



Call for Nomination

ITER Cryostat Rectangular Bellows

Ref. IO/17/CFN/10013854/SMS

Purpose

In the frame of the Call for Nomination regarding the contract for the ITER Cryostat Rectangular Bellows, this document summarizes the requirements for the design, manufacture, testing, transport & delivery and support to installation & commissioning.

Background

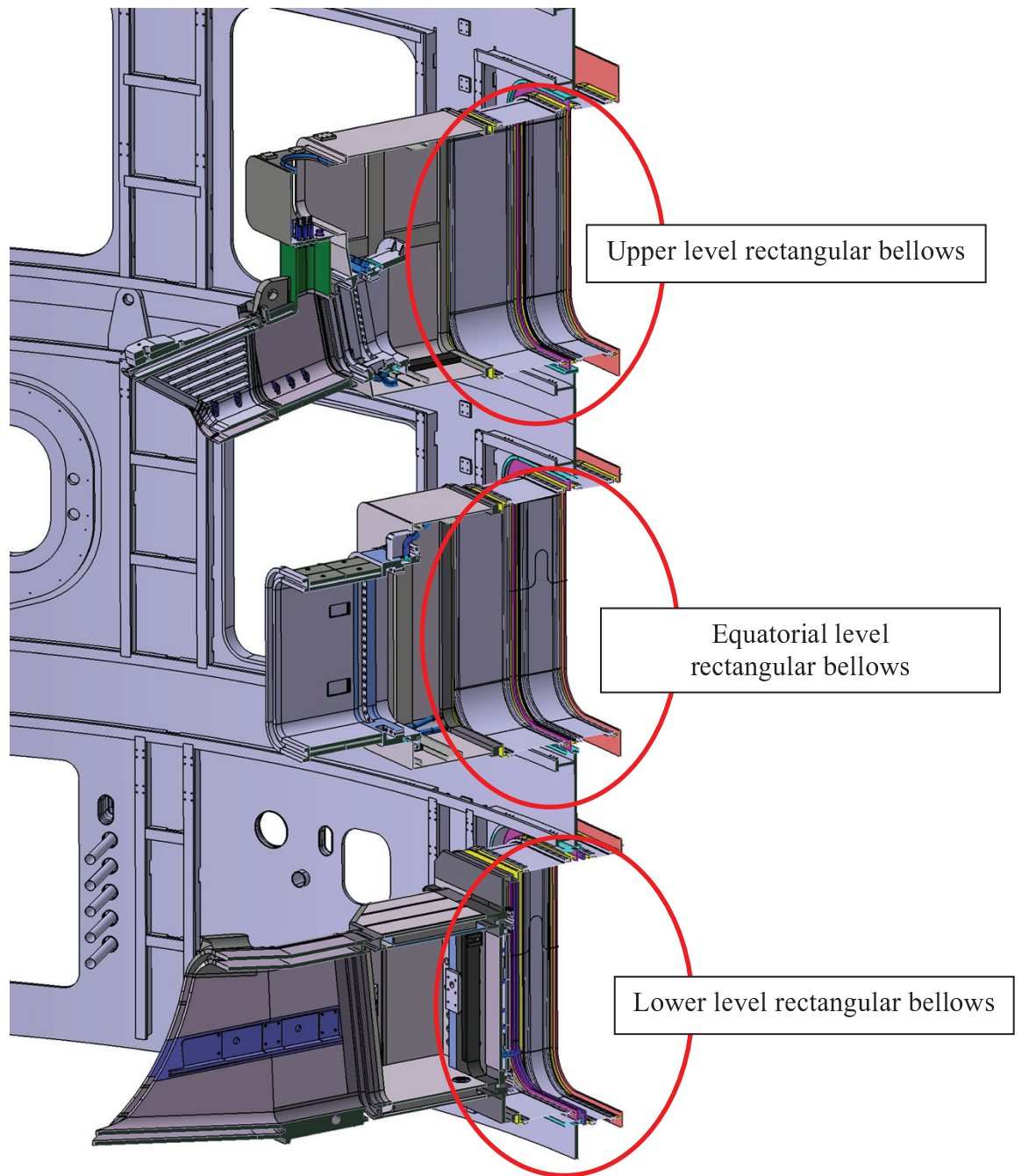
ITER (“The Way” in Latin) is one of the most ambitious energy projects in the world today. 35 nations are collaborating to build the world’s largest tokamak, a magnetic fusion device that has been designed to prove the feasibility of fusion as a large-scale and carbon-free source of energy based on the same principle that powers our Sun and stars.

For more information on the ITER project: <http://www.iter.org>

The Cryostat is one of the major components of the ITER machine. The Cryostat is a large, stainless steel structure surrounding the vacuum vessel and superconducting magnets. It is made up of a single wall cylindrical construction and is roughly 30 meters tall and wide. The main functions of the Cryostat are to provide a vacuum environment and to support the Tokomak basic machine main components.

Rectangular bellows is a Cryostat sub-system composed of expansion joints and their connecting ducts and flanges. There are 85 rectangular bellows distributed among all port extensions on all three levels of the Cryostat rectangular openings. The rectangular bellows are about 3 meters wide and 4 meters high and their weights range between 1.8 and 5.9 tons each. The bellows are of two major types, Port Duct and Port Cells, which respectively connect the Vacuum Vessel & the Cryostat and the Cryostat & the Building.

The primary function of the ITER Cryostat rectangular Bellows is to keep pressure confinement between the Cryostat & the Cryostat Space Room and the Cryostat Space Room & the Port Cell. The bellows also compensate for relative displacements between the connected large components (the vacuum vessel, the cryostat, the building) induced by thermal, seismic and electromagnetic loading during operational, incidental or accidental regimes.



**Figure 1 - 3D sectional view of the rectangular bellows layout
(showing Vacuum Vessel Port duct environment)**

Experience

The Contractor shall have adequate experience for the work and activities as detailed below.

- Compliance with codes and standards applicable for rectangular bellows (EJMA, ASME Section II/V/VIII/IX ...) and qualification for designing and manufacturing nuclear components
- Design development of large multiply rectangular bellows including use of advanced analysis capacities (Finite Element Analysis) for design justification
- Manufacture and testing of large multiply rectangular bellows including advanced forming (minimized stretching, no single roll or punch forming) and welding techniques (no circumferential weld in convolutions, no weld in convoluted corner area)
- Integration, installation and commissioning of large multiply rectangular bellows in complex plant environment

Work description

The scope of work can be summarized as follows:

1. Final Design Development – Prototype Testing

The design of the rectangular bellows is currently functional. All integration and interface details have been defined. The final detailed design of the rectangular bellows shall be developed in order to comply with all the functional, mechanical and interface requirements. The design shall be submitted to IO's approval through a dedicated Final Design Review. Prototype testing is required in order to validate the compliance and performance of the rectangular bellows. The following tests are to be performed: axial and angular spring rate tests, tightness tests (via Helium leakage test), burst tests, fatigue life tests, in-plane squirm tests, and test for interspace pumping of metallic sealed pockets between the layers.

2. Manufacturing Design – Fabrication – Inspection/Examination – Factory Acceptance Testing

The manufacturing design and all the corresponding manufacturing documentation (drawings, material supplier documentation, weld data packages, manufacturing procedures, Non Destructive Examination procedures, Manufacturing Inspection Plans ...) shall be prepared. It shall be reviewed before the start of fabrication through a Manufacturing Readiness Review. The fabrication of all 85 rectangular bellows shall be performed and all the inspection and examination requirements shall be implemented.

Factory Acceptance Testing shall also be conducted (Acceptance Data Package and final vacuum leak test).

3. Transport and delivery to the ITER Site

A proper packing and shipping plan shall be prepared and the transportation to the ITER Site shall be performed.

4. Support to installation, Site Acceptance Testing and commissioning

The on-site installation, Site Acceptance Testing and commissioning activities are the responsibility of IO. However, during activities which are critical for the operational functionality of the bellows, expert advice will be requested.

Timetable

The tentative timetable is as follows:

Call for Nomination	March 2017
Prequalification	April - May 2017
Tender submission date	July 2017
Award contract date	October - November 2017
Contract start date	December 2017 -January 2018
Contract end date	December 2022

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 cannot be modified later without the approval of the ITER Organization.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Bidders' (individual or consortium) must comply with the selection criteria. IO reserves the right to disregard duplicated references and may exclude such legal entities from the tender procedure.

Reference

Further information on the ITER Organization procurement can be found at:

<http://www.iter.org/org/team/adm/proc/overview>