance diagnostic designs in their integration into the tokamak complex.**

The work comprises of integration of distributed ex-vessel diagnostic systems in the buildings and integration of diagnostic systems inside port plugs and in the port cells.

Task encompasses several activities divided in Deliverable-based Sub-Tasks.

3 Definitions

CPD	Construction Process Document
DA	Domestic Agency
DFW	Diagnostic First Wall
DIR	Design Integration Review
DSM	Diagnostic Shield Module
PBS	Plant Breakdown Structure
PDR	Preliminary Design Review
RH	Remote Handling
SIR	System Integration Review

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

4 References

N/A

5 Estimated Duration

Work to be carried out over a period of 24 months predominantly at IO working site. Some missions of a short duration may be envisaged for the purpose of the execution of the Contract.

6 Work Description

- Engineering justifications to the Port Integration activities
- Integration of distributed ex-vessel diagnostic systems in the buildings

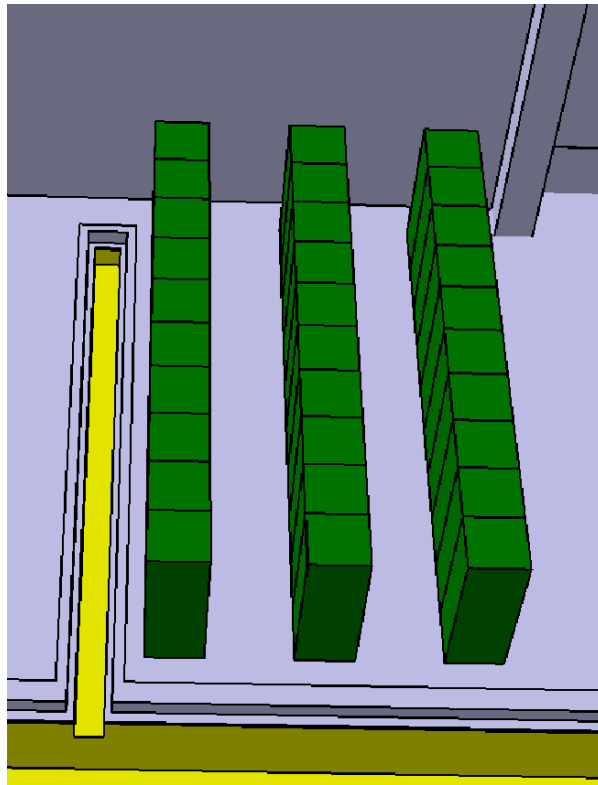


Figure 1. Example of allocation of instrumentation and control cubicles in the diagnostic area.

- Progress technical designs of systems and plants to ensure overall integration of systems in Port and other areas

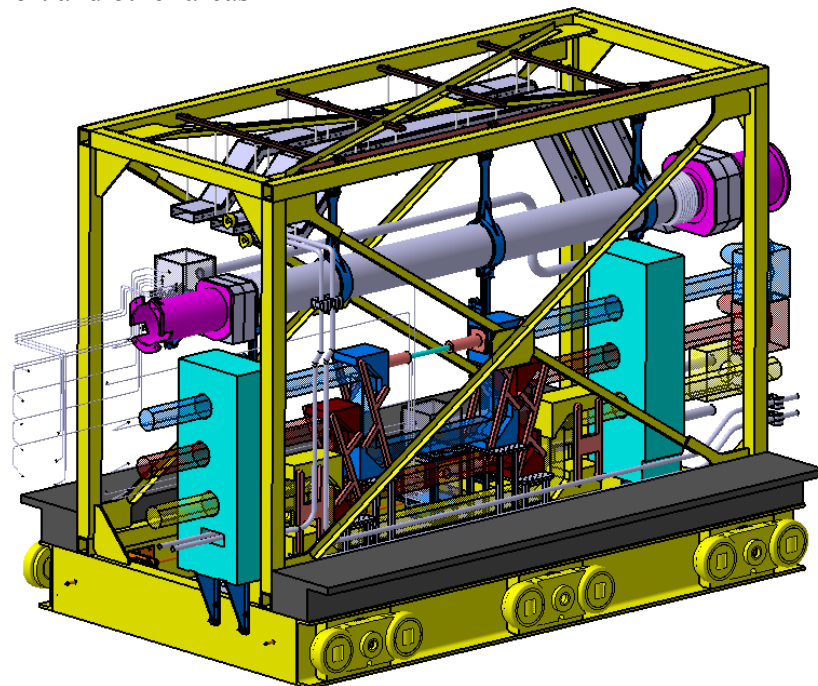


Figure 2. Example of diagnostics integrated in the Port Cell area.

- Provide effective management of deliverables and associated work to IO-TRO to meet project schedule in relevant areas.

7 Responsibilities

N/A

8 List of deliverables and due dates

These deliverables shall be the basis of acceptance by IO following the successful completion of the services. The criteria for acceptance is the report or input documents in the IDM.

D #	Description*	Due Dates
D1	Integrated components within 74 (Diagnostic components in the diagnostic buildings at B1 level). Provision of mechanical designs and a study on several options for diagnostic supports in dedicated rooms at B1 level, giving emphasis on designs of trapped components and hard-core components. Results into the Bld 74 System Integration Review input package.	T0 + 2 month
D2	Integrated components within 74 (Diagnostic components in the diagnostic buildings at L1 level). Provision of mechanical designs and a study on several options for diagnostic supports in dedicated rooms at L1 level, giving emphasis on designs of trapped components and hard-core components. Results submitted into the Bld 74 System Integration Review input package in the IDM.	T0 + 3 month
D4	Mechanical design of Upper Diagnostic Shield Module for UP#4/5/6. Assessment of its manufacturability and maintainability and preparation of CAD models in Enovia. Report submitted to IDM.	T0 + 4 months
	<p>Integration of Upper Ports#4/5/6:</p> <ul style="list-style-type: none"> - Refinements of the "Tenants Request Form" for interface tracking; new version submitted to the IDM - Report and CAD update of the DSM main frame; - First Assessment of the DSM cooling capacity, flow rate, pressure. Report submitted to IDM. - Prepare a mini-review to receive feedback from IO experts in the fields. <p>Input data for Integrated Port-Plug neutronics calculation for Upper Ports#4/5/6 recorded in the IDM.</p>	T0 + 6 month
D5	Integrated components within 74 (Diagnostic components in the	T0 + 7

	diagnostic buildings at L2 level). Provision of mechanical designs and study on several options for diagnostic supports in dedicated rooms at L2 level, giving emphasis on designs of trapped components and hard-core components. Results submitted into the Bld 74 System Integration Review input package in the IDM.	month
D6	Integrated components within Bld 13 (Diagnostic components in the assembly building). Provision of mechanical designs and study several options for diagnostic supports in dedicated rooms. Results submitted into the Bld 13 System Integration Review or DIR input package in the IDM. CPDs and the final programme for installation of diagnostic equipment in Bld 13 (all levels with diagnostic systems) finalisation in the IDM.	T0 + 9 months
D7	Integrated components within Bld 14 (Diagnostic components in the Tritium building). Provision of mechanical designs and study on several options for diagnostic supports in dedicated rooms. Results submitted into the Bld 14 System Integration Review or DIR input package in the IDM. CPDs and the final programme for installation of diagnostic equipment in Bld 14 (all levels with diagnostic systems) finalisation in the IDM.	T0 + 11 months
D8	Package and engineering justification for the next level (pre-PDR) EP#8 SIR. Mechanical models and freeze interfaces to start with analysis towards PDR. Actions resulting from the pre-PDR SIR changes implemented into the design and models and recorded in the corresponding document in the IDM.	T0 + 13 month
D9	Integrated components within Bld 11 (Diagnostic components in the Tokamak building, levels B1/L1/L2). Mechanical designs and study on several options for diagnostic supports in galleries and shielded corners in levels B1/L1/L2, giving emphasis on designs of trapped components and hard-core components. Results into the Bld 11 System Integration Review or DIR input package. CPDs and the final programme for installation of diagnostic equipment in Bld 11 (levels B1/L1/L2 with diagnostic systems) finalisation in the IDM.	T0 + 14 month
D10	Integrated components within Bld 11 (Diagnostic components in the Tokamak building, level L3). Mechanical designs and study on several options for diagnostic supports in galleries and shielded corners in level L3, giving emphasis on designs of trapped components and hard-core components. Results submitted into the Bld 11 System Integration Review or DIR input package in the IDM. CPDs and the final programme for installation of diagnostic equipment in Bld 11 (level L3 with diagnostic systems) finalisation in the IDM.	T0 + 15 month

D11	Input package and engineering justification to the PDR of UP#4/5/6. Mechanical models for the PDR and freeze design in Enovia. Input from analysis experts in the amended System Load Specifications and Structural Integrity Report of UP#4/5/6 including fire loads in the NB Cell. Technical issues (if any) received during Design Review answered and changes in the design implemented, if necessary, and recorded in the corresponding document in the IDM.	T0 + 17 months
D12	Integrated components within Bld 55 (Diagnostic components and test areas). Mechanical designs and study several options for diagnostic supports and equipment in Bld 55 to ensure preparation for integrated acceptance and commissioning of diagnostic ports. Results submitted into the Bld 55 (diagnostic test area) System Integration Review or DIR input package in the IDM.	T0 + 20 month
D13	Input package and engineering justification to the PDR of EP#8. Mechanical models for the PDR and freeze design in Enovia. Input from analysis experts in the amended System Load Specifications and Structural Integrity Report of EP#8 including fire loads in the Port Cell. Technical issues (if any) received during Design Review answered and changes in the design implemented, if necessary, in corresponding documents in the IDM.	T0 + 23 month
D14	Maintenance assessment of diagnostics and systems located in the test areas in Bld 55. Preparation of required documentation in the IDM (maintenance assessment, manpower requirements etc) and incorporate feedback from relevant IO experts.	T0 + 24 months

9 Acceptance Criteria

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 made on deliverables completion, as indicated in section 8, table of deliverables.

10 Specific requirements and conditions

- Experience in mechanical design of integrated systems;
- Experience in performing structural analysis of mechanical systems;
- Ability to work in ENOVIA/ CATIA CAD environment.

11 Work Monitoring / Meeting Schedule

The contractor will issue a monthly progress report made on deliverables completion. This progress report will at least track:

- Management plan.
- Task performed during the last month.

Work meetings may be organized by the IO-TRO on request depending on the need of the execution of the contract.

12 Delivery time breakdown

See table in section 8 for deliverable's time breakdown.

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 [Quality Assurance for ITER Safety Codes \(ITER_D_258LKL\)](#).

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.