



Contract for Mechanical Analyses and Calculations of TCWS piping (TCWS/FD/2)

SUMMARY

Purpose

The purpose of this Contract is to obtain specialized support in the field of mechanical engineering for the design for the IO Tokamak Cooling Water System (TCWS).

Background

The IO Cooling Water System (CWS) Section has the responsibility to design, procure and construct the TCWS. The TCWS has the following functions:

- To remove the heat load transferred from the Plasma to the Vacuum Vessel and in-vessel components (e.g. Blanket modules, Divertor, and In-Vessel Coils) with pressurised water (up to 156 °C and 4.0 MPa).
- To provide the decay heat cooling.
- To provide hot water (up to 240 °C and 4.4 MPa) and hot nitrogen gas (up to 350 °C 2.0 MPa) for baking of Vacuum Vessel and In-Vessel Components.
- To confine the activated corrosion products and the tritium potentially contained in the water.

In order to complete the final design of the TCWS, IO needs support in the field of mechanical engineering for the design of TCWS piping, under the direct responsibility of the IO CWS section.

Scope of work

The Contract is expected to be divided into 3 phases:

- Phase 1: Mechanical design of TCWS captive piping.
- Phase 2: Mechanical design of TCWS piping for First Plasma equipment.
- Phase 3: Mechanical design of TCWS piping for after First Plasma equipment.

The required scope of the work under this Contract will be as follows:

- TCWS captive piping stress analysis
 - Stress analysis of TCWS piping systems as per ASME B31.3 code and additional requirements set by ESP/ESPN French regulations, using the appropriate software and preparation of justifying reports. For such purpose, the IO will provide the awarded contractor with exchangeable files produced by Caesar II software, load specification and all related required input information. IO will also provide the 3D Plant Design System models.
- TCWS High energy line break analysis
 - To postulate leak, ruptures due to double guillotine breaks and its consequences using codes and procedures established by the IO.



- Detailed design of TCWS piping supports:
 - Selection of commercial of the shelf (COTS) supports.
 - Design of secondary structures.
 - Implementation into 3D plant design system.

Timetable

The tentative timetable is as follows:

- Call for Nominations April 2014
- Call for Pre-Qualification May 2014
- Call for Tender July 2014
- Tender Submission August 2014
- Award of the Contract October 2014
- Completion of Phase 1 April 2015
- Completion of Phase 2 April 2016
- Completion of Phase 3 April 2018

Experience

The contractor shall have adequate experience in piping design and pressure components for nuclear facilities. Specifically the contractor must have large proven experience in performing the following activities:

- Piping stress analysis for nuclear facilities.
- Practical application of procedures to postulate pipe rupture and the evaluation of the subsequent effects due to whipping effect.
- Design of supports for piping and equipment in nuclear facilities. Stress analysis of supporting structures.
- Implementation of Piping routings and supporting structures in different Plant Design Software packages.
- Design and structural analysis of Pressure Vessels and Heat Exchangers for nuclear facilities.
- Structural analysis by using FEM tools.
- Resolution of problems related with impact of objects by using explicit dynamics.

For the tasks above, the utilization of the following software will be considered advantageous:

- Caesar II.
- PV Elite.
- GT Strudl.
- ANSYS & LS- Dyna.
- CATIA.
- PDMS.
- Smart Plant 3D.

Furthermore, the contractor is expected to have a good level of knowledge of applicable regulations and codes to the ITER Tokamak Cooling Water System, in particular: ASME B31.3, ASME section III NF, ASME Section VIII and the requirements of French ESP / ESPN.



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 for each 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 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.