

## **Part-A(ii)**

Technical Specification for Third Party Inspection (TPI) of Contract for  
“Manufacturing and Supply of DNB and HNB3 Vacuum Vessel”

	<b>Title: Third Party Inspection (TPI) for DNB and HNB3 Vacuum Vessel”</b>	GeM Bid No.
		GEM/2026/B/7195365

## 1. DNB and HNB3 VACUUM VESSEL SYSTEM DESCRIPTION

DNB and HNB3 Vacuum Vessel system description is given in Informative Annexure II.

## 2. SCOPE OF WORK


I-I is having a contract with a Contractor located at Bangalore for Manufacturing, testing and Supply of Vacuum Vessel for HNB3 and DNB. A Manufacturing and Inspection Plan (MIP) shall be prepared by manufacturer which defines the sequence of Manufacturing and Inspection activities for DNB and HNB3 Vacuum Vessel Components. Manufacturer shall prepare applicable Quality Procedure(s) and other related procedures for each activity. The reference of the applicable Quality Procedure, Details of Records and the responsibilities of associated organizations i.e. (a) I-I, (b) IO are described in MIP.

TPIA shall inspect followings tentative HOLD points and Notification points as per approved manufacturing drawings, MIP and inspection/surveillance activities assigned by ITER India.

- Raw Materials Inspection at Factory
- Marking and Identification of Materials
- Mock-up and welding qualification activities
- Set up inspection of weld seam
- Visual Examination of the completed weld
- PMI of completed weld
- Helium Leak Testing of the weld
- Radiography Test
- Ultrasonic Test (where RT is not possible)
- LPE of completed seam
- Dimensional Examination after welding
- Final dimensional and Visual Inspection
- Final Cleaning, Pickling and Passivation
- Packing Inspection
- Review of Final Documents
- Release for shipping

### 2.2 The appointed inspector will closely witness the activity / operation. He will ensure that

- (i) Manufacturer is following applicable Quality Procedure during the execution of activity.
- (ii) Manufacturer is using calibrated measuring instruments and equipment
- (iii) Manufacturer is carrying out inspection of all points as defined in approved Manufacturing Drawings and MIP.
- (iv) Manufacturer is using applicable format while recording of results.
- (v) Manufacturer is recording true inspection values while generation of applicable records
- (vi) In case of Non-Conformity (NC) or ambiguity between requirements, TPIA Inspector will ask Manufacturer to stop the work immediately and inform I-I for the generation of this NC.
- (vii) Regular update to ITER-India on the status and resolution action taken by the contractor on product/process NCs.

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(viii) Update on actions and status on ITER-India quality surveillance observations provided on the contractor.

TPIA Inspector shall submit his inspection report with NC details (if any) to I-I within 2 (Two) days after completion of inspection stage at manufacturer or its subcontractor ‘site. The format of Inspection Report will be discussed and mutually agreed by I-I and TPIA before start of work. Inspection shall be treated as complete only when final inspection report is approved by I-I. TPIA Inspector shall prepare and submit the “Monthly Inspection Report” which consists of summary of inspections carried out during the month.

#### **Relocation of TPI Inspector:**

I-I want to keep a TPI continuously during the contract period, however, if due to any reason I-I cannot keep the person continuously, TPI should make arrangement for relocation of inspector with one-month advance notice from I-I.

#### **2.3 Qualification of Inspector**

TPIA shall submit the bio-data of at least 4 Nos. of inspectors which contains details of qualification and experience of the inspection engineers for the qualification before the start of work.

I-I will qualify -2 Nos. of Inspectors based on following requirements:

1. Inspector shall have minimum 10 years of experience in the Heavy fabrication Industry and preference given to inspector having minimum 5 years’ experience in the inspection of nuclear components.
2. Inspector shall have NDE LEVEL –II as per ASNT in, RT, UT, Visual Inspection and LPT at the time of performing the respective examination / testing.
3. Inspector shall have knowledge of ISO/EN/ASME Section III/international nuclear codes & standards.
4. Age of Inspector shall be less than 55 years.
5. Inspectors must be regular employees.

I-I Qualified inspectors shall be deputed for Inspection work. The list of qualified inspectors shall be maintained by the TPIA and I-I. Any addition / deletion shall be done after written approval from I-I.

#### **2.4 Inspection Team:**

The TPIA shall appoint and depute one qualified inspector regularly for the Contract period at Factory.

Based on need and workload of the inspection work, I-I will ask TPIA to appoint additional qualified inspectors with an advance notice of 07 days.

Employees of TPIA shall abide by the rules of manufacturing Contractor, its subcontractors and ITER-India during inspection/visit. In case of misbehaviour, proven incompetence or gross negligence, the Purchaser shall require the replacement of the personnel deployed for Purchaser’s assignment. These personnel shall be replaced with a competent person by the TPIA within 5 (Five) days after taking

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approval from Purchaser. The Purchaser also has the right to ask for replacement of TPIA personnel without assigning any reason.

## 2.5 Inspection Call:

2.5.1 Manufacturer will raise an inspection call well in advance to notify the execution of activities to I-I where I-I is having Hold Points (HP) and Notification Point (NP). This inspection call will be forwarded to TPIA if the said activity has been assigned to TPIA.

2.5.2 In case of assigned inspector 's absence, the substitute inspector should report within 24 hours.

## 2.6 Inspection Methodology:

2.6.1 Inspection shall be carried out as per the responsibilities defined in approved MIP & applicable documents and the Scope of Work defined in Clause No. 2 of this document. Manufacturer will provide all necessary facilities to TPIA to carry out inspections.

2.6.2 TPIA should satisfy itself for adequate safety at manufacturer site. I-I will not be responsible for any loss / damage on this account. In case of unsafe working conditions at manufacturer site, the TPIA should immediately inform to I-I

2.6.3 Inspection Report: Typical Format is provided in **Annexure-I**. However, following details must be a part of Inspection Report:

- (a) Contract Number:
- (b) Inspection Report Number:
- (c) Name of Supplier:
- (d) Proposed Date of Inspection:
- (e) Date(s) of Inspection
- (f) Description of Inspection Code
- (g) Description of Items
- (h) Reference of MIP, MIP Activity Number and other applicable documents referred for inspection
- (i) Quantity offered, accepted, reworked, rejected
- (j) Acceptance Status
- (k) Details of NC (if any)

It shall be ensured that all records of verification and inspection are enclosed with this IR.

## 3 INPUTS FROM I-I

- a) Inspection Call for each Inspection
- b) Copy of Contract Document (Technical Part) placed with manufacturer
- c) Copy of Quality Procedures of manufacturer
- d) Copy of Quality Plan and Manufacturing and Inspection Plan of manufacturer
- e) Copy of Quality Plan of I-I
- f) Drawings

It should be noted that all above mentioned inputs are confidential and must be returned to I-I at the time of contract completion. All input data from I-I will be given by CD / DVD.

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#### 4. DELIVERABLES

TPIA shall submit following reports with a NC details (if any) to I-I as a proof of completion of inspection activities

- a) Inspection Report
- b) End of TPIA Contract Report

Apart of above reports, TPIA will submit a monthly report which will includes the details of inspection(s) carried out, Inspection time taken to attend the call / submission of Inspection report and pending Inspection calls.

Typical Format of inspection report is provided in **Annexure-I**

#### 5. MONITORING

Performance of TPIA shall be monitored on aspects of response time taken to attend the inspection call, Timely submission of Inspection Report, Deficiency in Inspection, Feedback from manufacturer and Audit report from I-I Audit.

TPIA will arrange half yearly progress meeting to monitor the contract execution. The meeting notification shall be submitted to I-I at least 5 (Five) days in advance. In case of In-Person meeting the cost and expenses for the meetings (including travel expenses) shall be borne by each party. The MoM of these meeting shall be prepared by TPIA.

#### 6. RECORD KEEPING

All inspection records must be retained by TPIA for a period of 4 years after the completion of contract.

#### 7. CONTRACT COMPLETION

The contract will be completed after the approval of End of TPIA Contract Report. I-I will issue a completion certificate to the TPIA for their efforts.

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## Annexure I

### Typical Format of inspection report

INSPECTION REPORT				Page
Job No:	Report No:	Date of Report	Customer : ITER-India	

#### 1.0 ATTENDEES

NAME	COMPANY REPRESENTED	TITLE

#### 2.0 MATERIALS

##### 2.1 GENERIC MATERIALS

TAG / EQPT NO.	DESCRIPTION

##### 2.2 MATERIALS INSPECTED

PO ITEM NO.	TAG / SERIAL NO.	PRODUCT / MATERIAL / ITEM NAME	ORDERED QUANTITY	PRESENTED THIS VISIT	ACCEPTED THIS VISIT	QUANTITY ACCEPTED TO DATE

#### 3.0 DOCUMENTS USED

DOCUMENT NO.	REVISION/VERSION	TITLE	APPROVAL STATUS

#### 4.0 SCOPE OF INSPECTION

ITP LINE NO.	ITP ACTIVITY DESCRIPTION	ITEMS	RESULTS	CLAUSE

#### 5.0 EQUIPMENT AND INSTRUMENTATION USED (TO BE SUPPLIED BY SUPPLIER)

EQUIPMENT / INSTRUMENT DESCRIPTION	SERIAL NO	CALIBRATION CERT. NO.	EXPIRY DATE

#### 6.0 INSPECTION DETAILS

1. Main MIP No. \_\_\_\_\_, Sub MIP No. \_\_\_\_\_, Revision \_\_\_\_\_, Sr.No. \_\_\_\_\_, Name of Operation \_\_\_\_\_  
 Seam no. \_\_\_\_\_, spot no. \_\_\_\_\_ is \_\_\_\_\_ % witnessed as per procedure no \_\_\_\_\_  
 REV. \_\_\_\_\_, Dated: \_\_\_\_\_ and found satisfactory.

#### 7.0 NON-CONFORMANCES

NCR #	DESCRIPTION	DATE RAISED	DATE CLOSED

#### 8.0 ATTACHMENTS TO THIS REPORT

##### 9.0 PHOTOGRAPHS



## Annexure II

### DNB Vacuum Vessel

The DNB Vacuum Vessel containment vessel is a single vessel made from non-magnetic material (stainless steel). The design of the DNB Vacuum Vessel is not the conventional cylindrical or spherical shape the pressure-vessel codes would normally expect, but is in the form of a rectangular box. The DNB Vacuum Vessel is designed to comply with the requirements of RCC-MR 2007, class 2 components and in compliance with INB order dated 7<sup>th</sup> Feb 2012.

The DNB Vacuum Vessel connects to the Fast Shutter (FS) and hosts the Exit Scraper (ES), Calorimeter, Residual Ion Dump (RID), Neutraliser and the Beam Source (BS). It has a RH compatible large lid on the top (called Top Lid) to allow for the maintenance of these components.

The DNB vessel (main shell and top lid), the High-Voltage Bushing (HVB) and the Fast Shutter (FS) assembly constitutes the Primary Vacuum Boundary for the Diagnostic Neutral Beam Line Components.

Figure 1 shows General view of the DNB Vacuum Vessel with the main interfaces.

The DNB Vacuum Vessel will be delivered to the ITER site and installed in the ITER Neutral Beam Cell.

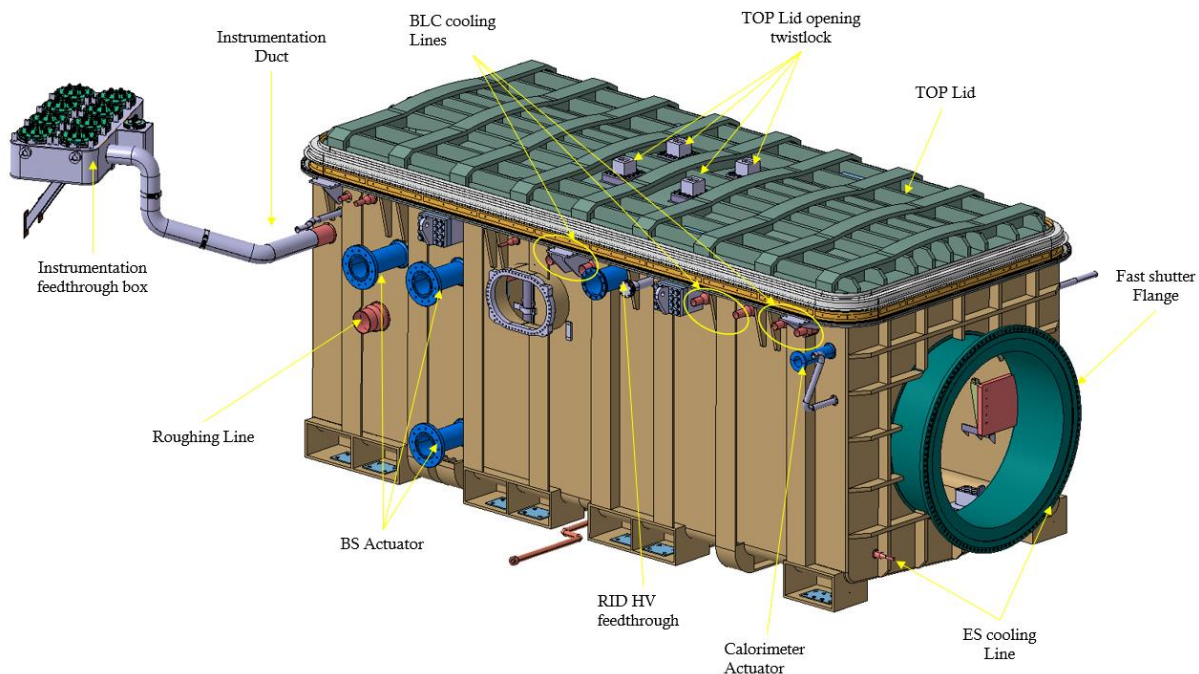


Fig 1: General View of DNB Vacuum Vessel with its interfaces

### HNB3 Vessel

The HNB3 Vessel is made in two parts henceforth termed the Beam Line Vessel and the Beam Source Vessel (BLV and BSV). These are considered separately for the design and construction but will be joined permanently together on site at the ITER Neutral Beam Cell. When completed with the BLV lid (Top Lid) and the BSV lid (Rear lid), the High-voltage bushing, and the Front-End components,

the assembly constitutes the Primary Vacuum Boundary for the Neutral Heating Beam Line Components. (see fig 2).

The vessels are made of non-magnetic material (stainless steel) and are surrounded by a Passive Magnetic Shield (PMS) and Active Correction Compensation Coils (ACCC) to ensure that the neutral beam injection is not diverted by stray magnetic field from the main torus magnetic coils fringe field, as the beam undergoes some small amount of re-ionization during the flight time to the plasma.

The design of the BLV and BSV is not the conventional cylindrical or spherical shape the pressure-vessel codes would normally expect, but is in the form of two flat-sided rectangular boxes. The BLV and BSV, separately and together, are designed to comply with the requirements of RCC-MR.

The HNB BLV and BSV will be welded on-site (not within the scope of this tender). The Beam Line Vessel connects to the FS and hosts the ES, Calorimeter, RID, NED and Cryopumps. It has a large lid on the top (called top lid) allowing the maintenance of these components. The Beam Source Vessel hosts the BS and has a lid (called rear lid) allowing the maintenance of the BS.

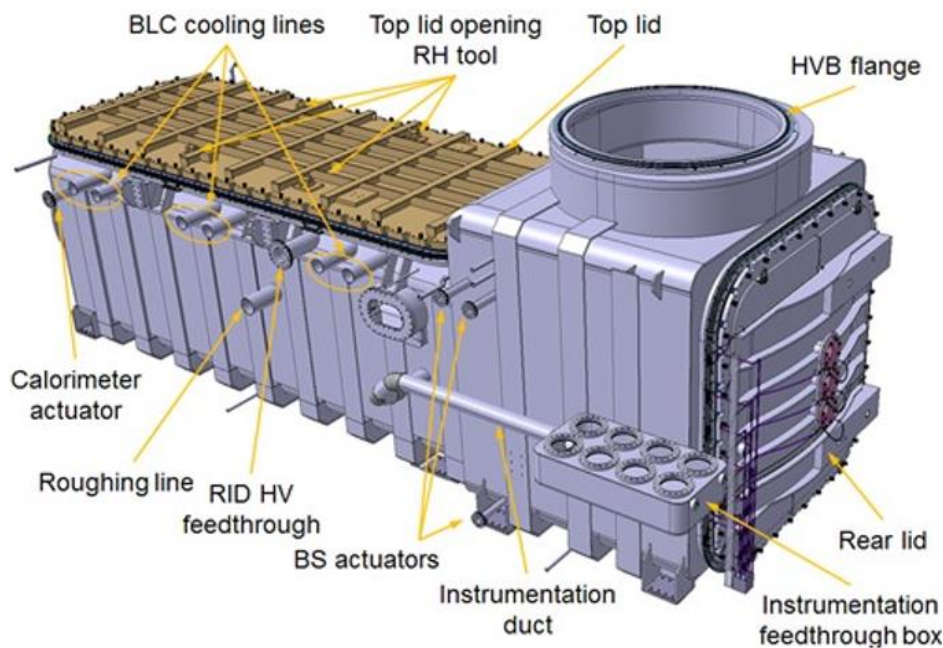


Fig 2: General View of HNB3 Vacuum Vessel with its interfaces