Contract for the Centralized Procurement and Preassembly of Piping Systems for ITER

ADDENDUM 4

Summary for the Detritiation Systems

Purpose

This Contract is for Centralized Procurement and Preassembly of Piping Systems for ITER. Addendum 4 gives the details on the Detritiation System (DS) pipework preassembly fabrication which will be included in the contract.

Background

ITER safety system includes the largest and most complex atmosphere detritiation system yet to be built. It consists of piping networks for:

- Tokamak Complex (PBS 32.DT.80)
- Hot Cell Facility (PBS 32.DH.80)

DS has a total pipework length of about 11.4 km and includes about 340 of valve spools distributed throughout the Tokamak Complex and Hot Cell Facility. Please refer to Annex 1 for further details on the system and on the scope of work.

Scope of work

Most of the DS components are classified as protection important components under the French Quality Order of 7th February 2012. The contractor shall execute the following activities, in compliance with the Technical Specifications for the Detritiation System piping network.:

1. Propose solutions to optimize the piping design introducing modularity and prefabrication, using spools, skids and support structures, as driven by the IO assembly requirements;
2. Apply best value for money criteria to evaluate sub-tier suppliers and manufacturers of piping materials and components and to submit a list to IO for approval;
3. Procure piping, pipe supports, fittings and valves according to the IO Technical Specifications and selected codes & standards, based on quantity estimates provided by the IO;

4. Execute the prefabrication or pre-assembly of the piping in skids or spools with supporting structures as proposed by the Contractors and accepted by the IO following the IO assembly schedule;
5. Prepare manufacturing dossier including design validation documentation according to IO technical specification and as proposed by Contractors and accepted by IO;
6. Prepare necessary qualification reports for safety important components;
7. Execute piping examination and testing, NDE inspections and hydro testing according to the selected codes & standards;
8. Provide packaging, temporary storage and shipping of piping materials and pre-assembled spools from workshops to ITER site at Cadarache;
9. Provide the necessary certification of conformity.

Experience

The potential tenderers shall have proven experience in the following areas:

- Design and Supply of piping systems and piping supports for nuclear island and/or for auxiliary circuits according to relevant codes & standards and in compliance with the French Quality Order of 7 February 2012. Pre-fabrication and fabrication of piping systems, modules, spools, skids, and supporting structures in qualified workshops in compliance with the French Quality Order of 7 February 2012.

Particular interest shall be paid to the Tenderers that have or plan to have workshop nearby or in close proximity (< 50 km) to IO site at Cadarache.

Facilities and personnel

The Supplier shall have access to suitable facilities for manufacturing of stainless steel piping spools.

The Supplier shall have access to suitable facilities for NDT (e.g. ultrasonic and radiographic inspection, leak testing).

The Supplier shall have capacity and personnel to perform required works. This includes, but is not limited to:

- Fabrication and assembly in high technology fields such as for chemical, oil & gas, nuclear or process plant involving control of tolerances and accurate metrology.
- Extensive experience in the qualification and performance of coded welds.
- Welder qualification in accordance French codes.
- Examination of weld integrity (ultrasonic and radiography).
- Leak testing.

Candidature

Participation is open to all legal persons participating either individually or in a grouping (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. 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 tenderer'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.

Annex – 1

The ITER Detritiation System includes the piping networks for the following:

- Tokamak Complex (PBS 32.DT.80)
- Hot Cell Facility (PBS 32.DH.80)

An overview of the Tokamak Complex DS given in Figure 1. Example valve spools are given in Figure 2. These spools are pre-assembled sets of valves needed to connect main pipe runs. Estimations of pipe lengths and quantities of spools are given in Table 1.

DS piping network serves as a ventilation network to transfer room air and other gases containing radioactive contamination to the DS core processing equipment for detritiation prior to release of the gases to the environment. Normal operating conditions are ambient meaning temperatures of 10-35 C and pressures near atmospheric (below 1.5 bar(a)).

The DS piping network is all seamless schedule 10 stainless steel pipes with sizes from DN50 to DN400. Most of the piping network is classified as Protection Important Components and shall be built taking into account seismic load stresses and thermal load stresses due to fire events.

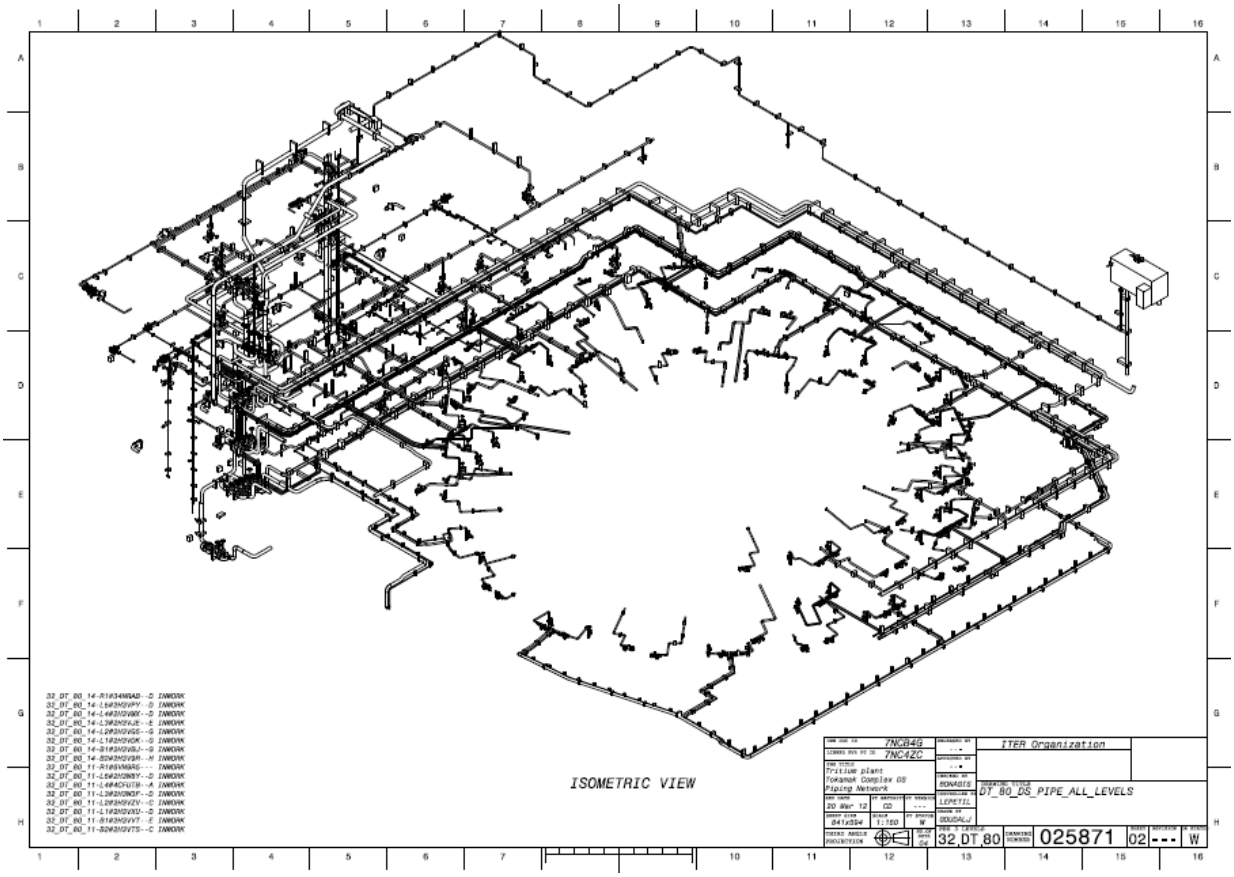

Figure 1 - Overview of ITER Detritiation piping network for Tokamak complex

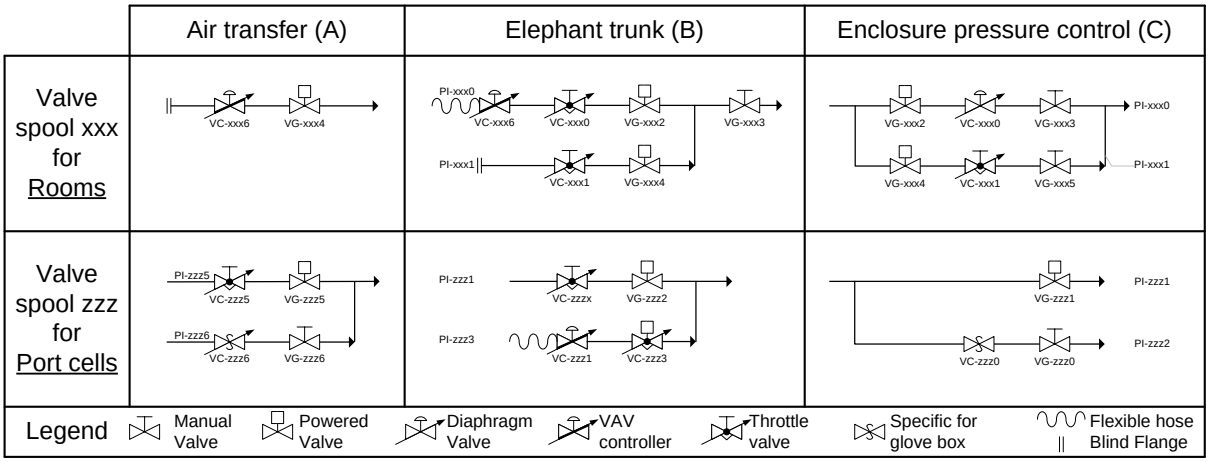

Figure 2 - Overview of valves spools for DS piping network

Table 1 – Pipe length by diameter and number of valve spools for the Tokamak Complex and Hot Cell Facility

	Blg 14 - Tritium Plant				Blg 11 - Tokamak Building				Blg 21 - Hot Cell			
	pipe	Spool for Room			pipe	Spool for Port cell			pipe	Spool for Room		
	length	A	B	C	length	A	B	C	length	A	B	C
DN 50	330 m			15	1365 m			46	2500 m	62		39
DN 65	1120 m				160 m							
DN 80			22		170 m					5	13	4
DN 100	910 m			4	540 m		46					2
DN 150	300 m				680 m	46			1100 m	5		5
DN 200					300 m					1		1
DN 250	590 m	18			300 m							
DN 300	90 m			6	330 m				50 m			
DN 400	50 m				390 m				100 m			
Total	3390 m	18	22	25	4235 m	46	46	46	3750 m	73	13	51

Summary by buildings

Tritium Plant building (bld. 14):	3.4 km, 65 valve spools
Tokamak building (bld. 11):	4.2 km, 138 valve spools
Hot Cell Facility (bld. 21):	3.8 km, 137 valve spools
Total:	11.4 km, 340 valve spools

Codes and standards

The Detritiation System safety design is provided by using the applicable codes and standards for the design of the systems, structures, and components as well as for the arrangement of equipment in buildings. Based on the codes and standards **Error! Reference source not found.** and in consideration of the codes and standards applied for the DS design, a list has been compiled. This is given in the following table:

Design

Tritium Handbook	IDM UID 2LAJTW v. 1.4 2009-11-10
Tritium Handling and Safe Storage (DOE)	DOE-HDBK-1129-2007, March 2007
Mechanical Requirements	
Codes and Standards for mechanical components	IDM UID 25EW4K v. 1.2, 2008-08-29 EDH Part 3 Codes and Standards IDM UID 2E8DLM
Piping Requirements	IO-91901181-0479_R, IO-91901181-0380_R
Piping	IDM UID2AC85T v. 1.1; 2009-09-04, CAD Manual, Section 12-2 Piping Design Guidelines, IDM UID 33WL3N v. 1.2 ASME B31.1, B31.3, B36.10, B36.19M
Piping components	ASME B31.1 Appendix A, ASME B32.3 ASME Section VIII, EJMA
Flanges and gaskets	DIN EN 1591, DIN 28090-1-2
Valve Requirements	IO-91901181-0479_R, IO-91901181-0380_R
Flanged, threaded and welded and joints	ASME B16.34, TA-Luft-VDI 2440, VDI 2200, DIN 28090-1-2,
Seismic Requirements	
General seismic requirements	IDM UID 2DRVPE v. 1.1, 2008-09-18
Seismic nuclear safety approach	ITER-D-3Z5N6P v. 2.0, 2011-06-27
Stress analysis	
Piping components (fittings, flanges, bolting)	ASME B31.3 and additional ASME section VIII-2, section II Part D
Equipment	ASME B31.3 and additional ASME section VIII-2, section II Part D, B16.47, DIN 28031
Support structures	ASME Section II Part D, LISEGA Standard Supports 2010, CAD Manual, EFE ITER SMPX 1020 000 Rev. 0
Allowable stress values	ASME B31.3 and ASME section VIII-2, additional ASME section II Part D or EN values
E, I&C Requirements	IEC 60987, IEC 61225, IEC 61226*, IEC 61513*,
	* PSS hardwired based, no software / firmware used