

Call for Nomination Documents

Call for Nomination - Procurement of optical strain gages for the ITER Vacuum Vessel

In the frame of the Call for Nomination of the optical strain gages channels, this document summarizes the needs as part of the design, qualification and procurement.



Call for Nomination

Optical strain gages on ITER Vacuum Vessel

Ref. IO/17/CFN/14098/SMS

Purpose

In the frame of the Call for Nomination of the optical strain gages channels, this document summarizes the needs as part of the design, qualification and procurement.

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 Vacuum Vessel (VV) is one of the major components of the ITER machine. The VV is a large, stainless steel structure. It is made up of a double wall structure that surrounds the plasma. Its primary function is to provide a high quality vacuum for the plasma and it is a major safety barrier for ITER. As such the monitoring of the Vacuum vessel conditions is required.

The aim of the operational instrumentation of the VV and in particular of the optical strain gages channels is to characterize the mechanical behaviour the vacuum vessel and determine the loads exerted onto the structure. Transducers and front end components will operate in a harsh environment combining fast electro-magnetic transients, dense magnetic fields, radiation and temperatures between 0 and 200° C. In addition, all front-end components are to be installed in the ITER cryostat, and therefore shall comply with specific vacuum requirements.

The technical specification is based on the final design undertaken by ITER. Optical strain gages shall be fibre Bragg gratings and include temperature compensation. Any technology of instrument is accepted however the sampling rate shall be in the range of 1kHz.

158 channels are required and needed transducers and instruments shall be supplied. In addition nearly 30% of spare transducers will have to be delivered along with the first batch.

Similarly, the instruments shall include at least 20% spare capacity. Additional channels for temperature compensation may be required. The required number of channels for temperature compensation is to be defined as part of the design.

The fibre playing an important role in the sensor, in-cryostat fibres are included in the scope of supply. Noteworthy, section of fibres in the machine have to be compatible with their environment and in particular radiations (dose up to 10MGy). ITER shall provide the general characteristics of the fibre and propose potential suppliers. The supply of fibres shall be agreed with the contractor. Feedthroughs are out of the scope of this procurement.

ITER being a first of kind machine and a nuclear facility, quality is a key aspect of procurements. All components have to be qualified for conditions in which they will be used. Foreseen qualifications include thermal test, mechanical tests, irradiation and outgassing tests.

First deliveries of sensors for installation are planned in June 2019.

Experience

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

- Be specialized in the integration of optical sensors and in the fabrication of either optical strain gages or the optical instruments.
- Recognized QA standards (ISO 9001 or equivalent)
- Experience with the development of applications for harsh environment (e.g. extreme temperatures or high vacuum or radiation)
- Experience in setting-up testing of optical strain gages, used in harsh environment.
- Any experience on the procurement of components for nuclear applications, ITER diagnostics or ITER instrumentation is a plus.

Work description

The scope of the work will be divided in 6 steps with two distinct lifecycle for respectively the design and procurement of transducers and the procurement of instruments. The following table illustrates the scope of work and parallel activities.

step	Transducers and front end components	Instruments (signal conditioners)
1	Design of transducers and front end components Selection of equipment and eventual adaptation to the specific conditions of use and requirement of ITER. This work is based on the final design developed by ITER.	Selection of equipment and design of sensors Selection of equipment compatible with the selected/developed transducer and meeting requirements of this technical specification.
2	Prototyping	
3	Testing Qualification based on prototype transducers and selected instruments. The objective is to demonstrate that all requirements are met while limiting the risk on series production.	
4	Series-production design and pre-series fabrication Definition of the fabrication procedures, followed by first sample production. Pre-series shall reflect the full fabrication process of the transducers.	
5	Qualification Qualification based on pre-series and selected instruments. Qualified cables will be free-issued by ITER for these qualifications of the full sensor. Some qualification may be repeated by ITER with an independent laboratory.	
6	Series production and delivery Transducer shall be delivered to ITER with pre-assembled pigtails for site acceptance tests and installation.	Delivery to third party for sub-assembly into cubicles Signal conditioner modules shall be assembled into standard racks and delivered for assembly in standard

	cubicles selected by ITER..
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Schedule

The tentative timetable is as follows:

End of call for nomination	May 2017
End of call for tender	July 2017
Contract signature	August 2017
Design and prototype testing	End in March 2018
Pre-series fabrication and qualification	End in February 2019
Series production batch 1	Due to 14 June 2019
Series Production of subsequent batches	End before 8 November 2019

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>