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Technical Specifications (In-Cash Procurement)

Technical summary of the ITER VV lower penetration In Vessel Viewing Port Extension (IVV-PE) procurement

Summary of Technical Specifications (ITER_D_ WDDTCE_v2.2)

china eu india japan korea russia usa

Procurement of ITER VV lower penetration In Vessel Viewing Port Extension (IVV-PE)

Call for Nomination (CfN)

Summary of Technical Specifications
(ITER_D_ WDDTCE_v2.2)

1 Purpose

The purpose of this contract the Procurement of the ITER VV lower penetration In Vessel Viewing Port Extension (IVV-PE), which involves the manufacture and assembly by welding of several 20 mm plates and forgings into a welded mechanical assembly measuring 5.5 m x 1 m x 1 m, with an estimated mass of 6.5T. A total of 6 ports needs to be purchased.

The IVV-PE is made of SS316L(N) with a value less than 0.2% of Co. All welds are TIG full penetration with 100% volume examinations according to RCC-MR 2007 requirements.

The IO is responsible for providing to the Supplier the design of the System, in accordance with this technical specification and related documents.

The Supplier then assumes responsibility for the manufacturing design, preparing the manufacturing and test/inspection campaign in accordance with the ITER Manufacturing Readiness Review Guidelines.

The contract execution can be divided into 3 main phases:

- Phase 1: IVV-PE design finalization & MRR preparation
- Phase 2: IVV-PE manufacture, assembly, factory acceptance tests (FAT)
- Phase 3: Delivery and Final Acceptance.

2 Scope of Work

Phase 1: IVV-PE design finalization & MRR preparation

This part of the contract consists in reviewing the final design proposed by IO and update it if needed based on the manufacturing and inspection process. The overall dimensions shall remain the same, but the welding configuration could be adjusted to ensure NDT feasibility.

Additionally, in view of the complexity of the material procurement according to the ITER specification, all deviation concerning this topic shall be discussed at this stage.

All the documentation required for the Manufacturing Readiness Review (QP, MIP, Welding Procedures Specification, NDT procedures, …) shall be done during this primary phase of the contract.

Phase 1 completed after the Manufacturing Readiness Review approval.

Phase 2: IVV-PE manufacture, assembly, factory acceptance tests (FAT)

This second phase of the contract shall start by the material procurement just after the MMR approval.

All the structures to be procured shall be manufactured and tested according to the approved MIP. In case of manufacturing issue, a dedicated Non Conformity Report shall be raised.

Finally, the manufactured structures shall have to pass the factory acceptance tests and be packed. The two specific tests of these components are the baking and the Helium leak test, which are necessary to meet vacuum requirements.

Phase 2 completed after the Manufacturing Inspection Plan (MIP) fully signed and approved by IO. FAT approved.

Phase 3: Delivery and Final Acceptance

Prior to the shipment, all the documentation required for the Delivery Readiness Review (DRR) (Delivery report, Equipment storage preservation, release note and transportation quality plan) have to be prepared.

After reception of the structures to the IO site, Site Acceptance Tests (SAT) shall be done for checking the delivery and after the handover of the full documentation, the contract shall be fully fulfilled.

Phase 3 completed after the End of Manufacturing Report (EMR) fully signed and approved by IO. SAT approved.

3 Supply Description

3.1 In Vessel Viewing Port Extension (IVV-PE)

The main components to be manufactured are the ITER Vacuum Vessel lower penetrations In Vessel Viewing Port Extension (IVV-PE) that are connecting the vacuum vessel to the cryostat and propagating the primary vacuum from the vacuum vessel to the outside of the cryostat into the so-called port cells.

The IVV-PE is made of a Closure Plate, a Cryostat Port Stub, a Port Extension, two Splice Plates, and Service Vacuum System pipes, see Figure 1.

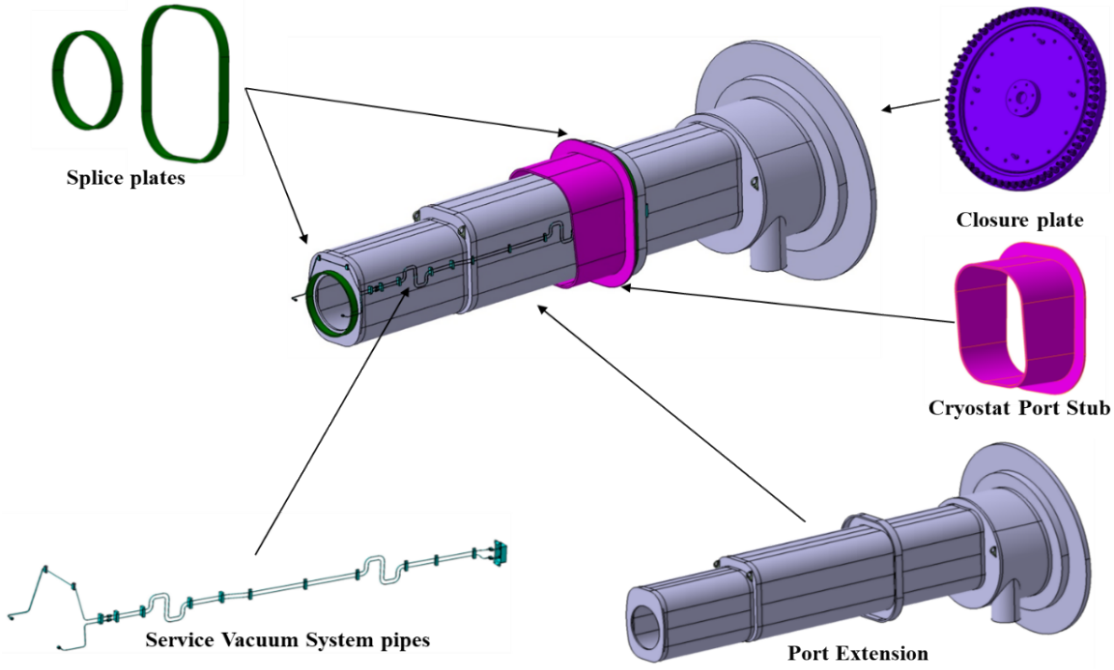


Figure 1 – IVV-PE main components

Table 1 – Quantities for the different types of equipment and materials

Item	Quality class Error! Reference source not found.	Safety Class Error! Reference source not found.	Vacuum Class Error! Reference source not found.	Seismic Class	Material**	Qty per sub assy	Comments
Cryostat Port Stub	QC-1	None	VQC-2A	SC-1	SS304L	1	See Figure 1 Weld cat.I.1, I.2 & II.1 (RC3833 a)
Closure Plate	QC-1	SIC-1	VQC-1A	SC-1	SS316L(N)	1	See Figure 1
Port Extension	QC-1	SIC-1	VQC-1A	SC-1	SS316L(N)	1	See Figure 1 Weld cat.I.1, I.2 & II.1 (RC3833 a)
Service Vacuum	QC-1	SIC-1	VQC-1A	SC-1	SS316L(N)	1	See Figure 1

System pipes							Weld between support and PE cat.V (RC3833 a)
Splices plates	QC-1	SIC-1	VQC-1A	SC-1	SS316L(N)	1	See Figure 1

*** The supplier can propose alternative materials.*

The Port Extension involves the manufacture and assembly by welding of several SS316L(N) components.

Figure 2 shows a proposed welding configuration, which shall be by done by full penetration manual TIG with surface and volumetric examination in accordance with RCC-MR.

An overview of the mass and dimensions of the main components are given in Figure 2& Figure 3.

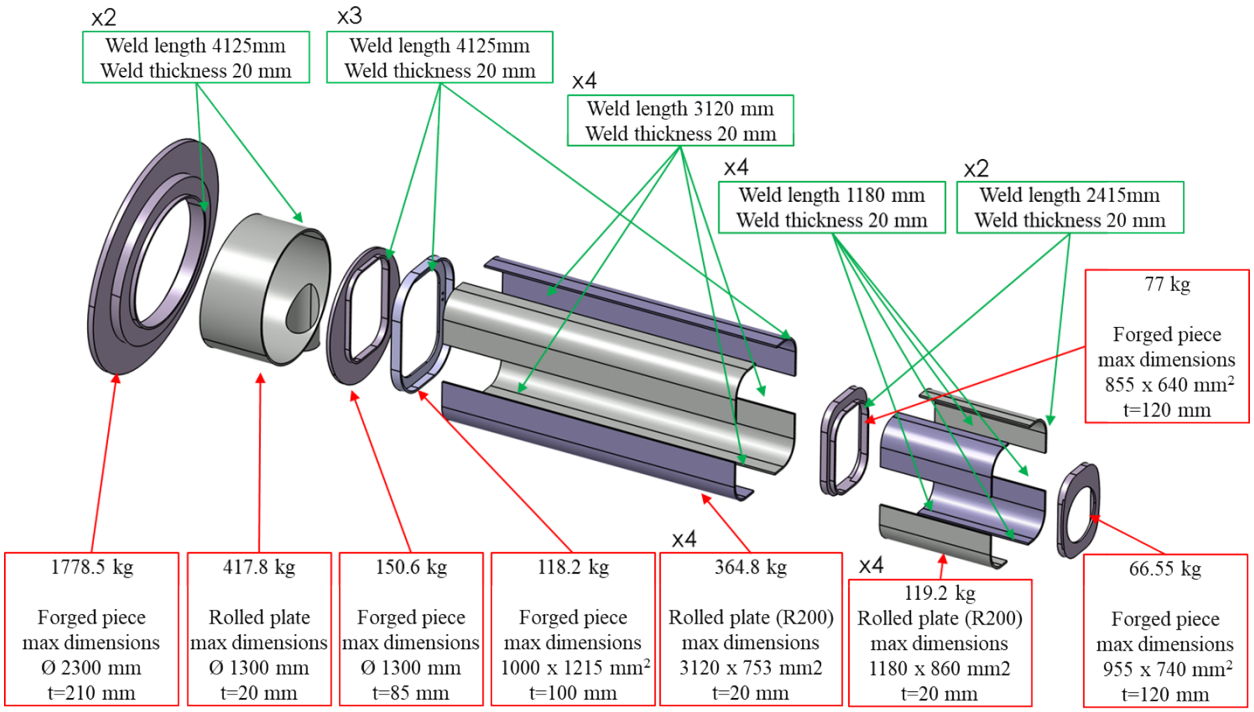


Figure 2 – Port Extension welding configuration proposal

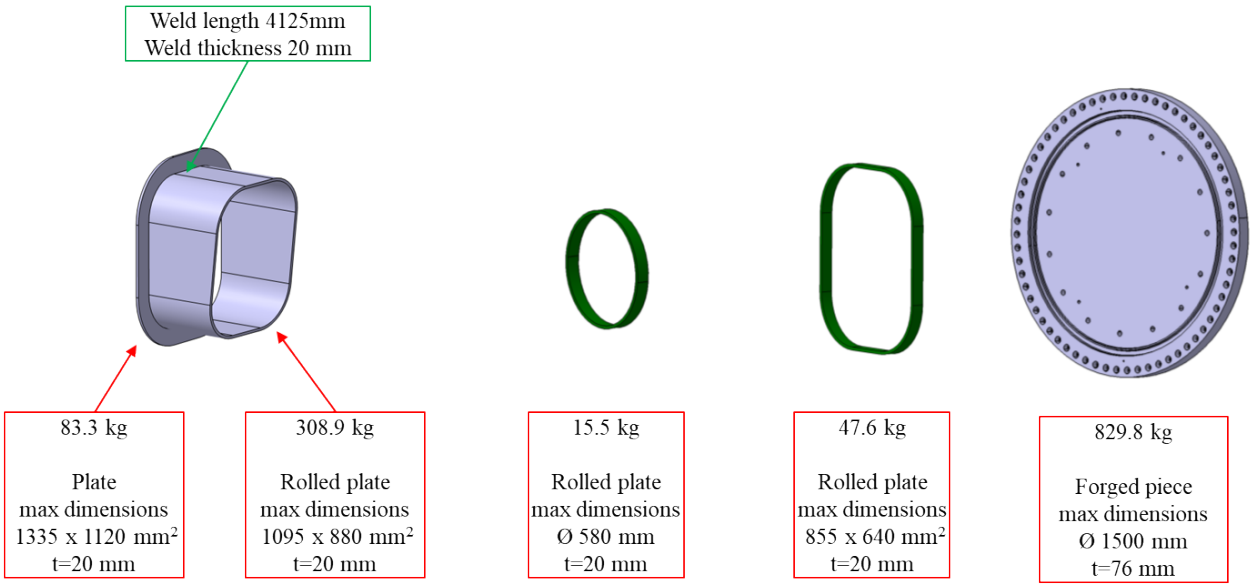
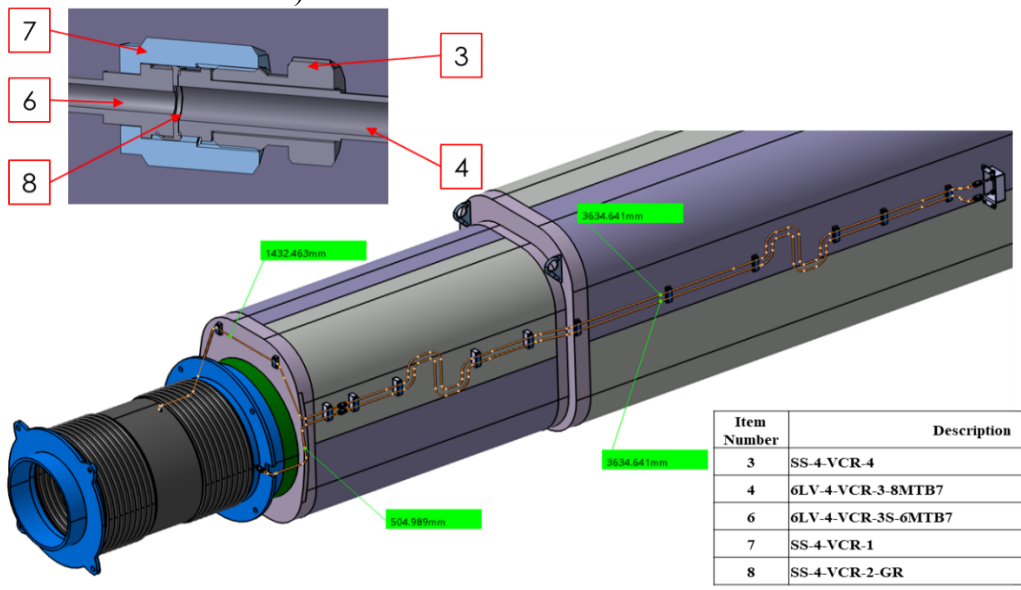


Figure 3 – Details on splices plates, closure plates and Cryostat port stub

3.2 Service Vacuum System (SVS)

To monitor the interspace between the SIC-1 double bellow, there are two Service Vacuum Lines, which are split in two parts mechanically connected with Swagelok connections (Items 3,4,6,7 &8).

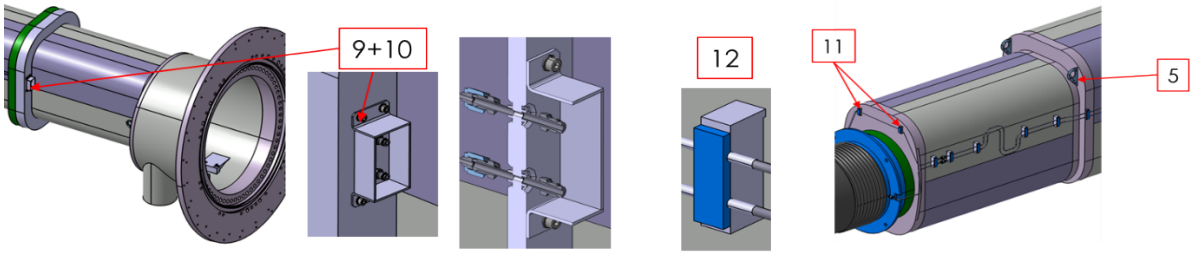
This SS316L pipes are bending according to the design below and the overall length is (1435+505+3635+3635) = 9.2m.



Item Number	Description	Qty
3	SS-4-VCR-4	10
4	6LV-4-VCR-3-8MTB7	8
6	6LV-4-VCR-3S-6MTB7	8
7	SS-4-VCR-1	6
8	SS-4-VCR-2-GR	6

Figure 4 – Overview of Service Vacuum System (SVS)

To support the SVS pipes, there are 11 clamps in SS316L (Item 11 & 12) and to avoid any damage during assembly phase, there is a SS316L box bolted to the Cryostat interface (Item 09 & 10).



Item Number	Description	Qty
5	LIFTING_LUG_WELDABLE	4
9	CYLINDER_HEAD_SCREW_ISO_4762_M8X12	4
10	WUERTH_464140708_WASHER_ISO-7089_16X1.6_ZINK-LAMELLE_SILBER	4
11	SVS_CLAMP	2
12	SVS_CLAMP	11

Figure 5 – Main interfaces of Service Vacuum System (SVS)

3.3 Lifting hooks

Finally, there are 4 welded lifting lugs for IVV-PE handling, see Item 05 in Figure 5. These lugs shall be designed and justified by the contractor. They may be directly welded eyelets or bolted eyelets as described in

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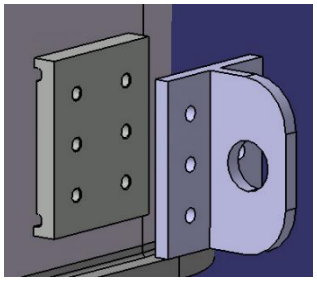
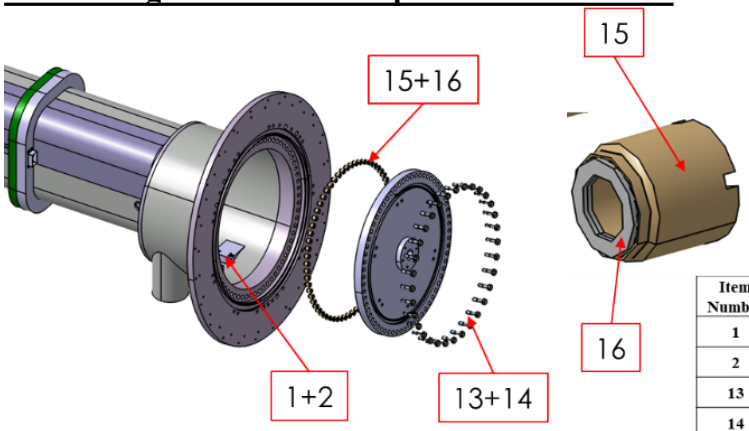


3.4 Interface components outside the scope of this contract

3.4.1 Bolting features

For first plasma configuration, the IVV-PE closure plate is mechanically connected to the IVV-PE flange with 32 bolts (including washers) in SS304L.
Nevertheless, for nuclear plasma phases, additional bolts will be required for providing enough preload for metallic gasket pre-compression, which justify the 65 Aluminum bronze inserts and Heico lock washers.
Finally, the IVVS diagnostic is bolted on the two supports inside the port through 4 aluminum bronze inserts locked with pins M27

The bolting features are not part of this contract.



Item Number	Description	Qty
1	INSERT_M16-M27	4
2	PIN_M27	4
13	SCREW_DIN_7964_M30X110-KDE	32
14	WASHER_ISO_7089_30	32
15	VV_PORT_THREADED_INSERT_M42x3-M30	65
16	HEICO_LOCK_WASHER_HLS-22S	65

Figure 6 – Details on bolting features

3.4.2 Double bellows

The double bellows is not part of this contract.

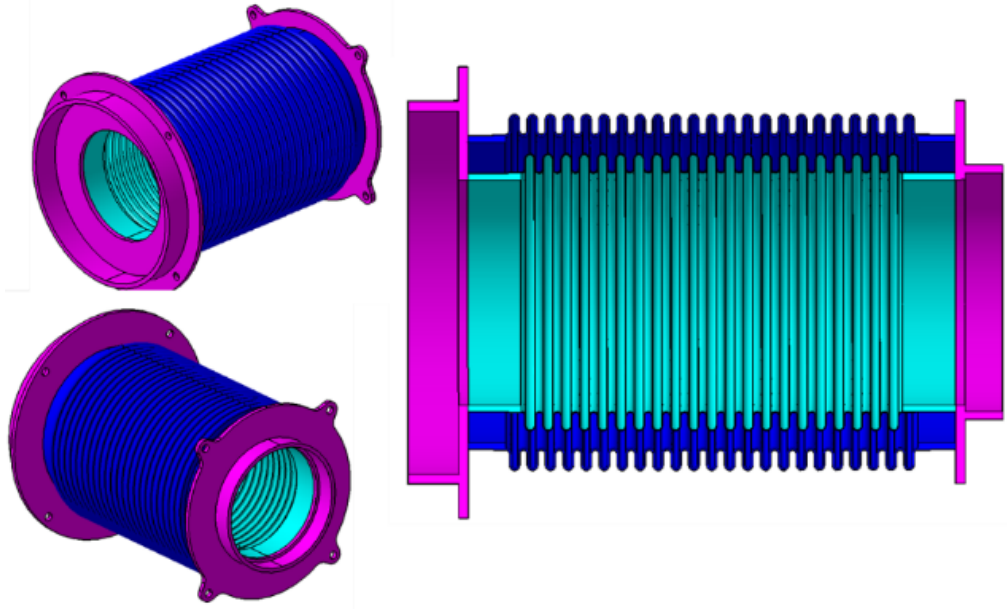


Figure 7 – Double bellows overview

4 Experience Requirements

The ITER Organization is looking for Contractor with demonstrated experience delivering components for ultra-high vacuum applications, with manufacturing processes including:

- Machining,
- Welding TIG process,
- Volumic Non Destructive Examination: Radiographic testing and/or Phased Array Ultrasonic Testing,
- Stainless steel workshop,
- Baking operation with vacuum pumping (cleaning test),
- Helium Leak Testing.

The contractor must prove its experience under a previous ITER contract and the RCC-MR code for manufacturing.

The Tenderer shall have and maintain a valid ISO 9001 certification and shall have the duty to verify and document the equivalent quality level of all its subcontractors and consultants.

5 Award of the Contract

The ITER Organization reserves the right to award one Contract for the whole scope of work or to split the procurement of the different systems in separate Contracts. Further details will be provided at the Call for Tender stage.
Suitable teaming arrangements for multiple companies are possible, where appropriate, to enhance the offering of the tenderer.

The language used at ITER is English. A fluent professional level is required (spoken and written English) with the Contractor liaising with ITER.

6 Candidature – Expression of Interest

Candidature is open to all companies participating either individually or in a grouping (consortium) which is established in an ITER Member State. A consortium may be a permanent, legally-established grouping or a grouping, which has been constituted informally -- but formalized with engagement letters -- 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.

The consortia will be assessed as a whole. Consortia cannot be modified later without the prior approval of the ITER Organization.

7 Timetable for the Tender Process

The tentative schedule for this tender process is as follows:

Call for Nomination (CfN)	*June 2025*
Pre-qualification	*July 2025*
Invitation for Call for Tender	*September 2025*
Tender Submission	*December 2025*
Contract signature	*March 2026*