

Title	Third Party Inspection for Vacuum Vessel In Wall Shields
Sub Title	PART-A (II): Scope of Work and Technical Specifications

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1 Description

This section briefly describes the In Wall Shields system, for which TPI services are required. The function of the IWS is to provide neutron shielding and to reduce toroidal field ripple. It is located between two shells of the vacuum vessel is part of the vacuum vessel of ITER.

IWS block is an assembly consisting of IWS plates stacked together with spacers using M30 bolts. Material of IWS plates are borated steels (SS304B7, SS304B4) and/or SS430. Thickness of each plate is 40 mm and are stacked together with spacers maintaining 4mm gap between two plates. The number of plates varies from 3 to 11 depending upon the location of the block in poloidal segment. The IWS block is assembled in 2 phases, namely IWS block pre-assembly and IWS block assembly. In the IWS pre- assembly, IWS plates are first fastened together with M30 lateral bolts and Nuts as shown in Sr. Nos. 1 and 2 of table-1. The lateral bolts have threaded holes in the bolt head for lifting IWS Blocks. After the IWS block pre-assembly, upper and lower brackets are added and fastened together with M30 central bolt. The complete block with brackets forms the IWS block assembly. Figure -1 shows typical design of IWS block

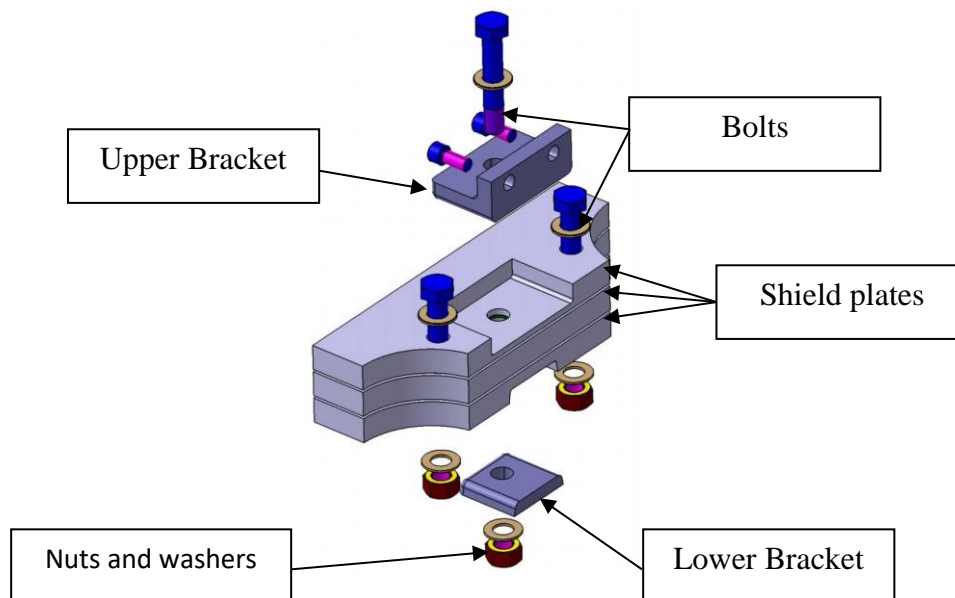
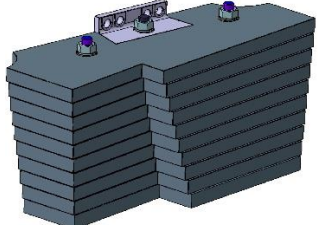
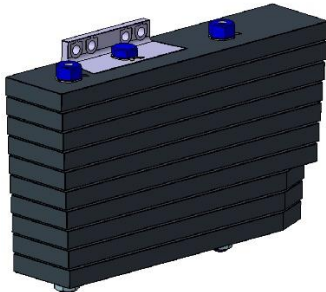




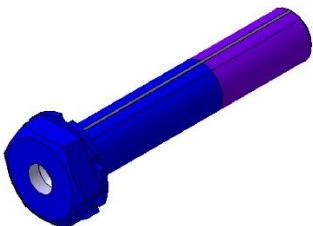
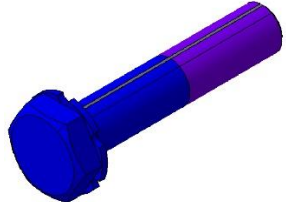
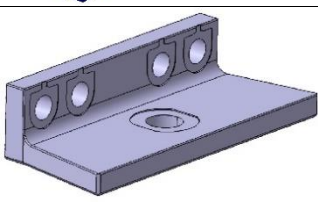
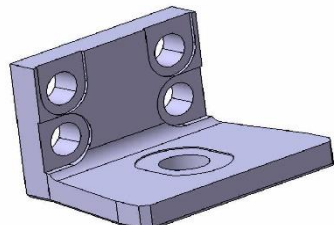
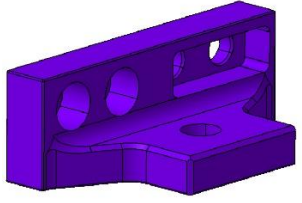
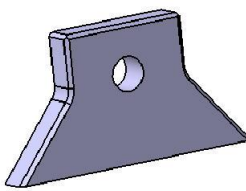
Figure-1: Schematic of IWS Block with three plates

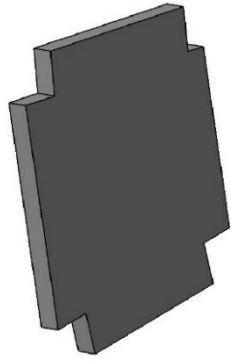
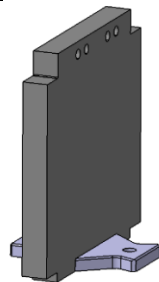



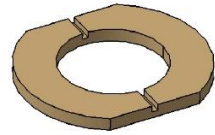
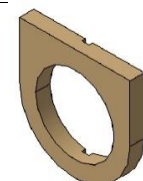

The brackets in the IWS block are used to mount the block to the Vacuum Vessel Support Rib by the Vacuum Vessel Manufacturer. A brief introduction to various IWS components is given in table-1 below:

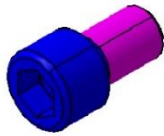
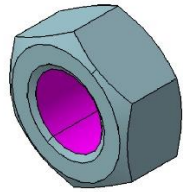



Details in this section are given only for information. Details of actual blocks and components will be provided with contract.

Table-1: Brief introduction to various IWS components

Sr. No.	Component description	Component
1.	IWS P-b-P block Assembly	
2.	IWS B-b-B block Assembly	
3.	IWS plates	
4	IWS block M30 lateral bolt (without flange for P-b-P block assembly)	

5.	IWS block M30 lateral bolt (with flange for B-b-B block assemblies)	
6.	IWS block M30 centre bolt (with flange common for all block assemblies)	
7.	Upper bolted bracket (manufactured from single piece)	
8.	Upper bolted bracket (manufactured by welding method)	
9.	Lower bolted bracket (L-shaped, manufactured from single piece)	
10	Lower bracket (welded type)	

11.	Support Rib	
12.	SR+LB assembly	
13.	IWS block M30 4 mm spacer	
14.	IWS block M30 14 mm spacer	
15.	IWS block M30 38 mm spacer	
16.	IWS block bolt lock washer	
17.	IWS block cap screw lock washer	
18.	IWS block upper bracket cap screws (with flange)	

19.	IWS block lower bracket cap screws	
20.	IWS block M30 Nuts (without flange for B-b-B block assemblies)	
21.	IWS block M30 Nuts (with flange)	
24.	M30×483 NI Rod	
25.	M30×483 NM Rod	

Note: - Field joints assemblies and their components are similar to IWS blocks and components but varies in size.

2 Duration and Required Man-month

- Duration of TPI contract will be for 08 months or till utilization of ordered man-months whichever is later. Contract duration can be extended for another 04 months at the same rate with same terms & conditions. The minimum extension period can be of half month and maximum extension period can be 04 months.
- The estimated man-months for contract duration is of 30. This can be increased to additional maximum of 10 % of ordered man-months, if the contract is extended based on the need as per point (a).

3 Scope of Work

Scope under this tender is to carry out “Third Party Inspection” (TPI) of various manufacturing processes, inspection and testing by selected “Third Party Inspection Agency (TPIA)”, as described

in this section. This tender is for Third Party Inspection of IWS components as per Scope of work (current section) described in Part-A (II) at “Onsite” addresses given in 1.1.1 (m) of Part-A (III).

- (a) TPIA shall appoint and depute inspector(s) at “Onsite” addresses given in 1.1.1 (m) of Part-A (III) as per instruction from ITER-India within 07 days from the date of finalization of inspector.
- (b) Based on need and workload of the inspection, I-I will ask TPIA to appoint additional inspectors with an advance notice of 07 days. TPIA shall depute additional inspector(s) within 07 days from date of request.
- (c) Manufacturing and Inspection Plan (MIP), which defines the sequence of Manufacturing and Inspection activities for IWS and its components will be provided by ITER-India to the selected bidder. ITER-India will also provide Quality Procedure(s) for each activity in the MIP. The reference of these applicable Quality Procedures, Details of Records and the responsibilities of associated organizations i.e. (a) I-I, (b) IO are given in MIP. Notification points are given in the MIP to witness the inspection of IWS Block and components.

4 List of inspection activities

Following are some of the activities to be performed by TPIA as per approved manufacturing drawings and Manufacturing and Inspection plan (MIPs):

- (a) Witness raw material inspection to be done by manufacturer before use.
- (b) Witness LPT of top, bottom and penultimate IWS plates ,
- (c) Witness UT and LPT of IWS (bolted) brackets,
- (d) Witness UT and LPT of IWS (Welded) brackets.
- (e) Witness UT and LPT of SR+LB Assemblies, and Field Joint Brackets.
- (f) Witness of Fasteners (Nuts, bolts, cap screws etc.)
- (g) Witness of Spacers and Washers.
- (h) Monitoring of ultrasonic cleaning of all IWS components, SR+LB Assemblies, and Field Joints components
- (i) Witness wipe test inspection of IWS components, SR+LB Assemblies, and Field Joints components
- (j) Visual inspection of components before IWS blocks Assembly, SR+LB Assemblies, and Field Joints assemblies
- (k) Witness that manufacturer applies torque on IWS fasteners during IWS block Assembly and Field Joint assemblies
- (l) Dimension and visual inspection of IWS blocks, SR+LB Assemblies, Field Joints and all IWS components.
- (m) Visual Inspection of Spot welding on fastener head of IWS Block assembly, Field Joints assemblies.
- (n) FAT of IWS blocks, SR+LB Assemblies and Field Joints assemblies
- (o) Witness cleaning of final deliverables prior to start the packing activity.
- (p) Witness packing of IWS blocks and components, ensure items as per packing list.
- (q) Surveillance of IWS Machining Process at Manufacturer’s site.
- (r) Ensure that applicable NCRs are raised by manufacturer when non-compliance is observed.

Bidder to take note of following:

- (1) Visual inspection is as per visual inspection procedure and includes inspection of final marking on the components and assemblies.
- (2) The packing includes both wrapping of individual blocks and final box packing. Ensure the component is properly cleaned and the items packed are as per packing list.
- (3) At the component level, the TPIA personnel will sign on the respective record e.g. Dimension Inspection, LPE, UE, wipe test etc. after completing the witness of each activity as per MIP. Correspondingly TPIA would also sign against the same activity on the MIP at the component stage and assembly.
- (4) In case of Non-Conformance raised by manufacturer, and its sub-contractor TPIA will ensure that the references of the respective NCRs are mentioned in the component and assembly EMRs. The NC must be closed before the component is cleared for next stage or before the final acceptance is done.

5 Inspector Responsibilities

TPIA inspector will witness, check, ensure and keep vigilance on following activities being carried out by Manufacturer and its Sub contractor during IWS manufacturing.

- (a) Manufacturer follows applicable approved Quality Procedure during the execution of activity.
- (b) Manufacturer uses calibrated measuring instruments and equipment.
- (c) Manufacturer carries out inspection of all points as defined in approved manufacturing drawings and MIP.
- (d) Manufacturer uses applicable format while recording of results.
- (e) Manufacturer records true inspection values while generation of applicable records.
- (f) During process monitoring the TPIA will ensure that the machine operator is aware about the job requirements, the operator follows the operating instructions, check machine maintenance and calibration records. TPIA will record the observations in a separate process monitoring report. The report format and frequency will be mutually agreed between TPIA and I-I.
- (g) In case of Non-Conformity (NC) or ambiguity between requirements, TPIA inspector can ask manufacturer to stop the work immediately and inform I-I for the generation of NC (if applicable).
- (h) TPIA inspector shall submit the inspection report with NC details (if any) to I-I within two working days after completion of inspection stage at the manufacturing site. The format of Inspection Report will be discussed and mutually agreed between I-I and TPIA before start of work. The Inspection shall be treated as complete only when final inspection report is approved by I-I.
- (i) TPIA inspector will prepare and submit the “Monthly Inspection Report” which should include summary of inspections carried out during the month.

6 TPI Inspection Team

The purchaser will qualify at least six inspectors based on the following requirements: -

6.1 Needed Skill of Inspector

1. B.E, B.Tech Mechanical Engineering (Minimum experience 4-6 years) or Diploma in Mechanical Engineering (Minimum experience 5-8 years).
2. ASNT LEVEL –II in Visual, UT and LPT techniques

3. Inspector shall have knowledge of ASME/ASTM Standards
4. The TPIA inspector shall have a minimum of 5 years' experience of inspection in the Precision manufacturing Industry and preference is given to inspector having experience in the inspection of nuclear components.
5. Age of inspector should be less than 60 years.
6. Inspectors must be regular employees or shall be working in contract with TPIA since at least three years prior to the tender date.

6.2 Working rules for Inspectors:

1. TPIA shall submit the bio-data of at least 18 inspectors with Part-A of the Bid which contains details of qualification and experience of the inspector, for the qualification and personal interview before start of the work. I-I will qualify inspectors based on the telephonic/personal interview and will inform TPIA
2. The list of qualified inspectors shall be maintained by the TPIA and I-I.
3. Needed number of inspectors qualified by I-I shall be deputed for inspection, any change, in the number of inspector(s) shall be done after written approval from I-I.
4. Based on the need, I-I will ask TPIA to appoint additional inspectors with 7days of advance notice. If additional inspectors is not deputed within 7 days it would be considered as a case of unattended inspection call and would be treated as per the section #10 of this document.
5. Inspectors may be asked to work in two shifts with 7 days of prior intimation.
6. In case of assigned inspector's planned absence, the substitute inspector should be made available. If the absence is unplanned, TPIA shall ensure that substitute inspectors shall report within 24 hours.

7 Inspection Call

Manufacturer will raise an inspection call well in advance to notify the execution of activities to I-I. This inspection call will be forwarded to TPIA. This inspection call must be attended by TPIA at the time given in the inspection call.

8 Inspection Methodology

- (a) Inspection shall be carried out as per the responsibilities defined in approved MIP and the Scope of Work defined in this document
- (b) TPIA should satisfy itself for adequate safety at manufacturers and sub-contractors premises. I-I will not be responsible for any loss / damage on this account. In case of unsafe working conditions at manufacturer's site, the TPIA should immediately inform I-I about the same.
- (c) Inspection Report: The format of Inspection Report (IR) will be finalized before the start of work. However, following details must be a part of Inspection Report:
 - Contract Number
 - Inspection Report Number
 - Name of Supplier
 - Proposed Date of Inspection

- Date(s) of Inspection
- Description of Inspection Code
- Description of Items
- Reference of MIP, MIP Activity Number and other applicable documents referred for inspection
- Quantity offered, accepted, reworked, rejected, etc.
- Acceptance Status
- Details of NC (if any)
- It shall be ensured that all records of verification and inspection are enclosed with this IR.

9 Inputs from I-I

- a) Inspection call for each Inspection.
- b) Copy of quality procedures of manufacturer.
- c) Information on changes in drawings (as and when implemented).
- d) Copy of Quality Plan and Manufacturing and Inspection Plan of manufacturer.
- e) 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.

10 Deliverables

TPIA shall submit following documents as deliverables.

- a) Quality Plan (to be submitted within 30 days after signing of contract)
- b) Daily work report (for urgent action only)
- c) 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.
- d) End of TPIA Contract Report (at end of contract)
- e) Review report and recommendation for NC
- f) Monthly Attendance sheet

The format of reports will be discussed and mutually agreed by I-I and TPIA before start of work. No additional charges will be payable for this activity.

11 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.

12 Penalty

Following types of Penalty can be applied during execution of Contract

12.1 Due to negligence in Inspection

If any discrepancy is found during checking of Inspected items and / or records and is established that the discrepancy is on account of inaccurate / inadequate inspection, the penalty of 10 % of man month rate will be charged per discrepancy. Moreover, the TPIA has to carry out inspection again of the item(s) found with discrepancy without any extra charge to ITER-India.

The Discrepancies will be primarily checked at following levels:

1. **At Assembly Stage:** Any deviation in component level observed during final assembly and established as a result of inspection error will be treated as discrepancy due to negligence of inspection.
2. **At Factory Acceptance Test (FAT) Stage:** Any deviation in component level and assembly level observed during Factory Acceptance Test and established as a result of inspection error will be treated as discrepancy due to negligence of inspection.
3. **Random Surveillance:** ITER-India also reserves the right to carry out surveillance of inspection activities at any time during the contract tenure.
4. Furthermore, discrepancies due to negligence in inspection can also be checked and verified during site acceptance of components at installation sites by final customer.

If the number of discrepancies are more than two in a given month then the ITER-India has right to replace the inspector.

Due to above reason, if three inspectors are to be replaced then ITER-India has the right to terminate the contract due to default by the TPIA.

12.2 Due to Unattended Inspection Call

If inspection call is not attended by TPIA inspector within two working days including intimated date of inspection, penalty of 10 % of man-month rate and the payment of the unattended days shall be deducted.

12.3 Due to unattended Inspection Call for change in location

If TPIA does not allot the inspector as per clause no. 3(b), *PART-A(II)-Scope of work*, then penalty of 10% of man-month rate shall be deducted.

13 Record Keeping

All inspection records must be retained by TPIA for a period of 5 years after the completion of inspection activities