

Technical Specifications (In-Cash Procurement)

Support on analysis for the diagnostic designs and integrated infrastructure

The objective of this engineering contract is to work with the ITER Diagnostic Team in the analysis that supports the diagnostic design and integrated infrastructure for diagnostics, with particular emphasis on the technical requirements, interface definitions, assessment of loads acting on diagnostic components and integration of diagnostics in tokamak infrastructure.

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1 Preamble

This Technical Specification is to be read in combination with the General Management Specification for Service and Supply (GM3S) – [Ref 1] that constitutes a full part of the technical requirements.

In case of conflict, the content of the Technical Specification supersedes the content of Ref [1].

2 Purpose

The purpose of this engineering contract is to provide specialised engineering analysis (structural assessment) and analysis of functionality of diagnostics integrated in the tokamak complex. It is also required to prepare corresponding EWPs and CWPs for port-based diagnostics and integrated diagnostic ports, IVVS and PPTF/ PIF under IO RO guidance. This concerns diagnostic systems and integrated ports which interface with each other and other services (from other PBSs). Integration of these diagnostics is a very important design driver for the overall success of diagnostics and to meet project milestones, in particular those for the AFP. Integration of the diagnostic ports and EWP preparation is led by IO ROs and shall be justified and agreed between all involved stakeholders, and then documented.

3 Acronyms & Definitions

3.1 Acronyms

The following acronyms are the main one relevant to this document.

Abbreviation	Description
AFP	Augmented First Plasma
CRO	Contract Responsible Officer
DMS	Disruption Mitigation System
FDR	Final Design Review
GDC	Glow Discharge Cleaning
EWP	Engineering Work Package
GM3S	General Management Specification for Service and Supply
ICD	Interface Control Document
IO	ITER Organization
IS	Interface Sheet
IVVS	In-Vessel Viewing System
PBS	Plant Breakdown Structure
PDR	Preliminary Design Review
PIF	Port Integration Facility
PPTF	Port Plug Test Facility
PRO	Procurement Responsible Officer
RH	Remote Handling

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3.2 Definitions

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Contractor: shall mean an economic operator who have signed the Contract in which this document is referenced.

Other definitions can be examined in the section 2.1 of the GM3S Ref [1] and may be required to ensure proper understanding of the document.

4 Applicable Documents & Codes and standards

4.1 Applicable Documents

This is the responsibility of the Contractor to identify and request for any documents that would not have been transmitted by IO, including the below list of reference documents.

This Technical Specification takes precedence over the referenced documents. In case of conflicting information, this is the responsibility of the contractor to seek clarification from IO.

Upon notification of any revision of the applicable document transmitted officially to the contractor, the contractor shall advise within 4 weeks of any impact on the execution of the contract. Without any response after this period, no impact will be considered.

Ref	Title	IDM Doc ID	Version
1	General Management Specification for Service and Supply (GM3S)	82MXQK	1.4
2	ITER Procurement Quality Requirements	22MFG4	5.1
3	Procurement Requirements for Producing a Quality Plan	22MFMW	4.0
4	Software qualification policy	KTU8HH	2.0
5	SRD-55 (Diagnostics) from DOORS	28B39L	5.5
6	Procedure for Management of Nonconformities	22F53X	9.1
7	Procedure for the Usage of the ITER CAD Manual	2F6FTX	1.1
8	Example of Port integration, Interface Sheet	UDR5AG	2.6
9	Example of Diagnostic integration in building, Interface Sheet	34GS5D	10.1
10	Example of the tenant system (GDC) in the diagnostic port plug, Interface Sheet	R85ZFY	3.3
11	Example of the service system (Component Cooling Water) and its relation to diagnostics, Interface Sheet	4669VY	1.12
12	Example of the remote handling system and its application to diagnostics, Interface Sheet	42N2SW	5.6
13	Example of other PBS system and its relation to diagnostics, Interface Sheet	4KU5D9	2.3
14	Example of EWP FDR presentations covering typical diagnostic installed in the buildings, folder	W7RSZK	(folder)

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15	ITER Abbreviations	2MU6W5	1.18

4.2 Applicable Codes and Standards

No particular Codes and Standards are envisaged to be applied to execute the work on deliverables. Sound engineering practise shall be followed.

5 Scope of Work

This section defines the specific scope of work for the service, in addition to the contract execution requirement as defined in Ref [1].

The work involves the delivery of the specialised engineering analysis (structural assessment) of diagnostic mechanical structures and analysis of functionality of diagnostics integrated in the tokamak complex. It is also needed to prepare corresponding EWPs and CWPs for port-based diagnostics and integrated diagnostic ports, IVVS and PPTF/ PIF under IO RO guidance to meet the project needs and milestones of the AFP. This concerns diagnostic systems and integrated ports which interface with each other and other services (from other PBSs). Integration of these diagnostics is a very important design driver for the overall success of diagnostics and to meet project milestones. Integration of the diagnostic ports and EWP preparation is led by IO ROs and shall be justified and agreed between all involved stakeholders, and then documented. Engineering work to freeze the designs and to produce EWP to enable manufacturing of the diagnostic components is necessary to meet key Project milestones, especially those for the Augmented First Plasma or integration in the buildings. It involves several areas of activity that have to be documented (documents referred therein can be provided as files upon request). There are more than 105 diagnostics and many of them are distributed from the diagnostic port plug to the enclosures in the buildings. The various transmission lines require supports and dedicated designs to pass through the penetrations. The corresponding EWPs shall be justified: structural analysis/ stress assessments, functional assessment on the performance of diagnostics etc. The corresponding technical reports shall be approved to endorse HOP and to enable manufacturing activities. These are priorities for the eventual installation of the diagnostic equipment.

5.1 Scope of work

5.1.1 Description

- Engineering analysis (structural) and assessment of functionality of diagnostics integrated in the tokamak complex:
 - Port integration, see example in Ref [8]
 - Integration in buildings, see example in Ref [9]
 - Tenant systems: diagnostic systems, DMS, GDC, see example in Ref [10]
 - Service systems: vacuum, water, liquid and gas, electric cables, HVAC, see example in Ref [11]
 - Maintenance: RH system, Hot Cell Facility, see example in Ref [12]
 - Other PBSs: vacuum vessel, blanket, cryostat etc, see example in Ref [13]
- Preparation, under IO RO's lead, EWPs for diagnostics located in the tokamak complex and in the buildings, see example in Ref [14] (presentations for the typical EWP FDR);
- Under the guidance and with inputs from IO ROs, draft, follow-up and amend technical reports on diagnostic performance and EWP-related documents;
- Draft minutes for IO and DA meetings;

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- On request from IO ROs, provide technical input for project change requests and other actions;
- Under IO RO guidance, provide technical information for Chits resolution from IO and DA design reviews (where EWPs are involved).

It is expected that during execution of this contract, there will be on average 4 (four) technical documents of above-mentioned scope assessed or created each month.

5.1.2 Service Duration

The duration shall be 12 months from the starting date of the contract. The service is governed by deliverables associated to due dates which are referenced in Section 8.

6 Location for Scope of Work Execution

Contractor shall perform the work at their own location. Means of telecommunications shall be used to connect to IO-TROs.

7 IO Documents

No particular input is expected from IO except these indicated in the Applicable Documents in Section 4.1.

8 List of deliverables and due dates

The Supplier shall provide IO with the documents and data required in the application of this technical specification, the GM3S Ref [1] and any other requirement derived from the application of the contract.

A minimum, but not limited to, list of documents is available hereafter with associated due dates:

Technical Design Family (TDF)	Generic Document Title (GTD)	Further Description	Expected date (T0+x) *
Engineering Analysis Report	Checklist for Analyses or Calculations	Report on Preparation of technical documents (creation or update of reports on performance, structural analysis reports, EWPs etc) for the ports and their tenants, including Disruption Mitigation System, and diagnostics in buildings, which are identified as priority in Q3-2024. Discuss with relevant ROs of all involved PBSs, agree the contents and upload them in the IDM for review, follow-up and approval. Prepare relevant presentations for the Design Reviews, if necessary.	T0 + 3 months

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Engineering Analysis Report	Checklist for Analyses or Calculations	Report on Preparation of technical documents (creation or update of reports on performance, structural analysis reports, EWPs etc) for the ports and their tenants, including Disruption Mitigation System, and diagnostics in buildings, which are identified as priority in Q4-2024. Discuss with relevant ROs of all involved PBSs, agree the contents and upload them in the IDM for review, follow-up and approval. Prepare relevant presentations for the Design Reviews, if necessary.	T0 + 6 months
Engineering Analysis Report	Checklist for Analyses or Calculations	Report on Preparation of technical documents (creation or update of reports on performance, structural analysis reports, EWPs etc) for the ports and their tenants, including Disruption Mitigation System, and diagnostics in buildings, which are identified as priority in Q1-2025. Discuss with relevant ROs of all involved PBSs, agree the contents and upload them in the IDM for review, follow-up and approval. Prepare relevant presentations for the Design Reviews, if necessary.	T0 + 9 months
Engineering Analysis Report	Checklist for Analyses or Calculations	Report on Preparation of technical documents (creation or update of reports on performance, structural analysis reports, EWPs etc) for the ports and their tenants, including Disruption Mitigation System, and diagnostics in buildings, which are identified as priority in Q2-2025. Discuss with relevant ROs of all involved PBSs, agree the contents and upload them in the IDM for review, follow-up and approval. Prepare relevant presentations for the Design Reviews, if necessary.	T0 + 12 months

(*) T0 = Commencement Date of the contract; X in months.

Supplier is requested to prepare their document schedule based on the above and using the template available in the GM3S Ref [1] appendix II ([click here to download](#)).

9 Quality Assurance requirements

The Quality class under this contract is 2, [Ref 1] GM3S section 8 applies in line with the defined Quality Class. 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 [Ref 2].

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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 [Ref 3].

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 [Ref 4].

10 Safety requirements

The scope under this contract covers for PIC and/or PIA, [Ref 1] GM3S section 5.3 applies.

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 flowed down defined requirements in [SRD-55 \(Diagnostics\) from DOORS \(28B39L v5.5\)](#) is mandatory.

This task is PIA as the work requires design activities and analysis verification for some PIC/SIC mechanical components. Compliance with provisions for Implementation of the Generic Safety Requirements by the External Actors/Intervenors <https://user.iter.org/?uid=SBSTBM> v2.2 is mandatory.

10.1 Nuclear class Safety

Some components under structural analysis are SIC-2. This makes the task itself as PIA. No PE/NPE components are involved.

10.2 Seismic class

For diagnostic SIC-2 supports in buildings, the seismic classes are SC-1 and SC-1(S).

11 Specific General Management requirements

Requirement for [Ref 1] GM3S section 6 applies completed/amended with the below specific requirements.

11.1 Contract Gates

The contract gates are defined in [Ref 1] section 6.1.5, this scope of service call for the following technical gates: Preliminary Design Reviews of PBS 55 systems scheduled in 2024 and 2025, Final Design Reviews of PBS 55 systems scheduled in 2024 and 2025.

11.2 Work Monitoring

Work is monitored through quarterly reports (see Section 8).

11.3 CAD design requirements

This contract does not imply CAD activities. Contractor may receive CAD data for information purpose only from IO-TRO following rules and guidelines given in [Ref 7].

11.4 Specific Requirements

- Experience in writing SLS for complex integrated systems;
- Experience in structural analysis of mechanical systems and assemblies;
- Experience in preparation of technical documents;
- 3D and 2D schematics definition;
- Technical risk analysis.

12 Appendices

N/A