

Technical Specifications (In-Cash Procurement)**CFE - HOF and HIRA in support of the development of
Equatorial Ports #08 and #17 with integrated diagnostic
and Disruption Mitigation Systems**

The purpose of the work is to support engineering development and integration of diagnostic and Disruption Mitigation Systems (DMS) in Equatorial Port #08 and #17 by performing

- a Human and Organizational Factors (HOF) analysis of maintenances and inspection operations
- Hazard Identification and Risk Assessment (HIRA) related to Human operations in the port cells.

Table of Contents

1	PURPOSE	2
2	SCOPE	2
3	DEFINITIONS	2
4	REFERENCES.....	3
5	ESTIMATED DURATION.....	3
6	WORK DESCRIPTION.....	3
6.1	WP 1 – Area Hazard Analysis.....	3
6.1.1	Input	3
6.1.2	Activities	3
6.1.3	Output	4
6.2	WP 2 – Human & Organizational Factor analysis	4
6.2.1	Input	5
6.2.2	Activities	5
6.2.3	Output	6
7	INPUTS FROM IO	7
8	RESPONSIBILITIES	8
8.1	Contractor’s obligations	8
8.2	Obligations of the ITER Organization	9
9	LIST OF DELIVERABLES AND DUE DATES	9
10	ACCEPTANCE CRITERIA.....	10
11	SPECIFIC REQUIREMENTS AND CONDITIONS.....	11
12	WORK MONITORING / MEETING SCHEDULE	12
13	DELIVERY TIME BREAKDOWN.....	12
14	QUALITY ASSURANCE (QA) REQUIREMENTS.....	12
15	SAFETY REQUIREMENTS	13

1 Purpose

The purpose of the work is to support engineering development and integration of diagnostic and Disruption Mitigation Systems (DMS) in Equatorial Port #08 and #17 by performing

- a Human and Organizational Factors (HOF) analysis of maintenances and inspection operations
- Hazard Identification and Risk Assessment (HIRA) related to Human operations in the port cells.

Both HOF and HIRA tasks are necessary to reflect recent design changes in the integration layout of the ports induced by the design evolution of diagnostic system and DMS. A specific attention is required in support of the DMS vacuum extensions disconnection procedure optimization.

2 Scope

The scope of the work includes Human and Organizational Factors (HOF) assessment and Hazard analysis for the different maintenance and inspection scenarios anticipated by Maintenance and Inspection procedures of the concerned ports and tenants.

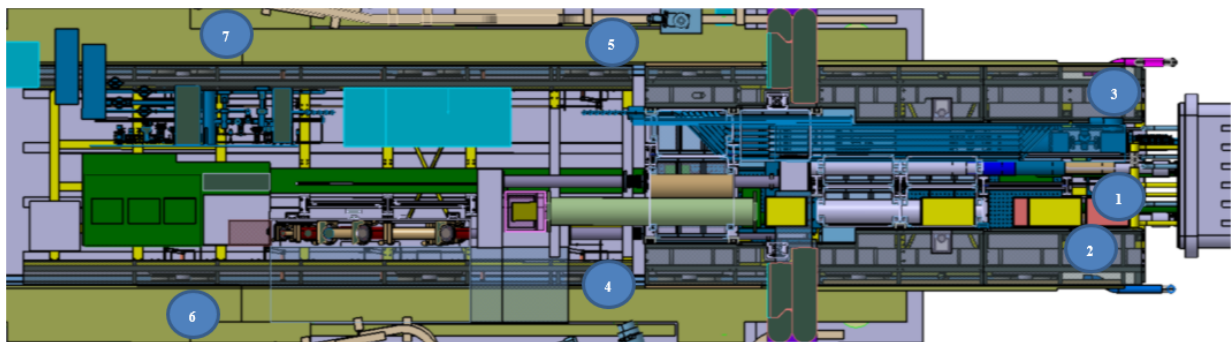


Figure 1. Schematic view (for illustration purposes only) of the work station disposition in EP#08.

3 Definitions

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

Acronym	Meaning
CAD	Computer Aided Design
HoF	Human Organizational Factor
ATP	Autorisation to Proceed
SDDR	Shutdown Dose Rate
EP	Equatorial port
FDR	Final Design Review
HIRA	Hazard Identification and Risk Assessment
ORE	Occupational Radiation Exposure
PCSS	Port Cell Support Structure
PDR	Preliminary Design Review
ISS	Interspace Support Structure
SIC	Structural Integrity Component

RO	Responsible Officer
PIA	Protection Important Activity

4 References

- [1] [ITER_D_YQSQ46](#) – Human and Organizational Factors Lessons Learned and Standard Requirements for ITER Maintenance and Local Operations
- [2] 05_F-DIR_TF-17_PC_Accessibility_Requirement [ITER_D_WVQ7V7](#)
- [3] Safe Access for Maintainability [ITER_D_RUGWUK](#)
- [4] [ITER_D_WQGAU9](#) – Input data report for EP#08 HIRA
- [5] [ITER_D_WQGDAQ](#) – Hazard Identification and Risk Assessment report for EP#08
- [6] [ITER_D_WQFGJZ](#) – Nuclear analysis report of EP#08
- [7] Port Cell #11 maintenance Feasibility study report –FINAL-by Orano ([ITER_D_WF8Y6D](#))
- [8] ITER Procurement Quality Requirements ([ITER_D_22MFG4](#))
- [9] Procurement Requirements for Producing a Quality Plan ([ITER_D_22MFMW](#))
- [10] Quality Assurance for ITER Safety Codes ([ITER_D_258LKL](#))
- [11] ITER_D_QUK6LF - ITER Human & Organizational Factors Policy
- [12] ITER_D_2WBVKU - ITER Human Factor Integration Plan
- [13] ITER_D_SAKT22 - ITER Procedure for HOF Issues Management
- [14] ITER_D_2B6TJB - Definitions of Human Contributions to ITER Safety
- [15] ITER_D_WVVGZA - ITER Human Factors Engineering Glossary and Definitions
- [16] ITER_D_2B7E6E - Overall Framework and Principles for Human and Organizational Factors Integration in ITER
- [17] Protective equipment and hostile environment layout (ITER_D_RBYZ42 v1.1)
- [18] ITER_D_JNPJ7T - Laser hazards table
- [19] ITER_D_NPEVB6 Defined requirements for PBS 55 - Diagnostics
- [20] ITER_D_2MU6W5 ITER Abbreviations
- [21] ITER_D_KTU8HH Software Qualification Policy

5 Estimated Duration

The overall duration of this task order is 12 months.

6 Work description

The work is divided into 2 Work Packages

6.1 WP 1 – Area Hazard Analysis

The objective will be to perform an integrated hazard analysis per area based on ITER Occupational safety procedure, gathering information coming from different PBS (Hazard Identification and Risk Assessment – HIRA per PBS available at each Design review) – see input package, and considering their interaction. The outcome of the risk assessment process shall include all risk mitigation measures that remove or reduce the risk through design solutions.

6.1.1 Input

- French Legal Requirements concerning OHS
- This technical specification
- Contract Input package up to date (notably ITER Occupational safety procedure, PBS HIRA)

- Output of others activities performed in the frame of this work

6.1.2 Activities

- Perform an integrated hazard analysis per area according to IO procedure
 - ➔ Identify the PBSs present each area;
 - ➔ Identify the hazards present;
 - ➔ Classify the room according to IO criteria (Oxygen deficiency, Confined space, Noise, Electricity, Pathogenic agents, ATEX, Laser, Electromagnetism, contamination, irradiation,...)
 - ➔ Identify hazardous interactions between PBSs
 - ➔ Identify transverse issues (lighting, accessibility...)
 - ➔ Identify workstations
 - ➔ Identify frequency of exposure to hazards or any other safety issues
 - ➔ Identify the safety precautions / constraints / limitations applicable to the workplace / room / area
 - ➔ Propose improvement and corrective action
 - ➔ Follow-up the improvement and corrective actions implementation
- Organize technical meeting on Hazard Analysis with IO team
- Closely interact and follow guidelines of IO OHS team

6.1.3 Output

- Hazard Analysis report per area.
These reports will be delivered with intermediate version with following steps:
 - ➔ Step #1: Compilation of hazards present in the room
 - ➔ Step #2: Compilation of integration issues regarding hazards
 - ➔ Step #3: Compilation of maintenance issues regarding hazards
 - ➔ Step #4: Room safety improvement and corrective actions
- These reports will be updated according to the implementation of corrective actions and changes done as per the ALARA implementation (Output of ORE and SDDR assessment).
Area Maintenance Data base filled in with Hazard Analysis parameters

6.2 WP 2 – Human & Organizational Factor analysis

Human & Organizational Factors (HOF) analysis based on ITER HOF program [ITER_D_2WBVKU] and as per the defined requirements for Diagnostics [ITER_D_NPEVB6]. The HOF program will follow the two levels approach:

- **Macroscopic analysis:** the objective of this analysis will be to have an overview of the needs for maintenance operations, the constraints generated by the working environment (hazards management and individual protections needed, accessibility issues, technical environment, performance requirements, etc.). The Return of Experience (REX) from other facilities with similar working situations shall be included - if possible (the contractor with the design/operation experience on the installations representing similar characteristics, especially in terms of hazards management, is preferred).
- **Microscopic analysis** will consist in elaborating and analyzing the maintenance/inspection scenarios (representative for the future possible activity in the port cell areas necessary to ensure facility's safety objectives. The Task Analysis method will be based on maintenance/inspection scenarios analysis. It will cover all

operation conditions that may occur for hands-on tasks performance, in particular for the analysis of the future working situations (workstations) which are the most penalized in terms of environmental and physical constraints, especially for the radiological/beryllium/other toxic zones, and that cover protection important activities [PIA] to address the human and organizational reliability issues.

The Macroscopic and Microscopic studies will be preceded by the review of existing ITER guidelines for the design of local workplaces (on site) and the complementary standards review (including a relevant anthropometric database [US/EU populations; 5th percentile female, 50th percentile male, 95th percentile male for workspace and equipment reachability assessment; 99th percentile male for human passage assessment]).

The HOF analyses will take into account – as far as possible – the Human Contributions to Safety [14] related to any human intervention on PIC components and/or human work performed in irradiated/contaminated areas, necessary to ensure facility's safety objectives. The analyses will identify the most representative working situations in ITER with the goal to cover all operation conditions, and the most penalized cases in terms of risk severity and operational complexity is implemented. These analyses might be done on selected port cell areas, so as the results could be propagated to the design of other (similar) port cell areas.

The results of the HOF analyses will provide the requirements and design solutions for workplace layout, accessibility (human passage, workspace at workstations, and equipment reachability), maintenance/inspection feasibility (e.g. equipment and procedures design), and work organization in line with ALARA and ORE approaches, including Health and Safety requirements.

6.2.1 *Input*

- This technical specification
- Contract Input package up to date (notably ITER HOF program, PBS maintenance plan)
- Output of other activities performed in the frame of this work

6.2.2 *Activities*

- Perform the review of ITER guidelines for the design of local workplaces (on site) and the international standards and guidelines that might bring additional design requirements adapted to ITER specificities (based on the references [1], [2], and [3]).
- Perform macroscopic study of the selected port cell areas in order to have the overview of maintenance operations in terms of accessibility, physical working conditions, radiation/contamination zoning, etc.
 - ➔ Input data analysis (design specification/description, hazard identification, maintenance database with available information such as maintenance/inspection tasks description, existing operating modes, etc.)
 - ➔ Preliminary analysis of the maintenance tasks requirements (analysis of workstations, environmental constraints, PIC/SIC equipment, maintenance and inspection phases and tasks, tools needed for the tasks performance, performance objectives and criteria)
 - ➔ Return of Experience [REX] (data collection/formalization on the operations in similar hazardous working environments, lessons learned for the ITER port cell areas design)

- Working groups / discussions with IO staff (needs analysis, preliminary statements, HOF issues identified, etc.)
- The HOF macroscopic study can be done in collaboration with the WP1 (Area Hazard Analysis), on proposal of the IO HOF expert.
- Perform microscopic study in order to identify and analyze the unsafe operations for human and machine safety, and offer suggestions for possible improvements (design of future working situations)
 - Preparation of the maintenance/inspection scenarios (work situations analysis) to complete safety cases for safety demonstration
 - Perform the task/activity analysis based on the chosen inspection/maintenance scenarios following appropriate HOF techniques, e.g.:
 - Scenarios unfolding based on design documentation support within working groups or interview with IO maintenance experts and designers.
 - Scenarios unfolding based on 3D mock-ups provided by IO
 - Scenarios unfolding based on physical mock-ups provided by IO (if possible)

NOTE 1: The ITER 3D tools (virtual reality), using the human avatars built up in line with the anthropometric database [US/European], should be used for the simulation of maintenance/inspection scenarios to analyse future hand-on tasks in the port cells – at least at the first iteration. The final – integrated demonstration might be done with physical mock-ups, subject to discussion and separate agreement with IO.

NOTE 2: The scenarios to be studied should include the tasks related to the preparation and closing of local interventions (the latter referring to hands-on interventions or remote handling), as well as the rescue and the evacuation of workers.

- Define the dimensions for:
 - Human passage towards workstations (covering the tools and equipment transport for the maintenance) and for rescue/evacuation;
 - Workspace dimensions taking into account the body movements (based on anthropometric database and task analysis) and tools/equipment handling during maintenance scenario (based on task analysis);
- Define the requirements for work organization in port cell areas for the maintenance/inspection on PIC equipment and in line with ALARA approach, to ensure human and organizational reliability;
- Consider the ergonomic requirements for the design of equipment to ensure their maneuverability (reaching distances, grasping, handling, etc.) especially while working in bubble suits and other Personal Protection Equipment;
 - The particular consideration in terms of human reliability should be given for any task to be performed on PIC (see the Human Contributions to ITER Safety [14])
- Consider the system integration in the working zones (port cell areas) with potential impacts generated by the presence of other systems and in line with the ALARA approach (analysis of Safety Sensitive Tasks related to the “limitation of exposure to radiations” safety function);
- Ensure the HOF Data traceability (HOF issues log and HOF design requirements data base update, Maintenance Database update with HOF results)
- Initiate Working groups or discussions with IO staff (needs analysis, preliminary statements, HOF issues identified, etc.)
- Contribute to Integrated Maintenance procedure development, participating to integrated technical meeting

- Organize technical meetings (working groups) on HOF with concerned IO teams and experts
- Review the Area integrated maintenance assessment Report and the Area maintenance report

6.2.3 Output

1. Method for HOF intervention (Human Factors Integration Plan)
2. Lessons Learned from the Return of Experience in similar facilities to feed the design of ITER port cell areas and to incorporate identified good practices in ITER maintenance strategy;
3. HOF report with the results of Task Analyses based on maintenance / inspection scenarios. Specific considerations will be made on the workstation where the 1st confinement barrier will have to be opened.

All the HOF deliverables shall be reviewed and approved by IO HOF RO.

7 Inputs from IO

- CAD models (through DET procedure) of the EP#08 and EP#17 from the port plug closure plate to the port cell door, including the port plug, interspace, bio-shield plug, and port cell as well as tenants;
- 55.Q8 - Maintenance, Test & Inspection Plan ([ITER_D_WQFY54](#))
- Outputs from EP#08 local SDDR assessment ([ITER_D_WQFGJZ](#))
- 55.Q8 - ORE assessment associated with DMS vacuum extensions disconnection on the basis of bagging concept ([ITER_D_4MSJ9Q](#))
- Definitive Maps for Phase I Areas ([ITER_D_3GS3KM](#))
- 55.QH - Maintenance Test & Inspection Plan ([ITER_D_45Q7H7](#))
- Outputs from EP#08 global SDDR assessment (ongoing, will be available in 2022 Q1)
- Outputs from EP#17 global SDDR assessment (ongoing, will be available in 2022 Q3)
- 55.QH - Input data report for HIRA ([ITER_D_45QB2T](#))
- 55.QH - Hazard Analysis Report ([ITER_D_54TDNP](#))
- 55.Q8 - Hazard Analysis Report – FDR ([ITER_D_5ZKGTU](#))
- 55.Q8 - Input data report for HIRA ([ITER_D_WQGAU9](#))
- 55.Q8 - Human and Organizational Factors Analysis ([ITER_D_54S9JU](#))
- Dust Contamination reports - contamination assessment for specific maintenance activities at ITER [9],
- Surface and Airborne Contamination Mapping for a Test Compartment - Task 3A [10].
- ITER_D_QUK6LF - ITER Human & Organizational Factors Policy
- ITER_D_2WBVKU - ITER Human Factor Integration Plan
- ITER_D_SAKT22 - ITER Procedure for HOF Issues Management
- ITER_D_YQSQ46 – Human and Organizational Factors Lessons Learned and Standard Requirements for ITER Maintenance and Local Operations
- ITER_D_2B6TJB - Definitions of Human Contributions to ITER Safety
- ITER_D_2B7E6E - Overall Framework and Principles for Human and Organizational Factors Integration in ITER
- ITER_D_WVVGZA - ITER Human Factors Engineering Glossary and Definitions
- Safe Access for maintainability (ITER_D_RUGWUK v1.3)
- Protective equipment and hostile environment layout (ITER_D_RBYZ42 v1.1)

- ITER_D_JNPJ7T - Laser hazards table
- ITER_D_NPEVB6 Defined requirements for PBS 55 - Diagnostics
- Documents for Diagnostics – PBS55 (for information)

Generic Diagnostic Port Plug Requirements (33LH72 v5.4)
Access space available inside the port cells when using the Personnel Access Door (SKJNGV v1.1)
Access strategy to Port cells (SQ2KFH v1.0)
Port Plug Maintenance List of Processes and Steps 12-02-2014 (BEUTMF v1.0)
Port Plug Maintenance Process Context (M38MRG v1.0)
Port Plug Maintenance Processes 09 and 10 (BFER9E v1.0)
Action A37 Update list of operations for port plug removal and installation_v1-0 (C9Y7AL v1.0)
Action A37 Update list of operations for EQ PP 11_v1-1 (C9YN3C v1.0)
Maintenance of Port Plug Summary Report (N3UWNJ v1.1)
Hands-on maintenance scheme proposal - presentation to PTF (Q4V8Q9 v1.0)
Port Cell Maintenance Standardization Preliminary Assessment (Q4SV8E v1.1)
Port Cell Maintenance - Port Plug Removal Process & VV Inner Environment Evolution (UPU6WP v1.0)
Maintenance Isolators for flange Breaching (ITER_D UPU9HN v1.0)
Detailed Study of Installation and Replacement Procedure (SZRNM7 v1.1)
11. Port Integration - Standardisation - ISS, Bioshield, PCSS Status_T.Giacomin (UHU9QX v1.2)
ITER_D_VESKZM - Port Plug Removal Strategy(v2.0)
ITER_D_V5CKAW - Port Cell Door Airlock Pre-Concept
ITER_D_URPHNL - D.1 Modular ISS / PCSS and bio-shield concept design presentation
ITER_D_URPVX5 - D.3 Modular ISS/PCSS Technical Issues: Remote Handling, Maintenance, ORE
ITER_D_UZAVCZ - D.7 Vacuum extension and contamination control
ITER_D_VVU6QF - Equatorial Ports Breach evolution Sealign Flange to Cask Docking Flange

8 Responsibilities

8.1 Contractor's obligations

The Contractor shall ensure that he complies with the provisions of the Framework Contract in particular with the following:

- The Contractor shall guaranty that all input information provided to perform the task remain property of IO and shall not be used for any other activity than the one specified in this specification.
- The Contractor shall be in charge of the training & coaching of all its resources.
- The contractor shall provide an organization suitable to perform the work as describe in this specification;
- The contractor shall work in accordance with the QA plan approved by IO;
- The contractor shall perform the activities accordingly to this specification taking into account all relevant additional documents and IO processes into account (hand books,

export control, intellectual properties, ...); The Contractor shall be responsible to produce and manage, using the ITER software platform, all the documents listed in chapter 11.

- The Contractor shall provide to the IO representative full access to its work premises and related documentation, to permit to follow up the progress of the work
- The Contractor shall provide the Suitably Qualified and Experienced Personnel (SQEP) for the contract performance, especially in the area of Human and Organizational Factors (see section 15 “Safety Requirements” for the qualification criteria of HOF SQEP)

Prior to the start of work on each activity, the Contractor shall review the input technical information provided to it by IO for completeness and consistency, and shall advise the IO representative of any deficiencies it may find. The contractor shall not be responsible for errors in the input technical information which could not be reasonably detected during such review; duration of this review will be agreed between Contractor and IO representative and will have no impact on the delivery schedule.

8.2 Obligations of the ITER Organization

The ITER Organization shall make available all data and information necessary to perform the activities specified in the present document.

- IO procedures required to achieve the activities according to ITER quality and safety rules;
- Information on diagnostic design and requirements for the development of the window assembly design.

The ITER Organization shall give the possibility to the contractor to review documents on the ITER documents database (IDM).

IO shall make available to the Contractor all technical data and documents which the Contractor requires to carry out its obligations pursuant to this specification in a timely manner. For delays of more than two weeks in making them available, the Contractor shall advise IO representative of the potential impact on the delivery of the Work Packages, to agree and define all the correction actions to take in place.

9 List of deliverables and due dates

N°	DELIVERABLE	EXPECTED DATE
D1	<p>For EP#08 – Update input data report for HIRA per area. HIRA report per area.</p> <ul style="list-style-type: none"> ➔ Step #1: Compilation of hazards present in the room ➔ Step #2: Compilation of integration issues regarding hazards ➔ Step #3: Compilation of maintenance issues regarding hazards ➔ Step #4: Room safety improvement and 	T0+1 Month

	corrective actions	
D2	For EP#08 - Perform macroscopic study of the selected port cell areas in order to have the overview of maintenance operations in terms of accessibility, physical working conditions, radiation/contamination zoning, etc. Perform microscopic study in order to identify and analyze the unsafe operations for human and machine safety, and offer suggestions for possible improvements (design of working situation). For EP#08 FDR-2 and FDR-3 - HoF Report (progressive) with the results of Task Analyses based on maintenance / inspection scenarios. Specific considerations will be made on the workstation where the 1 st confinement barrier will have to be opened.	T0+5 Months
D3	For EP#17 - Update input data report for HIRA per area. HIRA report per area. <ul style="list-style-type: none"> ➔ Step #1: Compilation of hazards present in the room ➔ Step #2: Compilation of integration issues regarding hazards ➔ Step #3: Compilation of maintenance issues regarding hazards ➔ Step #4: Room safety improvement and corrective actions 	T0+6 Months
D4	For EP#17 - Perform macroscopic study of the selected port cell areas in order to have the overview of maintenance operations in terms of accessibility, physical working conditions, radiation/contamination zoning, etc. Perform microscopic study in order to identify and analyze the unsafe operations for human and machine safety, and offer suggestions for possible improvements (design of working situation). For EP#17 FDR - HOF Report (progressive) with the results of Task Analyses based on maintenance / inspection scenarios. Specific considerations will be made on the workstation where the 1 st confinement barrier will have to be opened.	T0+11 Months
D5	For EP#17 - Update of HOF and Hazard Analysis report according to <ul style="list-style-type: none"> - implementation of corrective actions and changes done as per the ALARA implementation (ORE and SDDR) - Comments of the reviewer in IDM For EP#08 - Update of HOF and Hazard Analysis report according to <ul style="list-style-type: none"> - implementation of corrective actions and changes done as per the ALARA implementation (ORE and SDDR) 	T0+12 Months

	regulations). - Chits during FDRs of EP#08 - Comments of the reviewer in IDM	
--	--	--

10 Acceptance Criteria

The reports submitted via IDM will be always reviewed by technical experts of PBS55 nominated by the IO-TRO and by other relevant IO experts where applicable. Revision can be delegated upon consideration of the respective nominees.

The memos submitted via IDM by the Contractor are for general information. No revision nor approval processes are required.

11 Specific requirements and conditions

The Contractor's team shall cover all disciplines that may reasonably be required to carry out the Scope of Work.

The contractor shall demonstrate the qualifications of the HOF specialists (Suitably Qualified and Experienced Personnel [SQEP]):

- With the degree in Human & Organization Factors / Ergonomics (see section 15 for the HOF qualifications requirements),
- Having at least 5 years of working experience in the hazard industry and being familiar with the safety demonstration / safety cases,
- Being familiar with system engineering approach and with HFE methods and techniques for highly complex industrial/experimental systems,
- Having performed the HFE activities for the design of workplaces for maintenance/local operations on installations.

In addition, the following skills are necessary for the success of the activity:

- Strong experience in Mechanical Design in Nuclear Field (knowledge of off the shelf equipment, handling equipment, automatic robotic systems, I&C components, mechanical manufacturability...).
- Maintenance and HIRA experience is a strong commitment for the job to be performed.
- Familiarity with ITER Organization is an advantage.
- Understanding of the contamination and radiological aspects in nuclear facility (relevant to ITER Port Cells and Hot Cells environment).
- Ability to work with CATIA V5, AutoCAD 2D.
- Ability to produce technical documentation (i.e. calculation notes, 2D/3D drawings, design description document, system requirement docs, interface sheets...).
- Demonstrated and practical experience for participants in maintenance in nuclear facility (confinement management, ALARA) on piping, mechanical equipment's
- Experience in nuclear engineering design (equipment to be maintained, maintenance tools, handling)

The use of the Virtual Room will be possible under request from the contractor with a delay of 1 week. IO will assist the contractor for using the virtual Room. This activity will be performed in close collaboration with IO RH and DCIN representatives with whatever additional IO support as needed.

It is noted that Contractor's personnel visiting the ITER site will be bound by the rules and regulations governing safety and security.

The Contractor shall have and maintain the necessary equipment and licenses to run the software tools required to carry out the tasks and produce the deliverables in accordance with the tools adopted by the IO. The Contractor shall ensure that experts are adequately supported and equipped. It shall ensure that there is sufficient administrative, secretarial and interpreting provision to enable experts to concentrate on their primary responsibilities.

The official language of the ITER project is English. Therefore, all input and output documentation relevant to 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 in meetings with the ITER Organization.

The work described here is a Protection Important Activity (PIA). As such, it must be independently reviewed by the supplier and records of the revision must be produced.

All the files involved in the execution of the work must be submitted to ITER IO as a specific deliverable called "Acceptance Data Package" (ADP). This ADP will include, as minimum, the original CAD models, the simplified CAD models and records of independent verification. Additional content of the ADP can be specified by the TRO until the contract closing meeting.

12 Work Monitoring / Meeting Schedule

The work will be started by a dedicated kick-off meeting (KOM) at ITER premises and managed by means of Progress Meetings. It is expected that Progress Meetings will be held biweekly at ITER premises.

The main purpose of the Progress Meetings is to allow the ITER Organization/Diagnostics Division and the Contractor Technical Responsible Officers to:

- Allow early detection and correction of issues that may cause delays;
- Review the completed and planned activities and assess the progress made;
- Permit fast and consensual resolution of unexpected problems;
- Clarify doubts and prevent misinterpretations of the specifications.

The ITER Organization and/or the Contractor may request additional meetings to address specific issues to be resolved.

The Contractor will work predominantly on IO site in order to accelerate the common understanding of the context and focus the effort towards the needed direction. The Contractor shall be present at ITER premises for the PDRs of EP#17 and FDR of EP#08.

13 Delivery time breakdown

T0 is the date of the kick-off meeting.

The PDRs closure of the EP#17 is scheduled for Q1 2022.

The FDR-2 for the EP#08 is planned for Q1 2022.

The FDR-3 for the EP#08 is planned for Q4 2022.

14 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 [8].

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 [9]).

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 [8].

The use of computer software to perform 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 Software Qualification Policy_[21].

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.

The HOF task is a PIA:

- 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.
- The list of the requirements, including defined requirements [20], applicable for the PBS 55 are listed in [ITER_D_28B39L - SRD-55 \(Diagnostics\) from DOORS](#) (version 5.2)
- The contractor’s personnel, whose activities have the potential to impact on nuclear safety (notably, performing the analyses of human contributions to safety and ALARA) have to be **suitably qualified and experienced (SQEP)**¹ to carry out their jobs. The contractor’s organization will show that the HOF analysis is lead by HOF SQEP, who should be able to demonstrate a formally recognised and relevant academic qualification and experience commensurate with the seniority of the role. (In France, the formally recognized qualification in HOF is equivalent to University Master 2 or PhD level with **at least one full year** devoted to ergonomics/human factors²).

¹ A suitably qualified and experienced person (SQEP) is an individual who has the requisite qualifications, training and experience – effectively, the competence – to carry out tasks that may affect the safety of any operations or activities on the site.

² The minimum qualification criteria to perform the HOF/Ergonomic analyses in France are described in [Association for the acknowledgment of European ergonomist professional designation \[ARTEE\]](#).

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 ITER_D_7M2YKF](#).

This task is a PIA.

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