IDM UID
BY3C67

VERSION CREATED ON / VERSION / STATUS
30 Sep 2024 / 1.2 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

CFE - Optics and Radio-Frequency Engineering Expertise for 55.E6

The purpose of this contract is to provide ITER diagnostics specialized Optical and Radio-Frequency engineering for the 55.E6 Visible Spectroscopy Reference System (VSRS) diagnostic.

SERVICE

Table of Contents

SERVICE

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 Contractor shall work on the specialized Optical and Radio-Frequency engineering for the 55.E6 Visible Spectroscopy Reference System (VSRS) diagnostic located in Equatorial Port 8. This diagnostic uses advanced Optical and Radio-Frequency components that have specific integration, manufacturing and qualification needs. To support the IO RO with both integration and the detailed definition of qualification, manufacturing and factory acceptance testing requirements for those Optical and Radio-Frequency components, dedicated and qualified expertise in the above mentioned areas is required.

The engineering activities in this contract shall aim at refining the Optical and Radio-Frequency component design, with an emphasis and qualification, testing and manufacturability in view of preparing for their manufacturing and future installation on the ITER tokamak. In coordination with the Technical Responsible Officer (TRO) of the VSRS diagnostic, the Contractor shall contribute to the formulation of design solutions, integrated performance analysis of the components in the integrated mechanical design, input to testing plans and reports, input to manufacturability assessments, input to technical specifications and requirements for qualification, manufacturing and factory acceptance testing; to ensure the timely delivery and installation of this system. Additionally, the work shall include the preparation and review of dedicated technical documentation.

The Contractor shall allocate engineering resources with experience in Optical and Radio-Frequency engineering (from design up to installation) of complex scientific instrumentations, preferably diagnostic systems, for large scientific and / or nuclear facilities. It is expected the expertise will be distribute over two profiles, with each contributing to a 50% fraction of the requested activities.

3 Acronyms & Definitions

3.1 Acronyms

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

Abbreviation	Description
CMM	Configuration Management Model
DIR	Design Integration Review
FDR	Final Design Review
GM3S	General Management Specification for Service and Supply
IO	ITER Organization
MAM	Model Approval Meeting
PDR	Preliminary Design Review
PRO	Procurement Responsible Officer

SERVICE	
TRO	Technical Responsible Officer

For a complete list of ITER abbreviations see: ITER Abbreviations (ITER_D_2MU6W5).

3.2 Definitions

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

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

4.2 Applicable Codes and Standards

This is the responsibility of the Contractor to procure the relevant Codes and Standards applicable to the scope of work.

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].

5.1 Definition of Activities

5.1.1 Optical and Radio-Frequency Engineering

Specific activities in the scope of the TO include the followings:

Optical engineering

- To perform an integrated Optical system analysis based on the current, latest opto-mechanical design and the latest available input data from equatorial port manufacturing on manufacturing tolerances;
- To optimize the design of the 55.E6 mirrors, with specific emphasis on features to facilitate precision manufacturing (including polishing and coating) and installation (including alignment and metrology);

SERVICE

- To provide expert input on necessary activities to qualify the Optical component manufacturing process;
- To provide expert input on specifications to be defined for Optical component manufacturing;
- To provide expert input on the verification (by factory acceptance testing or other means) of the Optical component manufacturing specifications;
- To provide expert input on specifications to be defined for Optical component installation, metrology and alignment;

Radio-Frequency engineering

- To perform an integrated Radio-Frequency (mirror cleaning) system analysis based on the current, latest electro-mechanical design and the latest available input data from the standard ITER electrical vacuum feedthrough as well as in-vessel and ex-vessel connectors and cabling;
- To optimize the design of the 55.E6 mirror cleaning Radio-Frequency component (e.g. the pre-matcher and its connection), with specific emphasis on features to facilitate manufacturing (including copper coating on ceramics) and installation (including connections of cables and grounding);
- To provide expert input on necessary activities to qualify the Radio-Frequency component manufacturing process;
- To provide expert input on specifications to be defined for Radio-Frequency component manufacturing;
- To provide expert input on the verification (by factory acceptance testing or other means) of the Radio-Frequency component manufacturing specifications;
- To provide expert input on specifications to be defined for Optical component installation and post-installation testing;

5.1.2 Requirements

These activities require:

- High-level expertise in Optical engineering (visible wavelength range);
- High-level expertise in Radio-Frequency engineering (10-100MHz, up to 1kW);
- Above mentioned expertise should cover:
  - Design
  - Manufacturing (including verification thereof)
  - Installation/integration (including verification thereof)

It is expected this expertise will be distributed over two profiles, with each contributing to a 50% fraction of the requested activities.

Additionally, sufficient training and knowledge is expected of:

- Interfaces, requirements and system configuration management;
- Maintenance and reliability in nuclear environment;
- Manufacturing, inspection and testing procedures;
- Manufacturing, inspection and testing procedures for the above mentioned Optical and Radio-Frequency components taken into account they will be subject to nuclear radiation, high heat loads, vacuum and magnetic fields;

SERVICE

5.2 Service Duration

The duration shall be of 12 months from the starting date of the contract.

6 Location for Scope of Work Execution

The Contractor can perform the work at its own location.

7 IO Documents

Relevant input documents will be specified and provided during the execution of the work.

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:

Deliverable #	Technical Design Family (TDF)	Generic Document Title (GTD)	Description	Expected Date (T0 + X)*
D#01	Review or Decision or Recommendations Report	55.E6 Optical and Radio-Frequency engineering – 1st Quarter Progress Report	First quarter interim report, including: a) Record of the work performed; b) Status of engineering and analysis activities. c) Miscellaneous activities relevant to the scope of the TO.	3 months
D#02	Review or Decision or Recommendations Report	55.E6 Optical and Radio-Frequency engineering – 2nd Quarter Progress Report	Second quarter interim report, including: a) Record of the work performed; b) Status of engineering and analysis activities. c) Miscellaneous activities relevant to the scope of the TO.	6 months
D#03	Review or Decision or Recommendations Report	55.E6 Optical and Radio-Frequency engineering – 3rd Quarter Progress Report	Third quarter interim report, including: a) Record of the work performed; b) Status of engineering and analysis activities. c) Miscellaneous activities relevant to the scope of the TO.	9 months
D#04	Review or Decision or Recommendations Report	55.E6 Optical and Radio-Frequency engineering – 4th Quarter Progress Report	Fourth quarter interim report, including: a) Record of the work performed; b) Status of engineering and analysis activities. c) Miscellaneous activities relevant to the scope of the TO.	12 months

SERVICE

(*) T0 = Starting date of the contract; X in months.

The Contractor 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 QC-2 [Ref 1] GM3S section 8 applies in line with the defined Quality Class.

10 Safety requirements

No specific safety requirement related to PIC and/or PIA and/or PE/NPE components apply.

11 Specific General Management requirements

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

11.1 CAD design requirements

This contract does not require CAD activities.