

## **Technical Summary**

### **Contract for Procurement of lower in-cryostat PHTS bellow sub-assemblies and closure plates**

#### **Purpose**

The purpose of this Contract is the manufacturing and supply of bellow sub-assemblies and closure plates for ITER project / Tokamak Cooling Water System (TCWS).

#### **Background**

ITER will be the largest and most complex nuclear fusion system yet to be built. Situated in Southern France, adjacent to the French CEA Cadarache site, the ITER facility covers approximately 190 hectares and is designed to study the fusion reaction between hydrogen isotopes, tritium and deuterium.

The ITER Organization requires bellow sub-assemblies and closure plates for the construction of the Tokamak Cooling Water System (TCWS) in the cryostat.

#### **Scope of work**

The Contractor will be required to supply to the ITER Organization a required number of bellow sub-assemblies (i.e. 18 units) for the lower in-cryostat area for two TCWS systems, IBED PHTS and VV PHTS under the Contract conditions.

The scope of work for the Contractor includes fabrication, assembly, testing, cleaning and delivering of the required goods.

The bellows elements should be protected on the outside from damage during stages of future maintenance and other related actions which might inflict the damage to them.

Leakage tests shall be done with vacuum inside at a rate  $< 1.00E-07$  mbar.l/s.

X-ray examinations of bellows shall be performed of the inner ply longitudinal weld seam (only) and longitudinal weld seam of pipe section.

Below is required to have more than one ply and future tests for leaks with the use of small bore thru the flange to the first layer of ply shall be implemented.

These bellow sub-assemblies will be installed in the lower area of the cryostat. They will interface between the cryostat and the bio shield. Bellow sub-assemblies will be subjected to the following design conditions:

Item	T <sub>max</sub> °C	T <sub>min</sub> °C	P <sub>max</sub> Bar	Safety classification	Max design axial compression, mm	Max design axial extension, mm	Max design lateral movement, mm	Number of convolutions
Bellow	130	-70	0.4	SIC-1	20	20	40	16

**Table 1 Design Conditions**

Closure plates will be welded to the picture frame at B2M level.

All vacuum components are assigned a Vacuum Classification to point the service area on ITER. Bellow sub-assemblies are given a Vacuum Classification as VQC-2A. This is classified as cryostat primary vacuum component which is connected to the cryostat vacuum through an opening. Joints which separate the classes shall be classified according to the requirements of the more demanding class. The surface finish requirements according to each class are also to be applied. The VQC class shall be marked on any produced drawings. Materials which are used in vacuum are specified in the Technical Specification.

Details of the scope are stated in Table 2

System	Item	Material of construction	Bellow nominal size, DN	Quantity	GA drawing
CWS	Bellow	304L	850	18	See Annex-1

System	Item	Material of construction	Quantity
CWS	Closure plate	304L	18

**Table 2 Scope details**

Details of the closure plates and a General Arrangement drawing will be reflected in the Technical Specification. As a summary, these are stainless steel plates of a square or rectangular shape.

All other needed information related to the details of the scope of work including materials and scheduling will be provided and clarified at the stage of Call for Tender.

### **Timetable**

Tentative timetable is stated below:

- Call for Nomination launch.....Dec. 16
- Pre-Qualification launch.....Jan. 17
- Call for Tender launch.....March 17

This is given for information only and may be subjected to change.

### **Experience requested**

The Contractor shall demonstrate an experience to be able to produce manufacturing documentation (e.g. drawings) as per design inputs provided, fabricate, test and assemble the required goods as per ASME B31.3 Category M fluid [1], compliant with ESPN French regulations [2] wherever is applicable, and the bellow standards as per [5]. Assembly parts, as will be stated more precisely in the Technical Specification shall comply for bellows with ASTM A240M for grade type T304L [7] and for flanges with A182M for grade T304L [6].

The Contractor shall be able to provide Quality Assurance level and Supply Chain Management System required for manufacturing of nuclear components, as per procedure [8] and shall comply with the French Order of 7th February 2012 establishing the general rules for basic nuclear installations [3].

All Codes & Regulatory Requirements will be provided in the Call of Tender stage.

### **Candidature**

Participation is open to all legal persons participating either individually or in a grouping (i.e. consortium) which is established in an ITER Member State. A legal person 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.

The consortium groupings shall be presented at the pre-qualification stage. The Candidate's composition cannot be modified without the approval of the ITER Organization after the pre-qualification.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Candidates (individual or consortium) must comply with the selection criteria. The IO reserves the right to disregard duplicated reference projects and may exclude such legal entities from the pre-qualification procedure.

The subcontractor shall be able to provide Quality Assurance level and Supply Chain Management System required for manufacturing of nuclear components and shall comply with the French Order of 7th February 2012 establishing the general rules for basic nuclear installations

**The candidates shall be nominated for the full scope of work, described in this summary.**

## References

- [1] ASME B31.3- 2010, “Process Piping”
- [2] ESPN - Equipement Sous Pression Nucleaire - French Order 2005 December 12<sup>th</sup> for nuclear pressurised equipment (ESPN)
- [3] French Order dated 7 February 2012 relating to the general technical regulations applicable to INB - EN (ITER\_D\_7M2YKF)
- [4] RCC-MR 2007
- [5] EJMA standards 9<sup>th</sup> edition
- [6] ASTM A182M
- [7] ASTM A240M
- [8] TER Procurement Quality Requirements (ITER\_D\_22MFG4)

Annex 1

