

**Engineering support to the Mechanical Design
and Assessment of Radwaste Process Systems
Technical Specifications
(Call for expertise)**

**Radioactive Materials Engineering Section
PSE/PED**

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1 Abstract

The purpose of this contract is to acquire the service of a mechanical engineer for a fixed period to support the design of the ITER radwaste management systems that will be implemented in the Hot Cell Complex.

2 Background and Objectives

ITER radwaste will be generated in various ITER buildings such as Tokamak, hot cell (HCB), radwaste (RWB), personnel access control (PACB), and tritium plant buildings during the machine operation and maintenance periods.

ITER radwaste management systems should be designed for the treatment and storage of the intermediate-level and long-lived (Type B: in-vessel component replacement) radwaste, purely tritiated waste (tritium plant and fuelling system maintenance), low-level solid and liquid radwaste (Type A: process and housekeeping waste), and very low-level radwaste (TFA).

The Type B (intermediate level) radwaste management systems are accommodated in level B2 and B1 of the Hot Cell building.

The Conceptual Design Review for Type B radwaste systems is scheduled for June 2015 and the necessary documents need to be produced or updated to meet the milestone of CDR on time.

The technical data and inputs also need to be prepared and produced in timely fashion to support the preparation of the answers of the ITER licensing cell to the Safety Authority and documents for Group Permanent actions.

The objectives of the task are to support the radwaste management process/system design activities and CDR documentation preparation for Type B radwaste system, providing a mechanical engineer.

The proposed support works should be carried out to meet the project milestones of PBS 66 Radwaste Treatment and Storage Systems.

3 Scope of Work

The scope of the work of this contract is to provide engineering support to the IO staff in mechanical design and assessment activities of Radwaste Proces System, CDR document preparation for Type B radwaste system which is planned in June 2015.

The detailed work description is given in Section 5 below.

4 Estimated Duration

The duration of this contract shall be 7 month starting from 02 June 2014.

5 Work Description

A mechanical engineer is expected to provide the support to the ITER RMES (Radioactive Materials Engineering Section) staff members on the following work scope:

- Functional and risk analysis aiming at developing operational and commissioning procedures + Interlocks and Safety Control
- Support for P&ID update and development + Migration to Intergraph
- Design validation activities on load drop analysis, pipe/equipment stress analysis and Embedded Plates calculations
- Generating and updating necessary documents (mechanical field) for Type B radwaste system Conceptual Design Review including interface update, Design Compliance Matrix, equipment installation plan
- Assisting in producing nuclear design data for equipment and process designs
- Assisting in updating interface sheets
- Supporting the section's related other activities

6 Required Skills

The following criteria will be examined:

- 3 to 5 years' experience
- Experience developing and implementing mechanical device or system in nuclear facilities (preferred the experience on developing hot cells or radwaste management systems).
- Experience in design process management and control
- Experience in close cooperation with CAD designers
- Knowledge/skills in the following are an advantage:
 - Mechanical design
 - Performing engineering studies
 - ANSYS, CATIA softwares
 - Nuclear safety
- Good level of autonomy

Knowledge of Fusion reactors technology is an advantage.

7 List of deliverables and due dates

The mechanical engineer shall work closely with the ITER RMES staff members throughout the contract period and produce a progress report every four weeks based upon the work description (see chapter 5) and clarified with the IO-TRO each beginning of the 4 weeks period.

The list of deliverables and target date are the following:

- Within 2 month:
 - Functional analysis focussed on operational and commissioning aspects
 - Functional analysis focussed on Interlocks and Safety Control
 - Risk analysis focussed on operational and commissioning aspects
 - Risk analysis focussed on Interlocks and Safety Control
- Within 4 month:
 - Update of P&ID

- Load specifications for type B Radwaste System
- Embedded Plates calculations for type B Radwaste System
- Within 7 month:
 - Interface documents (ICD and IS) update
 - Process Flow Diagram (PFD) update for type B Radwaste System
 - System Design Description (DD) update for type B Radwaste System
 - Bill of material (BOM) for type B Radwaste System
 - Equipment installation plan for type B Radwaste System
 - On Site Assembly Plan for type B Radwaste System
 - On Site Testing and Commissioning Plan for type B Radwaste System

Further details of the deliverables shall be established by the IO-TRO at the beginning of the relevant work period.

8 Acceptance Criteria

The reports shall be reviewed by the IO-TRO for acceptability: adequacy between the deliverables.

9 Specific requirements and conditions

The official language of the ITER project is English. Therefore all input and output documentation relevant for this Contract shall be in English. The Contractor shall ensure that all the professionals in charge of the Contract have an adequate knowledge of English, to allow easy communication and adequate drafting of technical documentation. This requirement also applies to the Contractor's staff working at the ITER site or participating to meetings with the ITER Organization.

The work shall require the presence of the Contractor's personnel at the site of the ITER Organization, Cadarache, 13108 St Paul-lez-Durance, France, for the duration of the contract.

Documentation developed shall be retained by the contractor 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, it should fulfil IO document on calculation code for safety analysis.

For all deliverables submitted in electronic format the Contractor shall ensure that the release of the software used to produce the deliverable shall be the same as that adopted by the ITER Organization.

Financial proposal: The daily rate shall include all travelling and accommodation costs.

The engineer provided for on-site duties shall keep the normal daily working hours of the ITER Organization.

10 Work Monitoring / Meeting Schedule

The mechanical engineer shall report to the ITER Organization TRO and the RMES section leader. Meetings shall be held as and when deemed necessary by the ITER RMES staff.

11 Quality Assurance (QA) requirement

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 \(ITER D 22MFMW\)](#)).

Prior to commencement of any manufacturing, a Manufacturing and Inspection Plan must be approved by ITER who will mark up any planned interventions (see [Requirements for Preparing and Implementing a Manufacturing and Inspection Plan \(ITER D 22MDZD\)](#)).

Deviations and Non-conformities will follow the procedure detailed in [ITER Requirements Regarding Contractors Deviations and Non Conformities \(ITER D 22F53X\)](#).

Prior to delivery of any manufactured items to the IO Site, a Release Note must be signed in accordance with [ITER Requirements Regarding Contractors Release Notes \(ITER D 22F52F\)](#).

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 \(ITER D 258LKL\)](#).

12 References / Terminology and Acronyms

12.1 References

[RD1] RPrS

[RD2] [SRD-66 \(Radwaste Treatment and Storage\) from DOORS \(2EWUFD v3.3\)](#)

[RD3] [Updated design descriptions: Type B and purely tritiated waste management systems \(ITER D 3TBNLV v1.0\)](#)

[RD4] [DWO-66-307 Type B equipment development and engineering \(https://user.iter.org/?uid=67BJBV\)](#)

[RD5] [Radwaste Treatment and Storage Functional Analysis \(33U4M3 v1.0\)](#)

[RD6] [Failure Mode, Effects Analysis FMEA and Reliability Block Diagram analysis \(RBD\) report \(344ZKC\)](#)

[RD7] [Safety Overview of the Hot Cell Building \(L29DJW\)](#)

[RD8] [Equipment/system classification for Type B, Purely Tritiated and TFA radwaste system \(JE58US v1.0\)](#)

12.2 Terminology and Acronyms

In the following table denominations and definitions are given of all the actors, entities and documents referred to in this Specification, together with the acronyms used in this document.

<u>Denomination</u>	<u>Definition</u>	<u>Acronym</u>
ITER Organization	For this Contract the ITER Organization	IO-
ITER Organization Task Responsible Officer	Person delegated by the IO-RO for all technical matters, but limited to one specific task order	IO-TRO
Radioactive Materials Engineering Section	Radioactive Materials Engineering Section	RMES
Piping and Instrumentation Diagram	Piping and Instrumentation Diagram	P&ID
Conceptual Design Review	Conceptual Design Review	CDR