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Technical Specifications (In-Cash Procurement)

Summary of Technical specification: Threaded inserts and spring-type pins for in-vessel rails

Summary of Technical specification: "Threaded inserts and spring-type pins for in-vessel rails" to launch call for nomination

Call for Nomination
Summary of Technical Specification
Threaded inserts and spring-type pins for in-vessel rails

Ref. IO/18/CFN/14553/PMT

Purpose

In the frame of the Call for Nomination regarding the contract for threaded inserts and spring-type pins for in-vessel rails, this document summarizes the requirements for the design, material, manufacture, dimension check, testing, transport & delivery. This document also provides an estimate of the number of inserts and pins to be procured as well as their dimensions.

Background

ITER 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. It features a band of ports used to allow access for plasma heating, fuelling, diagnostics, and in-vessel component services. Its primary function is to provide a high quality vacuum for the plasma and it is a major safety barrier for ITER.
In-Vessel equipment such as In-Vessel coils and Blanket manifolds are installed onto Vacuum Vessel through welded rails with threaded inserts. Inserts aim to accumulate the loads from equipment and transfer it to the rail.
Inserts for Divertor, Blanket Manifolds and In-Vessel coils have internal thread equipped with a self-locking technology (Spiralock® or equivalent) to mate with the corresponding fixture bolt and a metric external thread that retains the insert within its supporting structure. More details about spiralock can be found at www.spiralock.com. A locking system different from Spiralock® could be proposed but would need to be accepted by the ITER Organization (IO) before implementation. Should this be the case, a qualification programme shall be agreed between the Contractor and IO. This qualification programme shall be carried out within a time frame that does not bring delay in the execution of the contract. The insert is locked by spring pin. This pin prevents the insert from rotating.

Each insert has 2 semi-circular slots: one for outgassing and another one to accommodate the pin. On the upper surface of inserts 2 rectangular slots are reserved for installation tooling. Typical insert with spring type pin is shown in the Figure 1.

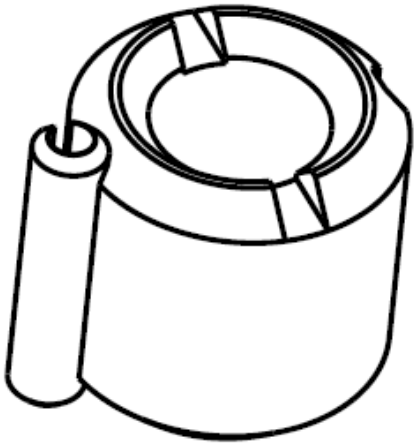

Figure 1 Threaded insert equipped with spring-type pin.

The inserts and pins dimensions and quantities required for Vacuum Vessel are represented in the Tables 1-2.

Inserts	Inserts length, mm	Main VV (9 Sectors)	Upper Ports	Lower Ports	Equatorial Ports	Total	+ Spare Parts
M12-M18	18	1080	2532			3612	100
M10-M20	20	216				216	10
M14-M22	22	8795	288	332		9415	100
M14-M33*	33	4				4	1
M16-M27	28			120	36	156	8
M20-M33	33	504		84		588	17
M16-M33**	17			60		60	6
M30-M48	48	72				72	4
M33-M64	41	108				108	5
Total		10779	2820	696	36	**14331**	**251**

Table 1. *Inserts position and quantity.*

Inserts (for info)	Pins		Main VV (9 Sectors)	Upper Ports	Lower Ports	Equatorial Ports	Total	+ Spare Parts 10%
	Nominal diameter, mm	Nominal length, mm						
M12-M18	5 (ISO 8752)	18	1080	2532			3612	360
M10-M20	4 (ISO 8752)	20	216				216	22
M14-M22	5 (ISO 8752)	22	8795	288	432		9515	351
M14-M33* M20-M33	7	32	508		84		592	58
M16-M27	6 (ISO 8752)	28			120	36	156	14
M16-	7	16			60		60	15

M33**								
M30-M48	10 (ISO 8752)	45	72				72	8
M33-M64	16 (ISO 8752)	40	108				108	11
	Total		10779	2820	696	36	**14331**	**839**

Table 2. Pins localization and quantity.

* Special inserts for Upper Port stub embedded rails;
*** Special short inserts for Lower Port stub extension RH rails.*
Material for the inserts currently chosen is Alloy 718 (UNS N07718) or Stainless Steel 660. The final choice of material for inserts will be done depending on actual cost and machining feasibility. Anti-seize coating to be applied on the internal and external threads.
Totally 14582 inserts need to be finally manufactured for VV, Divertor, Blanket Manifolds and In-Vessel Coils and 15170 pins.
Material for the pins is austenitic stainless steel. Preferable standard for pins is ISO 8752, however, pins of 7 mm diameters do not exist in the ISO 8752. Due to this, we consider spring-type pins of 7 mm nominal diameter of other standard (see Table 2).

Components to be provided by the supplier in addition to inserts and pins:

- Tools for dimensions check, such as standard ISO-1502 or DIN go/no-go gauges to be available at the supplier to perform dimensions check. The qualification certificates should be available to IO for information.
- Tooling for manual installation of inserts and pins to be provided by the Supplier. Material for this tooling shall be compatible with material requirements for Vacuum Vessel components.

Experience

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

- Experience working with manufacturing techniques for the metric and for spiralock or equivalent locking threads and spring-type pins.
- Experience performing anti-seize copper coating and related testing activities.

Work description

The scope of work can be summarized as follows:

1. **Manufacturing design development basing on the 3-D models and requirements from Technical specification and related detailed drawings.**

Supplier shall review the drawings and adopt them for tooling and manufacturing capabilities of factory. Values and instructions listed in the drawings is a subject of discussion and agreement between IO and supplier.

2. **Material purchase.**

Specification for procurement of bars for raw material will be provided by IO to Supplier. Specification will describe procurement of bars in solution annealed condition, but Supplier may order bars in solution annealed and precipitated hardened condition. Inserts shall be

finally supplied in solution annealed and precipitated hardened condition providing conformity with properties of Material specification.

Threaded surfaces of inserts need to be coated by anti-seize coating. Specification for the anti-seize coating is proposed by IO to the supplier.

Material for the spring pins is austenitic stainless steel as per ISO 8752:2009. Alternatively austenitic stainless steel AISI 316L or EN grade number 1.4404 can be proposed by Supplier and to be agreed with IO. Cobalt impurity content in inserts have to be reported.

3. Manufacturing documents preparation (MIPs, test plan, dimension control plan,…)

List of documents to be procured by Supplier to IO is the subject of discussion and agreement between two above mentioned parties during contract duration. Provisional list of documents to be proposed by IO.

4. Manufacture of inserts and covering by anti-seize coating.

Specification for anti-seize copper coating and testing needs will be proposed by IO.

5. Inspection.

Inserts inspection after fabrication should include the following activities:

- Dimension check of threads using Go / No-Go Gauges after fabrication and after coating.
- Penetrant Testing of threads.
- Visual examination for the coating.

6. Purchasing of pins.

7. Package and delivery.

Suitable precautions shall be taken to avoid damage to the equipment. The supplier shall design and supply appropriate packaging, adequate to prevent damage during shipping and handling operations. The packaging must preserve the cleanliness of the component for the duration of storage. The packaging should permit basic inspection without opening. The number of components per final package should be limited to a reasonable quantity (for ease of transport to the place of installation). Final packaging must be clearly marked with part number and batch.

Timetable

The tentative timetable is as follows:

Call for Nomination	June – July 2018
Prequalification	August – September 2018
Call for Tender	September – October 2018
Tender submission	November – December 2018
Award of contract	December 2018 – January 2019
Contract start	January - February 2019
Contract end	December 2019 – January 2020

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 form the tender procedure.

Reference

Further information on the ITER Organization procurement can be found at:
http://www.iter.org/org/team/adm/proc/overview