外部委託業者の募集

References: IO/25/OT/10032406/JGO

“Supply Contract for ITER Vacuum Vessel Pressure Suppression System Cooler Condenser"

（ITER 真空容器圧力抑制システム冷却コンデンサーの供給契約）

IO 締め切り 2025 年 7 月 10 日(木)

〇はじめに

本事前情報通知（PIN）は、作業契約の入札授与および実行につながる公開入札調達プロセスの最初のステップです。

この文書の目的は、作業範囲および入札プロセスに関する技術的内容の基本的な概要を提供することです。

〇背景

ITER は平和利用の核融合発電の科学的および技術的な実現可能性の実証を目的とした、国際共同研究開発プロジェクトです。ITER 機構の 7 つのメンバーは、;欧州連合（EURATOM が代表）、日本、中華人民共和国、インド、大韓民国、ロシア連邦、および米国です。

ITER の敷地はフランス南東部のブーシュデュローヌ地区にあり、ITER 本社（HQ）もあるフランス CEA サン・ポール・レ・デュランス に近いところに位置しています。詳細については、ITER のウェブサイト http://www.iter.org を参照して下さい。

〇作業範囲

本入札手続きは、ITER真空容器圧力抑制システム（VVPSS）向けに調達される冷却コンデンサー（EXC）の設計、製作、検査、試験および認証に関する供給契約の締結を目的としています。

詳細については、添付資料Annex II: Technical Specification 854JAF_v1_12.をご参照ください。

〇調達プロセスと目的

目的は、競争入札プロセスを通じて供給契約を落札することです。

この入札のために選択された調達手続きは公開入札手続きと呼ばれます。

オープン入札手順は、次の 4 つの主要なステップで構成されています。

- ステップ 1-事前情報通知（PIN）

  事前情報通知は公開入札プロセスの第一段階です。IO は、関心のある候補企業に対し、以下の概略日程に示された期日までに担当調達担当官に添付の関心表明フォームで以下の情報を提出し、競争プロセスへの関心を示すよう正式に要請します。

  特に注意:

  関心のある候補企業は、IO Ariba の電子調達ツール 「IPROC」 に登録してください（ま

だ登録していない場合）。手順については、
https://www.iter.org/fr/proc/overview
を参照してください。

Ariba（IPROC）に登録する際には、お取引先様に最低１名の担当者の登録をお願いします。この連絡担当者は、提案依頼書の発行通知を受け取り、必要と思われる場合は入札書類を同僚に転送することができます。

- ステップ 2-入札への招待
  関心表明提出後、提案依頼書（RFP）を 「IPROC」 に掲載します。この段階では、担当の調達担当者に関心を示し、かつ IPROC に登録している関心のある候補企業は、RFP が公表された旨の通知を受けることができます。その後、RFP に詳述されている入札説明書に従って提案書を作成し、提出します。

  このツールに登録されている企業のみが入札に招待されます。

- ステップ 3-入札評価プロセス
  入札者の提案は、IO の公平な評価委員会によって評価されます。入札者は、技術的範囲に沿って、かつ、RFP に記載された特定の基準に従って作業を実施するために、技術的遵守を証明する詳細を提供しなければなりません。

- ステップ 4-落札
  認定は、公開されている RFP に記載されている、コストに見合った最適な価格または技術的に準拠した最低価格に基づいて行われます。

〇概略日程

概略日程は以下の通りです：

マイルストーン	暫定日程
事前指示書（PIN）の発行	2025 年 6 月 26 日
関心表明フォームの提出	2025 年 7 月 10 日
入札開始	2025 年 7 月 18 日
明確化のための質問（もしあれば）と回答	入札提出の 5 日前
入札提出	2025 年 8 月 29 日
入札評価と契約授与	2025 年 Q3
契約調印	2025 年 Q4

〇契約期間と実行

ITER機構は2025年のQ3に供給契約を授与する予定です。予想される契約期間は15か月の予定です。

〇候補

参加は、個人またはグループ/コンソーシアムに参加するすべての法人に開放されます。法人とは、法的権利及び義務を有し、ITER 加盟国内に設立された個人、企業又は機構をいいます。ITER 加盟国は欧州連合(EURATOM メンバー)、日本、中華人民共和国、インド共和国、大韓民国、ロシア連邦、アメリカ合衆国です。

法人は、単独で、またはコンソーシアムパートナーとして、同じ契約の複数の申請または入札に参加することはできません。共同事業体は、恒久的な、法的に確立されたグループ又は特定の入札手続のために非公式に構成されたグループとすることができます。

コンソーシアムのすべての構成員(すなわち、リーダーと他のすべてのメンバー)は、ITER 機構に対して連帯して責任を負います。

コンソーシアムとして許可されるために、その点で含まれる法人はコンソーシアムの各メンバーをまとめる権限をもつリーダーをもたなければなりません。このリーダーはコンソーシアムの各目メンバーのために責任を負わなければなりません。

指名されたコンソーシアムのリーダーは、入札段階で、コンソーシアムのメンバーの構成を説明する予定です。その後、候補者の構成は、いかなる変更も ITER 機構に通知することなく変更してはなりません。かかる認可の証拠は、すべてのコンソーシアムメンバーの法的に授権された署名者が署名した委任状の形式で、しかるべき時期に IO に提出しなければなりません。

どのコンソーシアムメンバーも IPROC に登録する必要があります。

【※　詳しくは添付の英語版技術仕様書「**Supply Contract for ITER Vacuum Vessel Pressure Suppression System Cooler Condenser**」をご参照ください。**】**

ITER 公式ウェブ　http://www.iter.org/org/team/adm/proc/overview からもアクセスが可能です。

「核融合エネルギー研究開発部門」の HP：　http://www.fusion.qst.go.jp/ITER/index.html
では ITER 機構からの各募集（IO 職員募集、IO 外部委託、IO エキスパート募集）を逐次更新しています。ぜひご確認ください。

イーター国際核融合エネルギー機構からの外部委託
に関心ある企業及び研究機関の募集について

＜ITER 機構から参加極へのレター＞

以下に、外部委託の概要と要求事項が示されています。参加極には、提案された業務に要求される能力を有し、入札すべきと考える企業及び研究機関の連絡先の情報を ITER 機構へ伝えることが求められています。このため、本研究・業務に関心を持たれる企業及び研究機関におかれましては、応募書類の提出要領にしたがって連絡先情報をご提出下さい。

china eu india japan korea russia usa
Route de Vinon-sur-Verdon - CS 90 046 - 13067 St Paul Lez Durance Cedex - France

PRIOR INFORMATION NOTICE (PIN)

OPEN TENDER SUMMARY

IO/25/OT/10032406/JGO

for

Supply Contract
for ITER Vacuum Vessel Pressure Suppression System Cooler Condenser

Prior Indicative Notice annexes:
- Annex I: Expression of Interest
- Annex II: Technical Specification 854JAF_v1_12

Abstract

The purpose of this summary is to provide prior notification of the IO's intention to launch a competitive Open Tender process in the coming weeks. This summary provides some basic information about the ITER Organisation, the technical scope for this tender, and details of the tender process.

1 Introduction

This Prior Information Notice (PIN) is the first step of an Open Tender Procurement Process leading to the award and execution of Supply Contract.

The purpose of this document is to provide a basic summary of the technical content in terms of the scope of work, and the tendering process.

2 Background

The ITER project is an international research and development project jointly funded by its seven Members being, the European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA. ITER is being constructed in Europe at St. Paul–Lez-Durance in southern France, which is also the location of the headquarters (HQ) of the ITER Organization (IO).

For a complete description of the ITER Project, covering both organizational and technical aspects of the Project, visit www.iter.org.

3 Scope of Work

The present tender process is aiming to set up a Supply Contract for the design, fabrication, inspection, testing and qualification of a Cooler-Condenser (EXC) procured for the ITER Vacuum Vessel Pressure Suppression System (VVPSS).

For more details, please refer to - Annex II: Technical Specification 854JAF_v1_12.

4 Procurement Process & Objective

The objective is to award one Supply Contract through a competitive bidding process.
The Procurement Procedure selected for this tender is called the Open Tender procedure.
The Open Tender procedure is comprised of the following four main steps:

- Step 1- Prior Information Notice (PIN)
  The Prior Information Notice is the first stage of the Open Tender process. The IO formally invites interested Suppliers to indicate their interest in the competitive process by returning to the Procurement officer in charge the attached "Expression of Interest and PIN Acknowledgement" (Annex I) by the date indicated under the procurement timetable.
  Special attention:
  Interested tenderers are kindly requested to register in the IO Ariba e-procurement tool called "IPROC". You can find all links to proceed along with instruction going to: https://www.iter.org/fr/proc/overview.
  When registering in Ariba (IPROC), suppliers are kindly requested to nominate at least one contact person. This contact person will be receiving the notification of publication of the Request for Proposal and will then be able to forward the tender documents to colleagues if deemed necessary.

- Step 2 - Invitation to Tender
  The Request for Proposals (RFP) will be published on our digital tool "Iproc" after the submission of Expression of Interest. This stage allows interested bidders who have indicated their interest to the Procurement Officers in charge AND who have registered in IPROC to receive the notification that the RFP is published. They will then prepare and submit their proposals in accordance with the tender instructions detailed in the RFP.

Only companies registered in this tool will be invited to the tender.

- Step 3 – Tender Evaluation Process
  Tenderers proposals will be evaluated by an impartial evaluation committee of the IO. Tenderers must provide details demonstrating their technical compliance to perform the work in line with the technical scope and in accordance with the particular criteria listed in the RFP.

- Step 4 – Contract Award
  One or several Supply Contracts will be awarded on the basis of best value for money method, according to the evaluation criteria and methodology described in the RFP.

Procurement Timetable

The tentative timetable is as follows:

Milestone	Date
Publication of the Prior Indicative Notice (PIN)	26 June 2025
Submission of Expression of Interest form	No later than 10 July 2025
Tender launch	No later than 18 July 2025
Clarification Questions (if any) and Answers	5 days before submission deadline
Tender Submission	29 August 2025
Tender Evaluation & Contract Award	Q3 2025
Contract Signature	Q4 2025

5 Quality Assurance Requirements

Prior to commencement of any work under this Contract, a "Quality Plan" shall be produced by the Supplier and Subcontractors and submitted to the IO for approval, describing how they will implement the ITER Procurement Quality Requirements.

6 Contract Duration and Execution

The ITER Organization is planning to award the Supply Contract in Q3 2025. The estimated contract duration should be 15 months.

7 Candidature

Participation is open to all legal entities participating either individually or in a grouping/consortium. A legal entity is an individual, company, or organization that has legal rights and obligations and is established within an ITER Member State, being, the European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA.
Legal entities cannot participate individually or as a consortium partner in more than one application or tender of the same contract. A consortium may be a permanent, legally established grouping, or a grouping which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization.
In order for a consortium to be acceptable, the individual legal entities included therein shall have nominated a leader with authority to bind each member of the consortium, and this leader shall be authorised to incur liabilities and receive instructions for and on behalf of each member of the consortium.
It is expected that the designated consortium leader will explain the composition of the consortium members in its offer. Following this, the Candidate's composition must not be modified without notifying the ITER Organization of any changes. Evidence of any such authorisation shall be submitted to the IO in due course in the form of a power of attorney signed by legally authorised signatories of all the consortium members.
Any consortium member shall be registered in IPROC.

8 Sub-contracting Rules

All sub-contractors who will be taken on by the Contractor shall be declared with the tender submission in IPROC. Each sub-contractor will be required to complete and sign forms including technical and administrative information which shall be submitted to the IO by the tenderer as part of its tender.
All declared sub-contractors must be established within an ITER Member State in order to participate.
The IO reserves the right to approve (or disapprove) any sub-contractor which was not notified in the tender and request a copy of the sub-contracting agreement between the tenderer and its subcontractor(s). Rules on sub-contracting are indicated in the RFP itself.

ANNEX I

EXPRESSION OF INTEREST & PIN ACKNOWLEDGEMENT

To be returned by e-mail to: jingyu.gao@iter.org in cc to serena.profita@iter.org

Tender reference: **IO/25/OT/10032406/JGO**

Description: **Supply Contract for ITER Vacuum Vessel Pressure Suppression System Cooler Condenser**

Procurement Officer: **Jingyu Gao**

Company Name: **……**

Country of Origin: **……**

☐ WE ACKNOWLEDGE HAVING READ THE PIN NOTICE FOR THE ABOVE MENTIONED TENDER

☐ WE INTEND TO SUBMIT A TENDER

☐ WE ARE ALREADY REGISTERED IN IPROC

☐ WE INTEND TO REGISTER IN IPROC

Please list the users of ARIBA/IPROC that you wish to add as response team for this tender:

Name	E-mail
…	…

……

Signature:

COMPANY STAMP

Name: .....
Position: .....
Tel: .....
E-mail.....
Date: .....

IDM UID
854JAF

VERSION CREATED ON / VERSION / STATUS
18 Jun 2025 / 1.12 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

Technical Specification for Design, Manufacturing and Qualification of the VVPSS Cooler-Condenser

This technical specification outlines the requirements for the design, fabrication, inspection, testing and qualification of a Cooler-Condenser (EXC) procured for the ITER Vacuum Vessel Pressure Suppression System (VVPSS). The scope covers all activities necessary to ensure the delivery of fully compliant and qualified VVPSS EXC, meeting the project's structural, functional and regulatory requirements.

CONTENTS

1 PREAMBLE

This Technical Specification is to be read in combination with the General Management Specification for Service and Supply (GM3S) – [AD- 44] that constitutes a full part of the technical requirements.

In case of conflict, the content of the Technical Specification supersedes the content of [AD- 44].

2 PURPOSE

The purpose of this document is to describe the technical requirements for the design, equipment qualification, manufacturing and delivery of the cooler-condenser for the Vacuum Vessel Pressure Suppression System.

3 ACRONYMS

For a complete list of the ITER abbreviations, see ITER_D_2MU6W5. The abbreviations listed below shall have the following meanings where used:

ANB	–	Agreed Notified Body
ASME	–	American Society of Mechanical Engineers
ASN	–	Autorite de Surete Nucleaire (French nuclear safety authority)
ASTM	–	American Society for Testing and Materials
CRO	–	Contract Responsible Officer
DA	–	Domestic Agency
DN	–	Nominal Diameter
DTR	–	Drain Tank Room
EN	–	European Standard
ESP	–	Equipements Sous Pression
ESPN	–	Equipements Sous Pression Nucléaires
EXC	–	VVPSS Cooler-Condenser
HRA	-	Hazard and Risk Analysis
INB	–	Installation nucléaire de base (Basic nuclear installation)
IO	–	ITER Organization
ISO	–	International Organization for Standardization
MIP	–	Manufacturing and Inspection Plan
MRR	–	Manufacturing Readiness Review
MQP	–	Manufacturing Quality Plan
NDE	–	Non-destructive Examination
NPE	-	Nuclear Pressure Equipment
PED	–	Pressure Equipment Directive (equiv. ESP)
PIA	–	Protection Important Activity
PIC	–	Protection Important Component
PQR	–	Procedure Qualification Record
RTPO	-	Recognized Third Party Organization
QA	–	Quality Assurance
QAP	–	Quality Assurance Program
QC	–	Quality control
QP	–	Quality Plan
SDR	–	Supplier Deviation Request
SIC	–	Safety Importance Class
SO	–	Supply Order
VTA	-	Vendor to Advise
VVPSS	–	Vacuum Vessel Pressure Suppression System
WPQ	–	Welding Procedure Qualification
WPS	–	Welding Procedure Specificati

4 APPLICABLE DOCUMENTS & CODES AND STANDARDS

The orders, directives, codes and standards used in this contract are listed here. Other standards may also be acceptable, subject to IO's approval. The Contractor shall demonstrate conformity with the orders, directives, codes and standards in their last version.

For items not covered by the prod codes and technical specifications, the Contractor shall justify the soundness of the design approach.

For the ITER Applicable and Reference Documents, the last approved version applies. IO will notify the Contractor if any of the documents listed in the table below will be updated.

Table 1, List of Applicable Codes and Standards

Codes and Standards		
[AD- 1]	EN 13445:2014	Unfired pressure vessel
[AD- 2]	EN 13480:2017	Metallic industrial piping
[AD- 3]	EN 1092-1:2018	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories PN designated – Part 1: Steel flanges.
[AD- 4]	RCC-M:2022	RCC-M Section VI Design and Construction Rules for Mechanical Components of PWR Nuclear Islands
[AD- 5]	ASME NQA-1 - 2019	Quality Assurance Requirements for Nuclear Facility Applications
[AD- 6]	ISO 724:1993	ISO general-purpose metric screw threads – Basic dimensions
[AD- 7]	ASME B18.21.1:2009	Heavy Helical Spring Lock Washers
[AD- 8]	EN 10204:2004	Metallic products – Type of inspection documents
[AD- 9]	EN 1591:2013	Flanges and their joints - Design rules for gasketed circular flange connections - Part 1: Calculation
[AD- 10]	ISO 17025:2017	General requirements for the competence of testing and calibration laboratories
[AD- 11]	ISO 9001:2015	Quality management systems - Requirements
[AD- 12]	ISO 9712:2012	Non-destructive Testing - Qualification and Certification of NDT Personnel
[AD- 13]	SSPC-1:2015	Solvent Cleaning
[AD- 14]	SSPC-2:2018	Hand Tool Cleaning
[AD- 15]	SSPC-5:2007	White Metal Blast Cleaning
[AD- 16]	SSPC-10:2007	Near-White Metal Blast Cleaning
[AD- 17]	IEC/IEEE 60980-344	Nuclear facilities – Equipment important to safety – Seismic qualification
[AD- 18]	EN 9606:2017	Qualification testing of welders - Fusion welding - Part 1: Steels.
[AD- 19]	EN 3834-2:2021	Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements
[AD- 20]	EN 15614-1:2017	Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys

[AD- 21]	ISO 9692:2013	Welding and allied processes — Types of joint preparation — Part 1: Manual metal arc welding, gas-shielded metal arc welding, gas welding, TIG welding and beam welding of steels
[AD- 22]	EN 2516:1989	Aerospace series - Passivation of corrosion-resisting steels and decontamination of nickel base alloys
[AD- 23]	EN 17637:2016	Non-destructive testing of welds - Visual testing of fusion-welded joints
[AD- 24]	EN 17636:2022	Non-destructive testing of welds - Radiographic testing - Part 1: X- and gamma-ray techniques with film
[AD- 25]	ISO 10675-1:2022	Non-destructive testing of welds — Acceptance levels for radiographic testing — Part 1: Steel, nickel, titanium and their alloys
[AD- 26]	EN 11666:2018	Non-destructive testing of welds - Ultrasonic testing - Acceptance levels
[AD- 27]	EN 17640:2018	Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment
[AD- 28]	EN 9606-1:2017	Qualification testing of welders – Fusion welding – Part 1: Steels
[AD- 29]	EN 1515-4:2009	Flanges and their joints - Bolting - Part 4: Selection of bolting for equipment subject to the Pressure Equipment Directive 2014/68/EU

Table 2, List of ITER Applicable Documents

ITER Applicable Documents		
[AD- 30]	ITER_D_22MFG4	Quality Requirements for IO Performers
[AD- 31]	ITER_D_VT29D6	Instruction for Seismic Analysis
[AD- 32]	ITER_D_35BVV3	Instructions for Structural Analyses
[AD- 33]	ITER_D_2LTQ96	Radioprotection guide for ESPN application
[AD- 34]	ITER_D_XB5ABP	Equipment Qualification Program
[AD- 35]	ITER_D_KTU8HH	Software qualification policy
[AD- 36]	ITER_D_28QDBS	ITER Numbering System for Components and Parts
[AD- 37]	ITER_D_X3NEGB	Working Instruction for the Delivery Readiness Review (DRR)
[AD- 38]	ITER_D_848KCS	VVPSS Cooler-Condenser (EXC) datasheet
[AD- 39]	ITER_D_44SZYP	Working Instruction for Manufacturing Readiness Review
[AD- 40]	ITER_D_22F53X	Requirements for DA / Supplier / Subcontractors Deviations & Nonconformities
[AD- 41]	ITER_D_258LKL	Quality Assurance for ITER Safety Codes Procedure
[AD- 42]	ITER_D_4EUQFL	Overall supervision plan of the chain of suppliers for Safety Important Components, Structures and Systems and Safety Related Activities
[AD- 43]	ITER_D_3G3SYJ	Allowable values and limits in service level C and D for ITER mechanical components
[AD- 44]	ITER_D_82MXQK	General Management Specification for Service and Supply (GM3S)
[AD- 45]	ITER_D_74C73Q	Guideline for allowable loads for valves with flanged connection
[AD- 46]	ITER_D_XB5ABP	Qualification of Protection Important Components (PIC)
[AD- 47]	ITER_D_ADCXXD	Guidelines for qualification of mechanical equipment
[AD- 48]	ITER_D_98JL4W	Test method for ITER equipment for static magnetic fields
[AD- 49]	ITER_D_ADD99Y	Guidelines for qualification of electrical and I&C equipment
[AD- 50]	ITER_D_22F53X	Procedure for Management of Nonconformities

[AD- 51]	ITER_D_AKFUMQ	Guidelines for qualification by analysis
[AD- 52]	ITER_D_AGL2QP	Technical Specification for the Experimental Seismic Qualification of Active Electrical and Mechanical Components

Table 3, List of Applicable Orders and Directives

Applicable Regulatory Documents		
[ARD- 1]	PED/ESP	European Pressure Equipment Directive 2014/68/EU of 15th of May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment
[ARD- 2]	ESPN Order	Order dated 30th of December 2015 on nuclear pressure equipment. Consolidated version after the 1st of January 2019 shall be taken into account.
[ARD- 3]	INB Order	Order dated 7 February 2012 relating to the general technical regulations applicable to INB

Table 4, List of ITER reference documents for information

ITER Reference Documents for Information		
[RD- 1]	ITER_D_DU9A7L	ASN Guide #8 Conformity Assessment of Nuclear Pressure Equipment - Version of 2012-09-04 - EN
[RD- 2]	ITER_D_FXQ9NZ	ASN Guide #19 - Application of the French Order dated 12/12/2005 on Nuclear Pressure Equipment – Version of 21-02-2013 - EN
[RD- 3]	ITER_D_2LAJTW	Tritium Handbook
[RD- 4]	ITER_D_2EZ9UM	ITER Vacuum Handbook
[RD- 5]	ITER_D_KF63PB	ITER Safety Requirement Roombook
[RD- 6]	ITER_D_PSTTZL	List of ITER–INB Protection Important Activities
[RD- 7]	ITER_D_QVEKNQ	Release Note Template
[RD- 8]	ITER_D_WZPYVZ	Delivery Report Template
[RD- 9]	ITER_D_XBZLNG	Package & Packing List Template
[RD- 10]	ITER_D_WU9636	Template - Equipment Storage & Preservation Requirements Form
[RD- 11]	ITER_D_VQVTQW	Template for Structural Analysis Reports
[RD- 12]	ITER_D_22K4QX	ITER Quality Assurance Program (QAP)
[RD- 13]	ITER_D_X7KQRZ	HMS System Load Specification
[RD- 14]	ITER_D_4XYEJG	Thermal analysis for passive fire protection of the VVPSS lines
[RD- 15]	ITER_D_*BK7Y2G*	Template for Equipment Identification file
[RD- 16]	ITER_D_AQKXEH	Template for Qualification Strategy
[RD- 17]	ITER_D_BXTPJP	Template for Qualification Dossier
[RD- 18]	ITER_D_BXTNRJ	Template for Qualification follow-up document
[RD- 19]	ITER_D_BXTLMX	Template for Qualification Preservation Sheet
[RD- 20]	ITER_D_B9HR4D	Template for Qualification Plan
[RD- 21]	ITER_D_BXTDJE	Template for Qualification Synthesis Report
[RD- 22]	ITER_D_BXD2SS	Template for Qualification Test Specifications
[RD- 23]	ITER_D_BXTMAL	Template for Reference File
[RD- 24]	ITER_D_BXSQE9	Template for Qualification Test Report
[RD- 25]	ITER_D_AGL2QP	Technical Specification for the Experimental Seismic Qualification of Active Electrical and Mechanical Components
[RD- 26]	ITER_D_2ERTXQ	Load Specifications for Buildings with Safety Requirements
[RD- 27]	ITER_D_WDBC7H	List of manufacturing documents to be prepared and stored for PE and NPE

5 SCOPE OF WORK

The contractor is responsible for all necessary design development, qualification, and manufacturing activities to deliver the Vacuum Vessel Pressure Suppression System Cooler-Condenser that meets all applicable requirements. The tender aims to establish a contract for supplying a gas cooler and humidity condenser for the Vacuum Vessel Pressure Suppression System. The Exhaust Cooler-Condenser (EXC) is a component of the ITER Vacuum Vessel Pressure Suppression System (VVPSS) and provides cooling to 500 Nm^3/h of high-humidity air to reduce the water content of the gas. The activities are divided into the following tasks:

- **Task 1: Design & Structural Integrity Verification:** Develop a detailed process and mechanical design of the EXC for manufacturing. Perform structural integrity verification of the designs using the loads specified in this technical specification. Submit all geometry data, models, and drawings required for the integration of the equipment into the VVPSS CAD model. Provide all mandatory qualification documentation and documentation needed for the Final Design Review.
- **Task 2: Manufacturing:** Manufacture the EXC in line with the applicable requirements.
- **Task 3: Inspection, Examination and Factory Acceptance Tests:** Perform all necessary inspections, examinations, and testing required by the design code and technical specification.
- **Task 4: Delivery to IO site:** Design, analyse, and manufacture a suitable transport package for the cooler-condenser. Clean and prepare the equipment for transport. Prepare and hand over all documentation required by this technical specification.

The contractor has the option to divide the EXC cooling stages and the moisture separator into multiple separate pressure boundaries. Adding a moisture separator at the outlet of the EXC, while still inside the pressure vessel, will be considered an advantage during the tender phase. The contractor must specify the form of the moisture separator in the final delivery. If the moisture separator is part of the scope of work, the contractor is responsible for adhering to all requirements outlined in this specification, being considered as a compartment of the ESPN vessel.

Note, Task 2 can only begin after the approval of the internal ITER design gate. The contract will be put on hold after completing Task 1 until the ITER Final Design Review is completed. The target timeframe for the VVPSS Final Design Review is set from Q1 to Q3 of 2026.

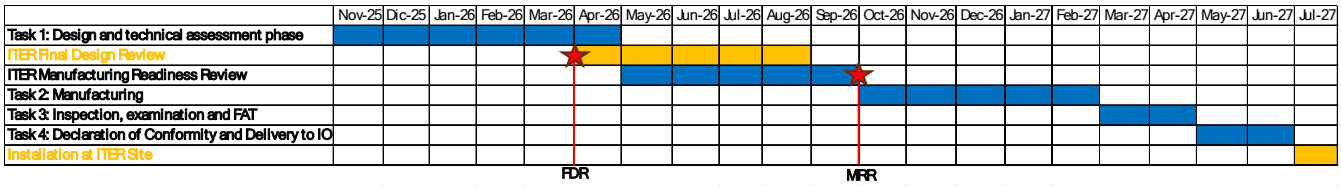


Figure 1, Estimated timeline for the delivery

5.1 MAIN FUNCTIONS AND BOUNDARIES

The main functions of the cooler-condenser can be summarised as follows:

1. To cool the Hydrogen Mitigation System (HMS) gas effluents;
2. To separate from the outlet gas flow and collect the condensed tritiated water;
3. To ensure confinement of the radioactive inventory.

Boundaries of jurisdiction shall be the equipment end connections (e.g. nozzles), where the condenser's pressure boundary connects to the adjoining VVPSS piping. The EXC is a nuclear pressure equipment, classified following [ARD- 1] and[ARD- 2], as defined in Section 7.1.

6 BACKGROUND INFORMATION

The Exhaust Cooler-Condenser (EXC) is a component of the ITER Vacuum Vessel Pressure Suppression System (VVPSS) and provides a final stage of cooling to the gas extracted from the ITER Vacuum Vessel before discharging them to the Detritiation System (DS). The cooling stage reduces the water content to meet the required level for the DS as well as the content of tritiated water vapour in the exhaust gas.

To ensure redundancy, the EXC foresees two units in series, with independent cooling supplies.

The ITER Chilled Water System (CHWS, PBS.26) constitutes the cold side of the EXC and the cooling role is defined as a Protection Important Component (PIC) function of ITER. This component consists of two independent internal cooling loops, each cooled by a separate chilled water train.

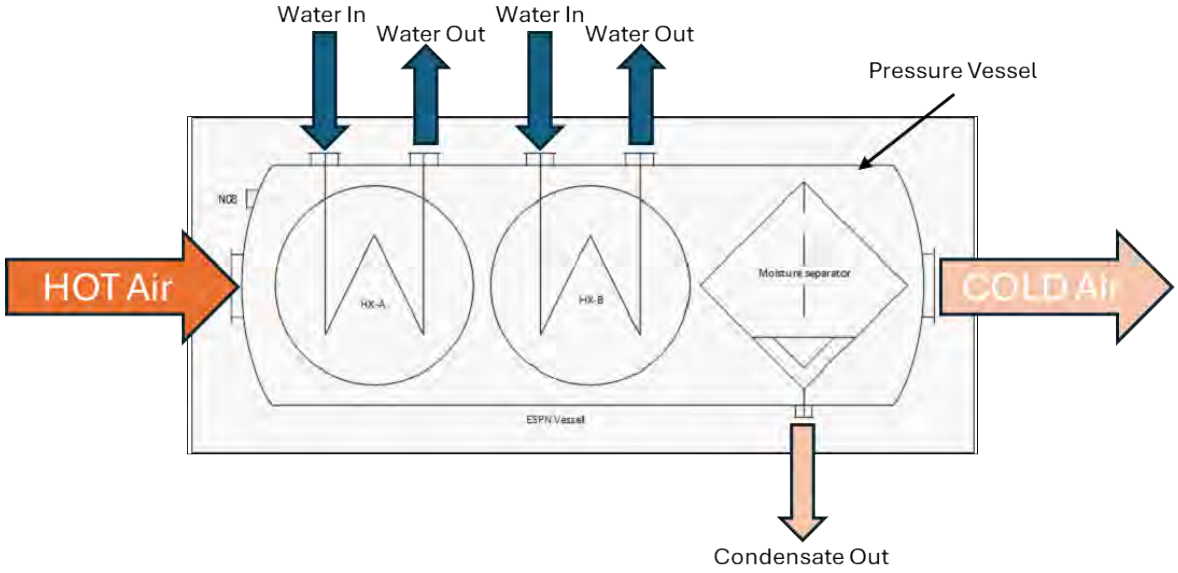


Figure 2, Preliminary EXC configuration – the moisture separator can be excluded from the scope of work if the dimension of the pressure vessel exceeds the space identified

7 TECHNICAL REQUIREMENTS

7.1 CLASSIFICATION AND CONFORMITY DECLARATION

Table 5, Cooler-condenser classification

	Safety class	Quality class	Seismic class	Vacuum class	Tritium class	PED Fluid type	PED category	ESPN level
EXC Body	PIC	QC-1	SC-1 (S) SL-2	No-VQC	TC-2A	Gas - II	IV	N3

Internal cooling pipes	PIC	QC-1	SC-1 (S) SL-2	No-VQC	Non-TC	Liquid - II	IV	N3
Moisture separator (optional)	PIC	QC-1	SC-1 (S) SL-2	No-VQC	TC-2A	Gas - II	IV	N3

NOTE, the classification of the EXC and its compartments will be confirmed once the Contractor provides the preliminary design.

NOTE, the "common walls", which define the boundaries of the ESPN compartments, shall be treated as per ESPN requirements.

Declaration of conformity to PED – ESPN regulations

The contractor is responsible for performing a conformity assessment in accordance with PED and the supplemental requirements of the IO technical specification only. The contractor will not be responsible for performing the conformity assessment for Nuclear Pressure Equipment (ESPN). As the Regulatory Manufacturer and Operator of the EXC, the ITER Organization (IO) will appoint an Agreed Notified Body (ANB) to conduct the conformity assessment in accordance with the ESPN Module H1.

The contractor shall provide the technical information needed for the IO to perform the ESPN conformity assessment until it is concluded and approved.

For the ESPN conformity assessment, the sizing of critical pressure parts shall take into account the worst-case tolerance analysis.

As a QC-1 component, critical quality activities must be approved by IO before being undertaken. Special processes identified throughout the document will require their procedures to be submitted to IO and accepted prior to their undertaking, and reports submitted in the manufacturing dossier

7.2 DESIGN CODES

The EXC is recommended to be designed and manufactured according to EN 13445 [AD- 1]. In addition to EN standards, the Contractor may use another design code to meet the requirement.

In addition to EN standards, the Contractor may use another design code to meet the requirements upon prior approval by IO.

The choice of code is at the discretion of the Contractor. However, if the Contractor selects a non-PED harmonised standard, it is the Contractor's responsibility to demonstrate the compliance of the selected design code with the PED Essential Safety Requirements.

7.3 QUALIFICATION OF ITER PROTECTION IMPORTANT COMPONENTS

This contract includes the complete qualification of the equipment for both normal and accidental conditions. The Contractor shall carry out Structural Integrity Analysis for pressure, temperature, interface and seismic loading conditions.

As stated in [AD- 46], this procedure applies to all active and passive PICs.

Equipment shall be qualified according to the following methods:

- Qualification by testing;
- Qualification by analysis (analogy/similarity, calculation, FEM);
- Qualification by the combination of both above methods.

Note, the Contractor is invited to provide information regarding its qualification experience and capabilities during the bidding process.

It is the responsibility of the IO to provide the Contractor with all the design input data.

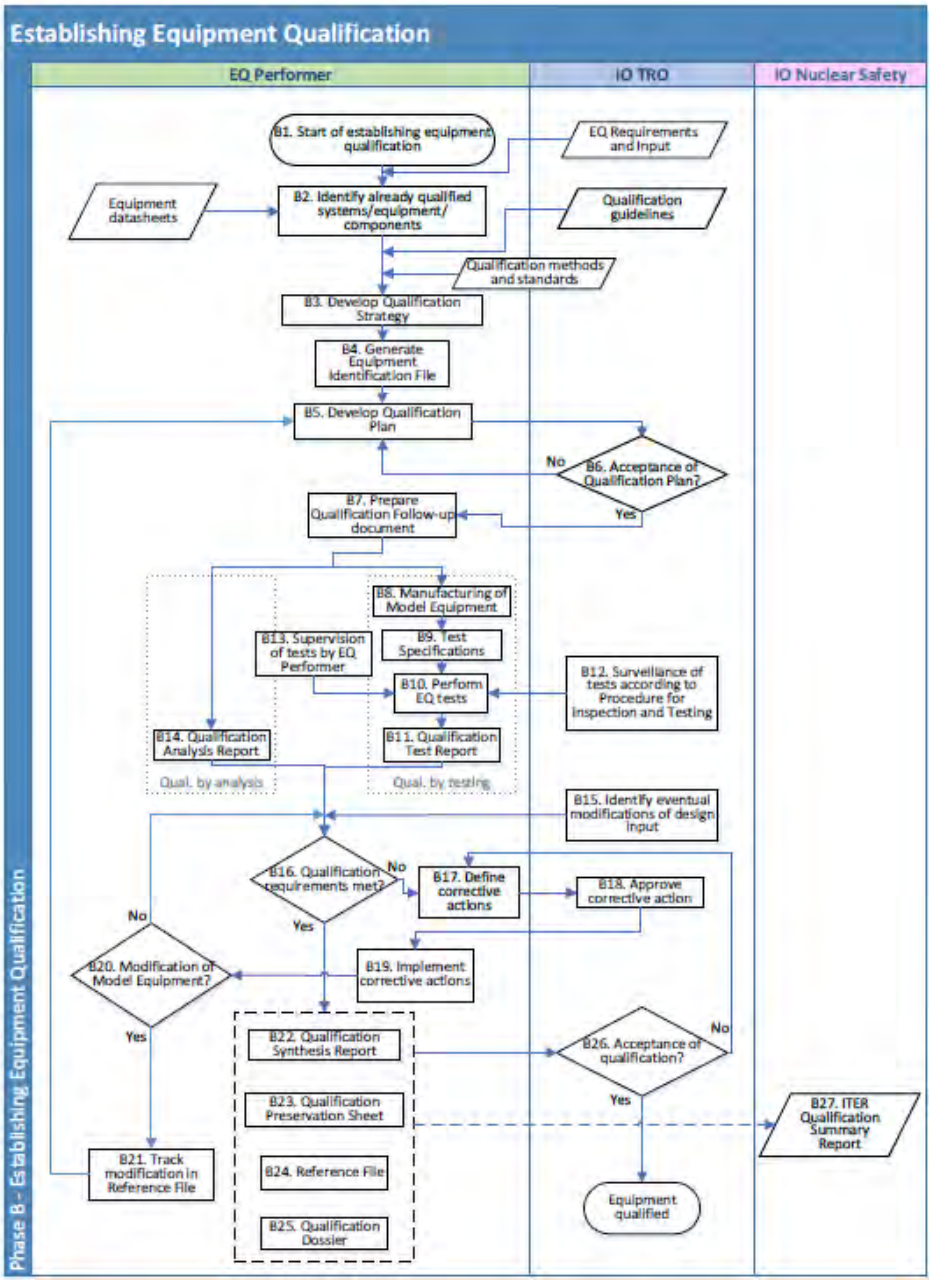
Table 6 provides the qualification documents maturity at the end of the design phases.

Table 6, Qualification documents maturity

Output	Final Design Review	Manufacturing Readiness Review, see 7.11
List of equipment to be qualified	Complete	
Identification File	Preliminary	

Qualification plan	Preliminary	
Qualification Test Specifications		Complete
Qualification Test Report		Complete
Qualification Analysis Report		Complete
Qualification Synthesis Report		Complete
Qualification Preservation Sheet		Complete
Reference file		Complete

Once the design input data are submitted, the Contractor, as Equipment Qualification Performer, shall follow the following steps:



7.3.1.1 Qualification of ITER Mechanical Components

Guidelines for the qualification of ITER mechanical components are available in [AD- 47].

Note, IO recommends the use of RCC-M [AD- 4] *to complement what is indicated in* [AD- 47].

- The Contractor shall identify the equipment or assembly in the Identification File.

7.4 LIFETIME

The EXC shall have a design life of 25 years.

From a qualification perspective, the lifetime starts at the end of manufacturing and so the duration spent in the warehouse and installation can be considered as follows:

- Storage at the ITER warehouse: up to 3 years - Storage Level C is considered.
- Installation: up to 2 years
- Operation: up to 20 years.

State	Storage - Level C	Installation	Operation
External Pressure	Atmospheric pressure		As per the Section 7.5
Internal Pressure			
Temperature	-8°C to +40°C indoor, no temperature control		
Humidity	0 to 100% (not controlled)		
Electromagnetic field	N/A		
Seismic	As per the Section 7.7.2		
Fire	As per the 7.7.3		

7.4.1.1 Ageing

The ageing of the EXC is not addressed in this technical specification for the following reasons:

- It is located in the ITER B11 facility, which maintains a controlled temperature and humidity environment.
- The VVPSS system is not continuously operational within ITER; it is estimated that the EXC will be operated less than 100 times over its lifetime.
- The VVPSS system experiences only low levels of vibration, typical of a standard industrial environment.
- While VVPSS items are exposed to irradiation during ITER plasma operation, irradiation qualification is only required for items that may degrade under fluxes. Irradiation qualification is also necessary when electronic devices are included.

7.5 OPERATING CONDITIONS

Design Conditions for the Vessel

Maximum Allowable Pressure (PS): 9 barg

Maximum Operating Temperature (TS_max): 100°C

Minimum Operating Temperature (TS_min): 0°C

Design Conditions for the Cooling Pipes

Maximum Allowable Pressure (PS): 20 barg

Maximum Operating Temperature (TS_max): 60°C

Minimum Operating Temperature (TS_min): 0°C

Operating Conditions

Parameter	Unit	Hot Side			Cold Side	
		Inlet	Outlet		Inlet	Outlet
Fluid Name	-	Process gas	Process gas	Condensate	Chilled Water	
Composition		99% air, 1% H_2 saturated with water vapour	99% air, 1% H_2 saturated with water vapour	100% water	Demin. water	
Corrosive content	-	N/A				
Fluid group (I/II ref PED)	-	II			II	

Maximum Flowrate	kg/h	670	600	70	23000 Note 1
Minimum Flowrate	kg/h	424	384	40	-
Operating Pressure	bar(a)	0.75			9
Nominal Density	Kg/m^3	0.758	0.913	1000	1000
Temperature	°C	50	11		6 <12
Dew Point	°C	50	11	-	-
Total Allowable Pressure Drop	Pa	1000			VTA

Note 1 - Chilled water flowrate per cooling unit, two independent cooling units shall be provided, each sized to perform 100% of the cooling duty

VTA - Vendor to Advise

Table 7, EXC design parameters

7.5.1 Relevant VVPSS Load Specification

Load Case	Internal Pressure Vessel [bara]	Internal Pressure Cooling Pipes [bara]	External Pressure [bara]	Temperature [°C]	Service Level
Hydrostatic test	PS*1.5	PS*1.5	Ambient	Ambient	A
Design conditions (PS, T_d)	PS	PS	Ambient	TS_max	A
External DTR accident	1	9	2	130	A
Fire in DTR	1	9	1.05	277	A
Normal Operation+SMHV	1	9	Ambient	Ambient	A
Normal Operation+SL-2	1	9	Ambient	Ambient	C

7.6 GEOMETRICAL FEATURES

The EXC will be installed in a highly congested area with large quantities of equipment. To allow a proper integration in the existing environment, the following table defines the maximum dimensions of the EXC.

Table 8, EXC geometrical features

	Value	Unit
L*W*H for the EXC vessel	2300 * 850 * 1500 [1]	mm
Connection type	Contractor to advise, based on inspection/maintenance, leak tightness, etc.	-

Table 9, Preliminary EXC nozzle list

Nozzles		
Tag	**Size**	**Function**

[1] **To ensure integration with the VVPSS system and the constraints with the DTR, any deviations from** The EXC will be installed in a highly congested area with large quantities of equipment. To allow a proper integration in the existing environment, the following table defines the maximum dimensions of the EXC.

Table 8 shall be assessed and approved by IO.

N01	DN150	Gas Inlet
N02	DN150	Gas Outlet
N03	DN65	Chilled Water Inlet
N04	DN65	Chilled Water Outlet
N05	DN65	Chilled Water Inlet
N06	DN65	Chilled Water Outlet
N07	DN40	Water Drain Line
N08	DN40	Water Cleaning Line
N09	TBD	Inspection

- The EXC shall be provided with a method of handling, such as lugs or eyebolts, to allow easy removal/maintenance and limit the exposure of workers to radioactive material. The heaters shall be designed for transporting and lifting in both vertical and horizontal positions.
- Each hanging/lifting lug shall be designed to support 175% of the dry weight of the respective component.

7.6.1 Insulation

- The EXC shall be thermally insulated on its external surfaces to limit heat gain from the environment to the vessels as well as act as a vapour barrier, protecting the vessels from external condensation.
- The insulation shall be a minimum of 25 mm thick. The Contractor shall demonstrate that the thickness of the insulation is enough to maintain the EXC below the maximum allowable temperature under fire load, see Section 7.7.3.
- The insulation material shall be free of halogenated material.
- The EXC shall be provided with supports upon which the insulation is fixed. Supports shall be capable of collectively supporting 125% of the insulation load. The insulation shall be reliably and safely fixed around the surface of each vessel and shall remain properly attached to the vessel following an SL2 seismic event.
- The insulation and cladding system shall be easily removable to enable inspection of the outer surface of the vessels.

7.7 STRUCTURAL INTEGRITY ANALYSIS

Structural integrity analyses are considered “Special Processes”.

- The Contractor should use FEA or analytical calculation to address all those design provisions not fully validated by the design code selected.
- Analysis reports shall be produced by the template for Structural Analysis Report [RD- 11].

7.7.1 Stress analysis

- The Contractor shall demonstrate the structural integrity of the EXC by using the structural analysis to verify that the components can withstand all identified loads to the required service level. The structural analysis shall be undertaken in compliance with Instructions for Structural Analyses [AD- 32].
- The analysis shall include stress calculations, which can be performed analytically or via FEM, using ANSYS or ABACUS software and complying with the Software Qualification Policy [AD-35]. All files in ANSYS or other calculation software to make a calculation, referenced in the reports shall be submitted to IO.

7.7.2 Seismic qualification

It is recommended that the Contractor provides since the beginning a detailed quotation and planning of the activities that consider the selected seismic qualification.

- The EXC shall be capable of withstanding the accelerations associated with an SL2 seismic event without loss of functional performance or confinement.
- The Contractor shall demonstrate via analysis that the EXC can achieve the normal operation functionality following an SMHV (Maximum historical probable earthquakes) event and maintain structural integrity during SL2 seismic events.

- All pressure equipment shall maintain its pressure boundary integrity after a seismic event.

For SMHV, a factor of 0.8 will be applied to the SL-2 FRS.

The methodology for seismic qualification of the EXC can be obtained from the guidelines for qualification by analysis [AD- 51] and the ITER Instruction for Seismic Analysis [AD- 31]. The methodology for performing seismic qualification by testing can be obtained from [AD- 52].

Qualification to seismic resistance can be performed by tests, analysis or mixed/combined methods.

Note, the qualification by analysis alone is recommended only for the analysis of the structural integrity of the equipment and its mounting; it is not recommended for analysing equipment functionality.

Appendix 1 provides the Contractor with the Floor Response spectrum.

7.7.2.1 Seismic Qualification Test Sequence

The seismic qualification tests, applicable only to those extended structures for which the analytical qualification is deemed not sufficient, shall be performed according to the standard IEC/IEEE 60980-344 Nuclear facilities – Equipment important to safety – Seismic qualification [AD- 17].

The seismic tests will have to be implemented after ageing preparation and tests.

7.7.2.2 Acceptance Criteria

Structural Integrity	Leak Tightness	Operability
No broken parts, no deformation.	No leaks out of the pressure boundary. Nozzle connection is maintained during and/or after the earthquake.	Gas and water flow normally.

7.7.3 Fire

Maximum fire temperature: 277°C

- The contractor shall guarantee the structural integrity of PIC components during and after a fire accident. Integrity is demonstrated with no external leaks and operability after a fire event.

7.8 MATERIALS

The material selected for the cooler-condenser is 304L Austenitic Stainless Steel.

Materials		
Cast items	ASTM A351 CF3	EN 10213 Grade GX2CrNi19-11 (1.4306)
Forged items	ASTM A182 F304L	EN 10222-5 Grade X2CrNi18-9 (1.4307)
Items fabricated from plate material	ASTM A240/A240M	EN 10088-2 Grade X2CrNi18-9 (1.4307)

- Any deviation from this material shall be agreed with IO and, in any case, compatible with the VVPSS piping assembly, which is ASTM A312M, grade TP304L.
- To ensure the VVPSS meets the radioprotection guidelines as stipulated in the Radioprotection Guide for ESPN Application [AD- 33], strict requirements are placed on the chemical composition of Cobalt, Niobium, and Tantalum. Strict requirements are placed on the composition of Boron to prevent adverse effects on weldability.

As a general remark, it is important to highlight the fact that the requirements for the chemical composition of Cobalt, Niobium, and Tantalum apply to all components and not only to the "wet parts".

Table 10, Impurities maximum compositions

Composition, % (maximum, unless otherwise indicated)		
Co	Nb	Ta
< 0.2	< 0.1	< 0.1

NOTE, IO may consider deviation from this requirement where the Contractor can demonstrate the component to have a small mass (i.e. bolts, nuts, washers, etc.) and the cost of achieving the above low activation requirements would be excessive compared to the decreased in overall cobalt, niobium or tantalum. No deviation is allowed on large items.

7.8.1 Prohibited materials

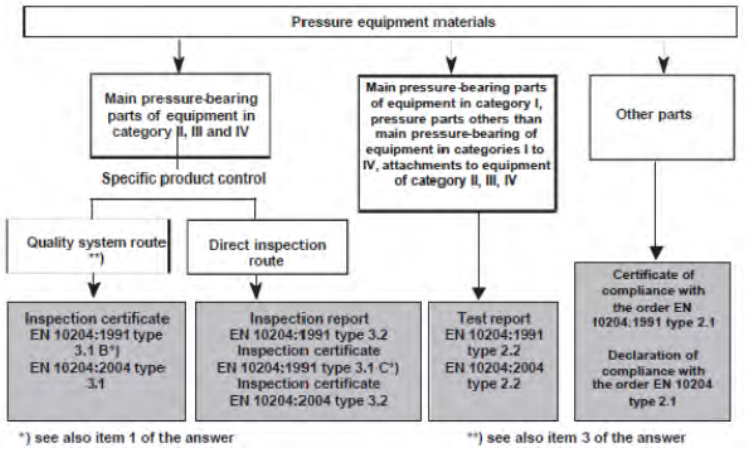
- The Contractor shall be aware of the following requirements, related to the prohibited materials:
  - Mercury shall not be used in any manner, including the construction of the EXC, which can result in the exposure of cooler parts to the metal or its vapour.
  - The use of lead or other low melting point metals in contact with the working fluid is prohibited.
  - The use of nitrided surfaces exposed to the working fluid is prohibited.
  - Care shall be taken to prevent contamination of materials by red lead-graphite-mineral oil, molybdenum disulphide lubricants, halides, sulphur, copper, zinc and phosphorus.
  - Teflon and similar elastomers may not be used.
  - The use of Halogen products is prohibited. This requirement applies to all components, including gaskets and other non-metallic materials. Any deviation from non-zero halogen content in any of the materials used shall be reported to IO and its use shall be subjected to IO approval.
  - The use of materials containing asbestos shall be prohibited.
- The Contractor shall ensure that all stainless-steel material covered by this specification does not come into contact with any other metals (especially carbon steel), at any stage of the whole manufacturing process (in particular during raw material storage, manufacturing itself, final product storage) and shipping as well, by ensuring a proper segregation from non stainless-steel material. The purpose is to avoid cross-contamination of stainless steel with other metallic products. In case of proven contamination of stainless steel by carbon steel, the Contractor shall perform pickling and passivation of the contaminated material. Pickling and Passivation shall be considered as a “special process”.

7.8.2 Testing requirements

NOTE, as per PED Essential Safety Requirements, the Offset Yield Point (Proof Stress) shall be evaluated at 0.2% and 1% plastic deformation.

- Certificates (test reports) showing that required tests have been carried out at the source should be submitted. Type 3.1 certificate of EN 10204 [AD- 8] shall be provided for main pressure-retaining materials. The chemical Co, Nb and Ta concentration evaluation shall be included as a result in the Type 3.1 certificate. If the impurities maximum concentration test is performed separately, the Agreed Notified Body shall be involved in this process to confirm the test results.
- **A second material testing certificate, submitted by an independent certified laboratory, shall be included in the list of documentation submitted to the Contractor, after the placement of the supply order.**
- Inspection Certificate Type 3.2 must be provided by the Contractor when material manufacturer does not have a Quality Assurance System in line with the requirements of PED Annex I 4.3 and ISO 9001 [AD- 11]. The certificate can be provided by the Contractor provided there is justification from the competent bodies following material testing.
- Materials shall be clearly marked so that they are always readily identifiable with their test certificates and reports. Marking shall be transferred to all pieces when a part is cut to make more than one component. Material without identification shall not be used in the manufacture. The method of marking and marking procedures are subject to IO acceptance.

Note, Considering the function of gaskets, inspection documents should be the type 2.2 [AD- 8]*. As the gasket is not the main pressure-bearing part of the equipment, it is not necessary to have type 3.1 or 3.2 in terms of this regulatory framework.*



7.8.3 Impact and Tensile Test

- Mechanical properties shall be obtained from test specimens that represent the final heat-treated condition of the material required by the material specification. The tensile test shall be carried out at all operating temperatures, up to the design temperature.
- The impact test shall be performed at a temperature not greater than 20°C but not higher than the minimum TS.

Table 11, Acceptance criteria for the Impact and Tensile Test [ARD- 2]

Type	Material structure	A @ RT	KV
Base metal	Ferritic	A ≥ 14%	KV ≥ 27J @0°C
	Austenitic	A ≥ 25%	KV ≥ 60J @20°C
		A ≥ 45%	No KV required
Deposited metal (weld)	Austenitic	A ≥ 25%	KV ≥ 50J @20°C for test coupon
Bolting	Ferritic	A ≥ 12%	KV ≥ 40J @0°C
		12%≤A ≤ 14%	KV ≥ 40J @0°C & Reduction in area ≥ 0.45
	Austenitic	A ≥ 12%	KV ≥ 40J @0°C or KV ≥ 50J @RT
		12%≤A ≤ 14%	KV ≥ 40J @0°C or KV ≥ 50J @RT & Reduction in area ≥ 0.45

- All tests shall be carried out by an ISO 17025 [AD- 10] accredited laboratory.

7.8.4 Sensitization

- The contractor must ensure that intergranular corrosion is completely avoided. The Contractor shall perform at least ASTM A262, Practice A, E and finally provide a detailed view of microstructures with SEM observations.

7.9 FLANGED CONNECTION

Above all other requirements of this technical specification, the Contractor shall ensure that the flanged connections comply with the leak tightness requirements.

- For the preparation of flanged ends with flange facing, nut-bearing surfaces, outside diameter, thickness, and drilling, IO recommends the use of EN 1092 [AD- 3]]. It is the responsibility of the Contractor to provide the pressure class of the selected flanges, based on the Maximum Allowable Pressure (PS) and Maximum Allowable temperature (TS).
- Flanges furnished with tapped holes shall provide full effective thread engagement, not including the chamfered thread, for a length at least equal to the nominal diameter of the bolt thread.
- IO recommends the use of weld-neck type flanges, which provide a smooth transition between the vessel and the pipeline and minimise the pressure drop. The Contractor shall define the most appropriate type of flange and the final selection shall be approved by IO.
- Flanged ends shall be prepared with flange facing, nut-bearing surfaces, outside diameter, thickness, and drilling by EN 1092-1.

- EXC supplied with flanged ends shall be provided with adequate bolts, nuts, washers, and gaskets as described below:
  - Bolts: Bolting for the flanged connections shall be supplied with each flange and should conform to EN 1515 [AD- 29]. The material selection shall be based on the assembly requirements to achieve leak tightness. The Contractor shall calculate the bolt torques to provide proper assembly.
  - Nuts: Nuts for the flanged connections shall be supplied with each flange and should conform to EN 1515. The material selection shall be based on the assembly requirements to achieve leak tightness.
  - Washers: Washers (lock or Belleville) shall be supplied with each flanged connection, as described in ASME B18.21.1 [AD- 7].
  - Gaskets: Gaskets shall be supplied with each flange. The gaskets should conform to EN 1591 [AD- 9] to ensure compliance with leak tightness requirements, as defined in section 7.11.
    - The Contractor shall be able to identify minimum gasket compression stress for assembly (Qa), testing (Qmin) and operation/accidents (Qsmin).

7.9.1 Threaded Fasteners

- Threaded fasteners shall have M series threads conforming to ISO 724 [AD- 6].
- All threaded pressure-retaining fasteners shall be provided with corrosion-resistant locking devices.
- The minimum strength of the material used for the nuts and bolts shall meet the requirements of EN 3506-1.

7.10 WELDED OR PERMANENT JOINTS

Welding activities are considered “Special Processes”.

NOTE, permanent joints, other than welds, shall follow the equivalent requirements described in this section.

- Each welding procedure that is to be followed in fabrication shall be included or cross-referenced in the Manufacturing and Inspection Plan (MIP) and weld map. Additionally, the procedures shall be included in the Weld Data Package.
- All pressure-bearing joints shall be full penetration butt-welded. No threaded joints or socket welds shall be used.
- The pressure-bearing welded/permanent joints shall permit volumetric NDT, in agreement with [AD- 1].
- All repairs, re-work, or scrapping shall be documented and records maintained for each specific item. The records shall relate repairs with the procedure used. A maximum of one weld repair cycle shall be permitted on austenitic stainless steel. The IO shall be notified in the event the weld repair is unsuccessful.
- Production welding operations may only be undertaken provided the following requirements are met:
  - Personnel satisfy the requirements of EN 13480-4 (Section 9.1) and EN 3834-2 [AD-19];
  - The filler materials shall have Inspection Certificate type 3.1 as per EN 10204 [AD- 8];
  - Welding procedures have been qualified in accordance with EN 15614-1 [AD- 20];
  - All the welds shall be identified with a unique number and shall be traceable back to the welder/operator and WPS used;
  - Any visible defect liable to affect the correct execution of the next pass shall be removed.
  - Cracks or cavities visible on the surface shall be removed by chipping, grinding, and/or milling.
- The welding procedure qualification record and welder shall be approved by the Notified Body or RTPO when it is classified as a pressure-bearing weld, as per Article R. 557-4-2, §11 a) i or ii.

7.10.1 Preparation for welding

- Preparation of welding should comply with ISO 9692 [AD- 21].

- The edges to be welded shall be kept in the position, either by mechanical means temporary attachments, by tack welding or by a combination.
- This cleaning of internal and external surfaces should conform to EN 2516 [AD- 22]. The surface within 50mm from the area of the weld shall be smooth, free from cracks, fins, tears and other discontinuities, which would affect the quality of the welding.

7.10.2 Surface Preparation Requirements

- Selection, qualification and application of coating materials should follow applicable sections of the Steel Structures Painting Council (SSPC) specifications.
- Surface roughness (Ra) shall not exceed 6.3 µm.
- All coating systems must be applied following the Contractor's recommendations.

7.11 MANUFACTURING READINESS REVIEW

- Following the approval of the MIP, a Manufacturing Readiness Review (MRR) shall be conducted by IO, in line with [AD- 39], and closed before the start of manufacturing activities. This MRR shall be included on the MIP as a Hold Point.

The MRR is a joint ITER-Contractor meeting to give approval for the Contractor to start manufacturing. For the final approval, the following documentation shall be presented:

- Procedures for special processes;
- All manufacturing drawings;
- Material test certificates;
- Engineering (Structural) analysis;
- Personnel qualification.

7.12 MANUFACTURING INSPECTION AND TESTING

- Inspection, examinations and tests shall be conducted to provide compliance with EN13445 [AD- 1].
- The Contractor shall prepare a Manufacturing and Inspection Plan that meets the requirements of ITER MIP [AD- 30]. All testing shall be recorded as required by the referred standard for the relevant testing method. If testing is not recordable, the testing quality shall be ensured by quality control of the testing process.

Note, the MIP is a listing of the chronological sequence of manufacturing operations affecting quality encompassing the whole scope of the subcontract and ranging from verification of materials, manufacture, inspection and test to delivery. For PIC elements, the MIP also clearly identifies the PIA. It will be used to monitor quality control and acceptance tests.

- Before Manufacturing operations, the MIP shall be generated by the procedure provided in Section 4 of ITER MIP [AD- 30].
- Non-destructive examinations shall be performed after heat treatment. Surfaces shall be clean and free of surface conditions that may mask unacceptable indications.
- Examination personnel shall be qualified and certified by ISO 9712 [AD- 12] and shall be approved by the RTPO.

Note, IO reserves the right to inspect all Non-Destructive Examination (NDE) reports for auditing purposes.

7.12.1 Visual examination

Visual examination is considered a "Special Process".

- All finished welds shall be subject to visual examination.
- Visual and dimensional control shall be conducted according to EN 17637 [AD- 23] before the execution of non-destructive examination after possible heat treatment and before any machining or grinding operations of weld surfaces.
- During welding, each pass shall be visually examined, after the complete removal of the slag, if necessary.
- A complete visual inspection of the pressure boundary parts is required before final assembly and on accessible pressure boundary parts without disassembly after hydrostatic testing. The purpose of the visual inspection is to verify all surfaces are free of cracks, hot tears, arc strikes, prod marks and/or other detrimental discontinuities.

7.12.2 Volumetric examination

- The rules of EN13445-5 applies.
- The Contractor may choose Radiography or Ultrasonic inspection as appropriate.

7.12.2.1 Radiography inspection

Radiography examination is considered a “Special Process”.

- IO recommends the use of EN 17636 [AD- 24] and ISO 10675-1 [AD- 25] for the radiographic procedures and acceptance criteria.

7.12.2.2 Ultrasonic inspection

Ultrasonic examination is considered a “Special Process”.

- IO recommends the use of EN 11666 [AD- 26] and EN 17640 [AD- 27] for the ultrasonic examination of casting products.

7.12.3 Surface examination

- All exterior and all accessible interior surfaces shall be examined. The Contractor will provide a detailed description of the surface examination method selected.

7.12.4 Wall thickness measurements

Dimensional inspection is considered a “Special Process”.

- The wall thickness of the pressure boundary shall be measured. The Contractor shall ensure that the sizing of critical pressure parts takes into account the worst-case tolerance analysis.
- The Contractor shall take several measurements and record the location of the measurements on the drawings.

7.12.4.1 Acceptance Criteria

The acceptance criteria shall meet the requirements of EN ISO 17635.

7.13 FACTORY ACCEPTANCE TESTING

The Contractor shall perform the functional tests of the EXC for normal operating conditions, according to Section 7.5. FAT shall include as a minimum:

- Assembly leak test;
- Cooling system test;
- Drainage test;
- Lifting test.

- The Contractor shall provide a report for each test and demonstrate compliance with the requirements specified in this technical specification. This program shall provide documented evidence that the equipment is able to fulfil its safety functions in all postulated normal and accidental conditions in which it is required and during the required operating period.

7.13.1 Assembly leak test

Leak testing is considered a “Special Process”.

- The Contractor shall ensure that the total leak rate does not exceed 10^{-5} $Pa.m^3.s^{-1}$ at design conditions.
- A helium leak test shall be conducted. IO recommends following the requirements of EN standards referenced in [AD -1]. Testing shall be performed prior to any painting or coating.

7.13.2 Cooling system test

Cooling system testing is considered a “Special Process”.

- The cooling system test shall demonstrate the capability of cooling a relevant airflow (according to Section 7.5);
- The Contractor shall evaluate the total pressure drop on the air side and demonstrate compliance with the requirement defined in Table 7.

7.13.3 Drainage test

Drainage testing is considered a “Special Process”.

- The Contractor shall demonstrate that no pooled water remains after the full drainage of the Cooler-Condenser. IO recommends carrying out this test after the hydrostatic pressure test.

7.13.4 Lifting test

- The lifting test shall demonstrate that no deformation occurs as the result of the hanging/lifting of the EXC. The Contractor shall lift 150% of the EXC dry weight for at least 20 minutes. At the conclusion of the test, the Contractor shall examine all exterior surfaces around the lifting lugs with Dye Penetrant to exclude the presence of cracks or deformation.

7.14 FINAL ASSESSMENT PROCEDURE

The following sequence of actions shall be performed and recorded:

- Document check;
- Visual examination before the pressure test;
- Pressure test;
- Final visual examination after the pressure test.

7.14.1 Pressure test

Pressure testing is considered a “Special Process”.

- The pressure test shall be carried out according to EN 13445 [AD- 1].
- The parts operated under pressure shall be pressure tested. Testing may be done in the component or assembled conditions. All process volumes shall be connected to provide equal pressure. These tests shall be conducted after all machining and welding operations on the parts have been completed. The Contractor shall prepare and submit the pressure test procedures for the IO review and approval.
    - The minimum test pressure shall conform to the PED Annex I, 7.4 [ARD -1].
- All joints, including welds, shall be left uninsulated and exposed for examination during the test.
- The hydrostatic test pressure shall be maintained for at least 30 minutes.

7.14.2 Visual Examination

- Visual examination shall be performed according to Section 7.12.1.
- The visual inspection must be conducted on every part of the equipment, both internally and externally, during manufacturing only when it becomes impossible to examine during the final inspection.

7.15 IN-SERVICE INSPECTION AND MAINTENANCE

- The operator shall be able to inspect all internal and external surfaces of the EXC, including “common walls”. If this requirement is not achieved, the Contractor shall provide a list of representative accessible parts to be inspected for each associated risk identified (e.g. structural failure, corrosion).
- The scope of this specification shall include technical field support and consultation services during the installation, initial operation of all equipment furnished, performance testing and training of IO operating and maintenance personnel.
- The Contractor shall include in the operation and maintenance manual instructions on how the internal and external inspections can be undertaken. Any tools required to perform the above inspections shall be included in the scope of supply of this contract (excluding cameras or endoscopes).

7.16 PACKAGING AND HANDLING

- The Contractor shall provide a transport package for the EXC, adequate to prevent damage during shipping lifting and handling operations.
- Before packaging, the Contractor shall prepare a manufacturing and qualification dossier as well as a Contractor Release Note (CRN) in accordance with reference [AD- 30] using template [RD- 7] and submit it to the IO for review and approval.
- Packaging shall be provided to ensure adequate protection, during transport, shipping, lifting and handling operations and delivery, and on-site storage before installation. The material certificates shall be submitted to the IO for acceptance.
- The interior surfaces of the components shall meet the requirements for ASME NQA-1 [AD- 5] Table 302.5 Class B cleanness.

- Where appropriate, accelerometers or other sensors shall be fitted to ensure that limits have not been exceeded. When accelerometers are used, they shall be fixed onto each box and shall be capable of recording the acceleration along three perpendicular directions.
- Shock-absorbing material shall be used.
- All the flanges shall be fitted with caps after final testing.
- The EXC has to be wrapped in plastic covers to protect them during final storage and transportation. The use of adhesive tape for detection and packaging shall be restricted to prevent the risk of contamination from the tape. In particular, tape used on austenitic stainless steel shall meet leachable chloride and fluoride limits of 15 ppm and 10 ppm, respectively. Where used, tape shall be fully removable leaving no residue, using isopropyl alcohol or acetone as the solvent to remove all traces of the adhesive.
- Internals of the EXC complete assemblies shall be preserved by means of nitrogen gas (<100 ppm H_2O) or dry air. All volumes shall be interconnected to provide equal pressure in each volume. Internal nitrogen or air-dry preservation shall be maintained during transport.
- The Contractor shall provide any special lifting equipment required for the handling of the transport packages. All lifting equipment provided by the Contractor shall be proof-tested to the applicable loads.

8 LOCATION FOR SCOPE OF WORK EXECUTION

The Contractor can perform the work at their own location.

9 LIST OF DELIVERABLES

9.1 WELD DOCUMENTATION REQUIREMENTS

The following welding documentation shall be retained in the Contractor's shop and available for IO review.

- Administrative procedures for the control of the welding program, which includes qualification of Welding Procedure Specifications, qualification and assignment of welders, filler metal control, the performance of post-weld heat treatment (PWHT), control of welding work, specification of workmanship requirements, and other information related to the administrative control of welding.
- Records of Welder Performance Qualification and updates/renewal of qualification for the welders who will be assigned to the work, according to EN 9606 [AD- 28]. Additional requirements of EN 13480-4 [AD- 2] section 9 shall be applied as well.
- Drawing(s) depicting examination surface configuration and the surface finish for pressure retaining and integrally attached welds and adjacent base material subject to the volumetric examination shall be provided by the Contractor.

Welding and NDE documentation listed above shall comply with the requirements of Annex I – section 3.1.2 and 3.1.3 of the PED [ARD- 1].

9.2 MANUFACTURING DOSSIER

All the following documents shall be submitted to IO for acceptance.

Contract Documentation

- Final technical specification;
- Quality Plan;
- NDT procedures/Inspection personnel certifications;
- Full supplier list;
- List of Welders – Certificates;
- List of documents.

Design Documentation

- List of standards used and solutions adopted to meet the applicable requirements;
- Preliminary Qualification Dossier
  - Qualification Strategy, using template [RD- 18];
  - Equipment Identification Files, using template [RD- 17];

  - Qualification Plan, using template [RD- 22].
- Structural analysis report;
- Special process procedures;
- Verification and validation of software documents;
- Assembly, 3D models (.stp files) and detail drawings;
- Bill of Materials;
- Manufacturing Inspection Plan;
- Hazard and Risk Analysis;
- Any document that can be used to show compliance with the requirements identified by hazards and risks analysis;
- Technical Note on the process and sizing calculations.

Material Documentation

- Material test reports;
- Material supplier's quality system certificate;
- Consumable list;
- Inspection document of the base materials and permanent joining materials;
- Traceability procedures for the base materials and permanent joining materials;
- Destructive test report.

Fabrication Documentation

- Weld maps and weld repair procedures (if applicable);
- Heat treatment report, including temperature measurement data;
- NDT reports;
- Surface roughness measurement report;
- Inspection report with complete dimensional and tolerance evaluation – technical note justifying thickness in the case of a design by calculation;
- As-built drawings;
- Approval of welding documentation by RTPO or NB;
- Certificate of cleanliness;
- List of special tools, if any;
- Hanging/lifting lug load test report.

Qualification and Procedure Documentation

- Permanent marking and labelling procedures;
- Qualifications of the personnel for manufacturing special processes;
- Qualification dossier, using template [RD- 17]
  - Surveillance of tests;
  - Identification and definition of corrective actions;
  - Qualification Test Specifications, using template [RD- 22].
  - Qualification Follow-Up, using template [RD- 18];
  - Qualification test reports, using template [RD- 24];
  - Qualification analysis reports, using template [AD- 51];
  - Qualification synthesis reports, using template [RD- 21];
  - Qualification preservation sheets, using template [RD- 19]
  - Reference file, using template [RD- 23]
- Description of the methods used for in-service inspections
- Deviation requests and non-conformity requests;
- Installation, operation and maintenance manual – Instruction manual, bilingual English and French.

Delivery Documentation

- Cleaning and packing report;
- Final Assessment Report;
- Delivery report;
- Packing list;
- Preservation manual;
- Contractor Release Note;
- Photographs of packaged components;

- Any document/drawing/procedure that needs prior approval by the IO as mentioned elsewhere in this specification;
- Declaration of Conformity.

9.3 LIST OF DELIVERABLES

Table 12, list of deliverables

Deliverable	Description	Estimated due date	Contract Gate?	Percentage of Payment
D1.1	Kick-off meeting minutes	T0 + 1 week	No	-
D1.2	Approval of documents related to the "**Contract documentation**" section	T0 + 1 month	No	-
Hold Point (T1)	Approval of all the qualification documents needed for the Final Design Review and Preliminary Qualification Dossier	T0 + 3 months	Yes	10%
Completion of Task 1				
D2.1	Approval of documents related to the "**Design documentation**" section, excluding the Seismic analysis report	T1 + 3 months	No	-
D2.2	Approval of documents related to the "**Material documentation**" section	T1 + 4 months	No	-
Hold Point (T2)	Closure of the Manufacturing Readiness Review and approval of the Seismic analysis report. Approval of all the qualification documents needed for the MRR.	T1 + 4 months	Yes	20%
Completion of Task 2				
D3.1	Completion of the FAT	T2 + 2 months	No	-
D3.2	Approval of **Manufacturing Dossier**	T2 + 3 months	Yes	40%
Hold Point (T3)	Approval of the ESPN dossier, which enables the shipment of the equipment	T2 + 3 months	No	-
Completion of Task 3				
D4.1	IO acceptance of the delivered equipment	T2 + 4 months	Yes	30%
Completion of Task 4				

10 QUALITY ASSURANCE REQUIREMENTS

The Quality class under this contract is QC1.

[AD- 30] and [AD- 44] apply in line with the defined Quality Class.

11 SAFETY REQUIREMENTS

The scope under this contract covers PIC and/or PIA and/or PE/NPE components, [AD- 44] GM3S section 5.3 applies.

12 SPECIFIC GENERAL MANAGEMENT REQUIREMENTS

The requirement for [AD- 44] GM3S section 6 applies in full.

The Contractor and the IO shall meet to review the progress of the work and discuss technical issues.

The Contractor or IO can request specific meetings or communications to resolve issues. All the meetings shall be held by video conference. The Contractor shall be responsible for producing minutes of each meeting, which shall be circulated for review and approval by all attendees before formal issue.

The Contractor shall provide the Deliverables corresponding to the Task assigned by IO in due time.

13 DELIVERY

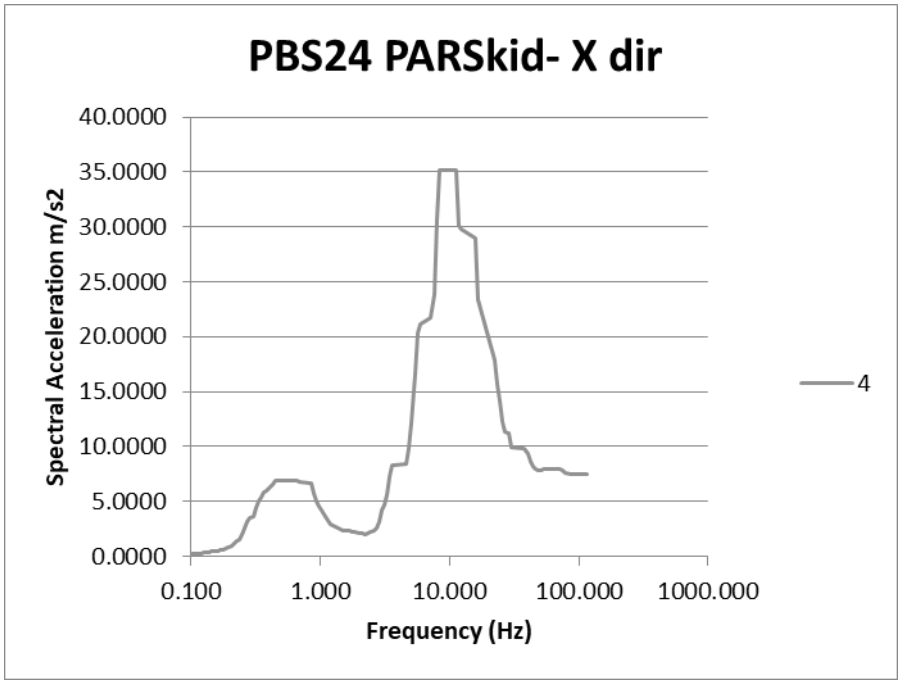
- The transport of the components shall be the responsibility of the Contractor. The selection of the transport company shall be at the contractor's discretion and the Contractor shall be responsible for the transport to the delivery location.
- Before the shipment, a Release Note shall be prepared in accordance with [AD- 30] and approved by the IO. Additionally, a native file item-level packing list and a delivery report shall be provided to logistics.data@iter.org in accordance with the working instruction for the DRR [AD- 37], at least 15 working days before the planned shipment date for each shipment.
- Marking shall be transferred to all pieces when a part is cut to make more than one component. The method of marking and marking procedures shall comply with the document "ITER Numbering System for Components and Parts" [AD- 36]. IO will provide a detailed 'IO component identification standard' together with printed label (QR-code) templates.
- Shipment and Delivery will be undertaken using the International Commercial Terms (Incoterms) 2010. The Contractor shall deliver the equipment "Delivered At Place" (DAP) to the IO Site:

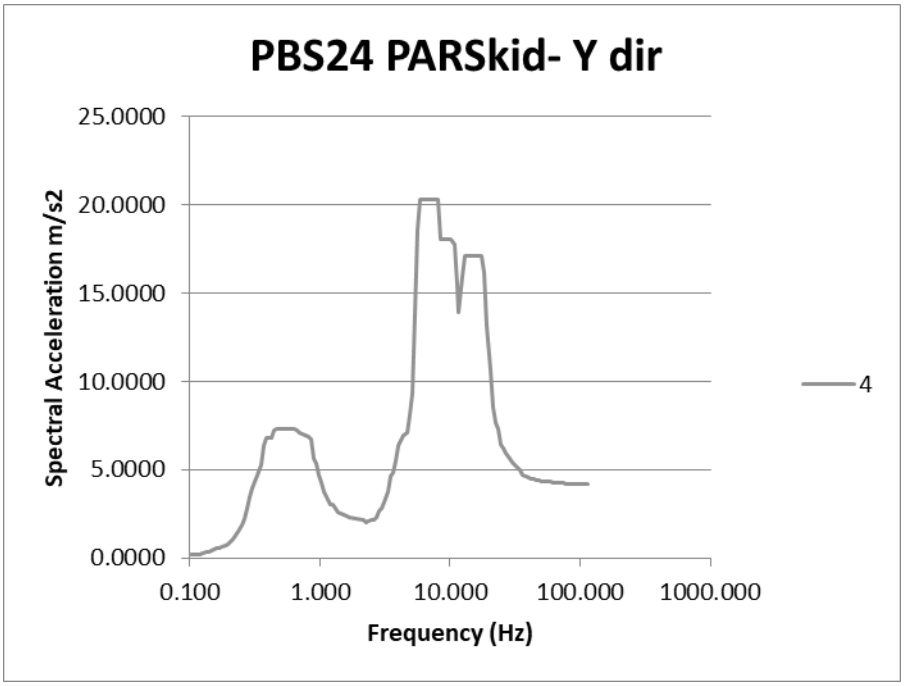
  ITER Organization,
  Route de Vinon-sur-Verdon
  CS 90 046
  13067 St Paul Lez Durance
  Cedex
  France
- After packaging, the Contractor shall prepare and submit a Delivery Report [RD- 8] and Packing List [RD- 9] to the IO for review and approval. The Contractor shall sign the Declaration of Integrity and stamp it before submission to the IO. Declaration of Integrity is included in the Delivery Report.

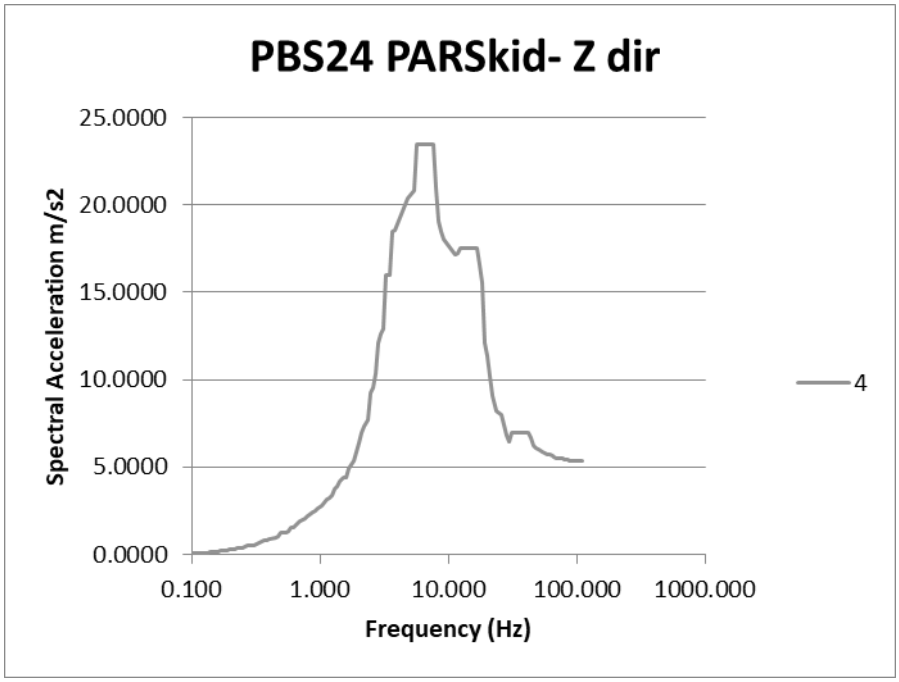
APPENDIX 1: FLOOR RESPONSE SPECTRA

The tables below provide the Floor Response Spectra for SL-2 seismic events.

Seismic event SL-2






PBS24 PARSkid- Z dir
Spectral Acceleration m/s2
25.0000
20.0000
15.0000
10.0000
5.0000
0.0000
0.100
1.000
10.000
100.000
1000.000
Frequency (Hz)
4