

Technical Specifications (In-Cash Procurement)

summary Technical specification for passive Vacuum Nuclear safety pressure switches

The purpose of this document is to provide summary technical specifications for the Call for nomination associated with the development, prototyping and qualification of passive vacuum pressure safety switch, based on existing commercial product, for Safety Important functions control that would be compatible with ITER environment and Safety requirements, and further qualify such sensor for its use on ITER Safety functions.

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Vacuum Nuclear Safety Pressure switches for the ITER Project

Summary Technical Specifications
(Call for Nominations)



1 Purpose

This call for nomination is associated with the development, prototyping and qualification of a passive vacuum pressure safety switch, based on existing commercial products, for safety important functions control (mainly Loss of vacuum events) that would be compatible with ITER environment and Safety requirements, and further qualify such sensor for its use on ITER Safety functions. This will lead to the manufacture and supply of the qualified product to the IO by the contractor.

The vacuum pressure switches shall be:

- Mechanical switch, without any embedded electronics
- Of all-metal and ceramic vacuum wetted part for high vacuum and confinement compatibility
- Compatible with the ITER environment under normal and abnormal conditions, including magnetic field up to 300mT, and radiation up to 10⁶Gy (Si equivalent)
- With a settable trigger pressure range foreseen for ITER safety functions between 5 mbar and 1.5bar (absolute).
- Compatible with up to category A nuclear safety functions (IEC 61226),
- Compatible with implementation of investment protection function at least SIL-2 equivalent (IEC 61508/61511).

It is foreseen that once qualified, these sensors will be standardised to cover all vacuum related safety and investment protection functions on the project (over relevant pressure range).

2 Background

Situated in Southern France, adjacent to the French CEA Cadarache site, the ITER International Organisation (IO) facility covers approximately 190 hectares and is designed to study the fusion reaction between the hydrogen isotopes of tritium and deuterium.

In order to achieve the safest operation of ITER, active nuclear safety functions will be implemented. Function triggering at vacuum pressure will require qualified pressure switches capable of withstanding the specific ITER environmental condition while maintaining their function.

3 Scope of Work

Identification of the most promising Catalogue product(s) and design modifications required to fulfil ITER vacuum safety functions requirements shall take place as part of the call for tender, and be considered within the evaluation.

The awarded contract shall involve:

- Modification of the sensor design to make it fully compatible with ITER environment and design/codes requirements.
- Manufacturing of prototypes of this sensor
- Performing the necessary combination of tests, calculation and simulations for its qualification as PIC component playing an active role in a nuclear safety function.

Up to two manufacturers may be awarded for the initial phase of design, prototyping and qualification. The manufacture offering the best technical, quality and cost efficient solutions shall be awarded the manufacture of the switches

It is intended that once selected and qualified, these vacuum pressure switches are standardized for use on ITER investment protection and nuclear protection I&C systems, and that a Strategic Agreement (Framework Supply Contract) is put in place between the IO and the awarded manufacturer to facilitate their acquisition by the Domestic Agencies and Contractors (indicative total estimated number of 400 devices).



4 Contract Duration

The design, prototyping and qualification work is expected to be completed within 15 months of the contract being awarded.

Following successful development and qualification, it is expected that a framework supply contract for Vacuum Safety pressure switches will be awarded for a duration of 4 years, renewable.

5 Tentative time table

Action	Tentative date(s)
Call for Nomination	Early May 2021
Pre-Qualification	Early June 2021
Call for tender	Early July 2021
Tender submission	Mid August 2021
Contract Award	End September 2021
Start of contract	October 2021

6 Candidature

Participation is open to any legal entity either an individual or a group (consortium) which is established in an ITER Member State. A legal entity 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 prequalification.

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 references and may exclude such legal entities from the pre-qualification procedure.

More information on ITER Organization Procurement process can be found at: <https://www.iter.org/proc/generalinfo>

7 Experience and Key competences

The Candidates will need to demonstrate that they have the capabilities to successfully perform the entire scope of work mentioned above and in particular:

- 1) Design, manufacture and supply of sensors used on nuclear facilities or large energy physics experiments (particle accelerators, spallation sources, light sources, Tokamaks).
- 2) Already manufacture and commercialize passive mechanical pressure switches as catalogue components.

The following Key competencies are required:

- 1) Experience in vacuum instrumentation development and manufacturing.

And/or

- 2) Experience in nuclear pressure switches development, manufacturing and qualification



8 Quality Assurance Requirement

The organization conducting these activities should have an ITER approved QA Program or an ISO 9001 accredited quality system or equivalent

Prior to commencement of the work, a Quality Plan must be submitted for IO approval giving evidence of the above and describing the organization for this task; the qualification and experience of the workers involved including named individual(s) who will act as Independent Reviewer(s) and Checkers(s) and any anticipated sub-contractors.

9 Regulatory Requirements

ITER is a licensed nuclear facility as defined in the Decree of Authorisation of Creation of ITER-INB-174 and consequently IO, the Nuclear Operator, must comply with the French Order of 7th February 2012¹ establishing the general rules for licensed nuclear installations in France (INB-Order).

The IO as Operator is responsible for ensuring that Protection Important Components are qualified, supplied, and applied to meet their safety functions in compliance with their associated safety requirements and under the requirements of the INB-Order¹.

The Supplier must demonstrate compliance with the provisions for the implementation of the INB Order¹ including the defined requirements (articles 2.5.1 and 2.5.2) in their organization and in the chain of subcontractors.

10 CE Markings

CE Markings shall be implemented on final catalogue items in accordance with the requirements of European Directives for the components under the scope of this technical specification.

11 List of Abbreviations

CEA	Commissariat a L'Energie Atomique (French Nuclear Agency)
CE	Conformité Européenne
INB	Installation Nucléaire de Base – Licensed Nuclear Installation
IO	ITER International Organisation
PIC	Protection Important Component
QA	Quality Assurance

¹http://www.legifrance.gouv.fr/affichTexte.do;jsessionid=B2DB236305F4E342C3472DD5277457D1.tpdjo11v_1?cidTexte=JORFTEXT000025338573&dateTexte=20130705