

Technical Specifications (In-Cash Procurement)

CfN - Technical Summary for Procurement of the Neutral Beam Port Liners

This document summarizes the Technical Specification for Procurement of the Neutral Beam Port Liners



Procurement of Neutral Beam Port Liners

Call for Nomination (CfN)

Summary of Technical Specifications

1 Purpose

The purpose of this contract is the procurement of Neutral Beam Port Liners (NBPL) and the integration of Heating Neutral Beam Plates to their corresponding Shield Blocks. The NBPL components are a part of the Blanket System which provide additional nuclear and thermal shielding to the Vacuum Vessel and Blanket Modules around the Heating and Diagnostic Neutral Beam ports.

2 Background

ITER is 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. The ITER Members - China, the European Union, India, Japan, Korea, Russia and the United States - are now engaged in a decades-long collaboration to build and operate the ITER experimental device, and together bring fusion to the point where a demonstration fusion reactor can be designed. General information on the scope and design of the ITER machine is described in the www.iter.org website.

Working conditions inside the Vacuum Vessel of ITER combine ultra-high vacuum, high temperatures and demanding electromagnetic conditions.

The Neutral Beam Port Liners include thirteen components, located near the Neutral Beam port area of the Vacuum Vessel. These include:

- the Diagnostic Neutral Beam (DNB) Liner, and
- the Heating Neutral Beam (HNB) Plates: four plates each in each of the three HNB ports.

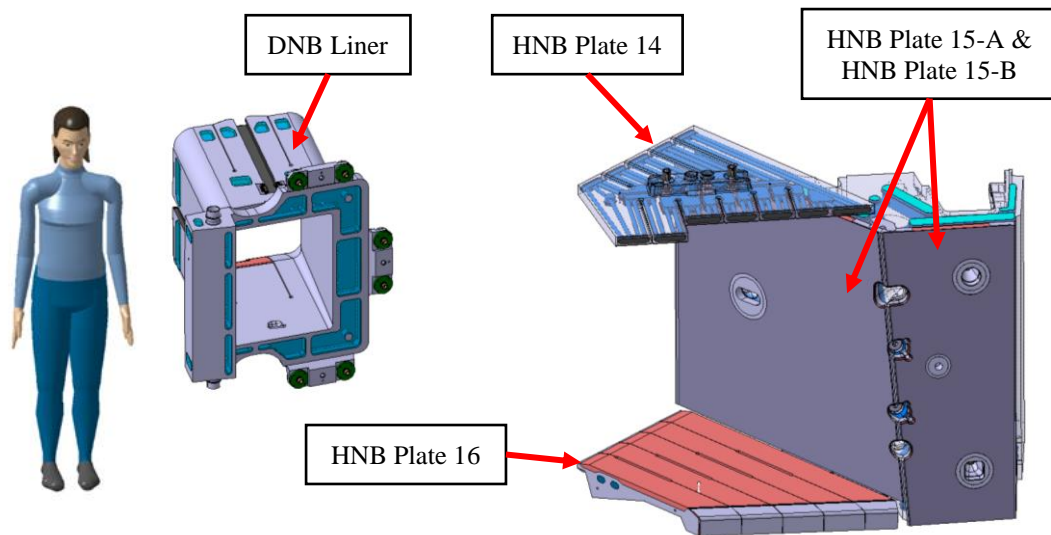


Figure 2-1. Neutral Beam Port Liners

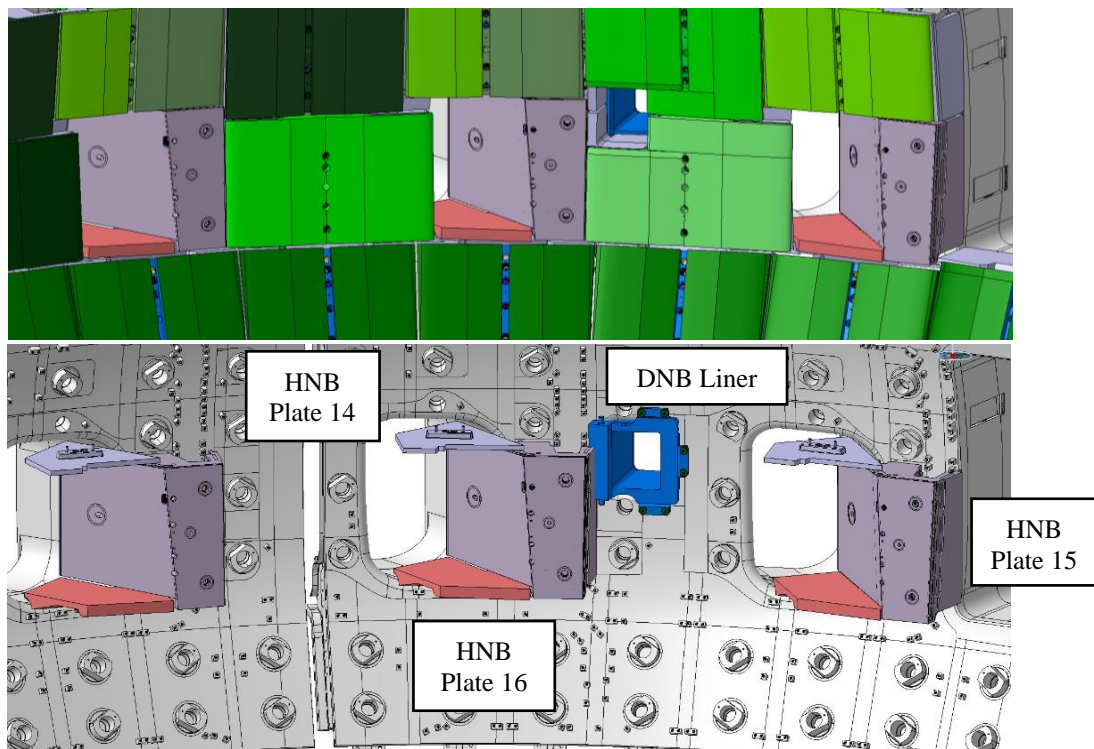


Figure 2-2. The NBPL, located at the Neutral Beam Ports, consist of one DNB liner (in blue) and twelve HNB plates (four plates in each of the three HNB ports).

3 Supply Description

3.1 DNB liner

The DNB liner consists of a 60mm thick flange on the Blanket Shield Block side and a 40mm thick on the Vacuum Vessel side. The DNB liner is a stainless steel component with internal cooling in the form of deep drillings and milled water boxes with welded covers. A small portion of the component includes 3mm CuCrZr layer. The DNB liner is mechanically fixed to the Vacuum Vessel via bolts and dumping pads, where some Standard Parts coated with Electrical Insulation Coating or Copper Anti-seizing Coating.

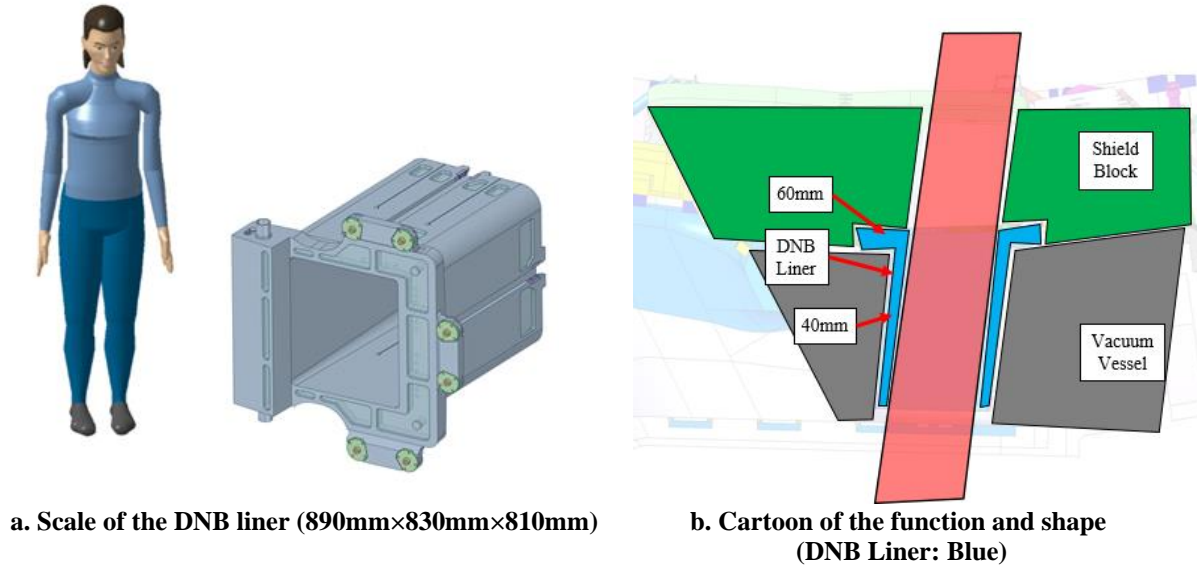
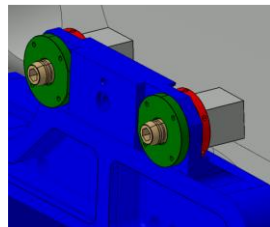


Figure 3-1. Diagnostic Neutral Beam liner (for information only)

6 bolts with floating sleeves



8 dumping pads

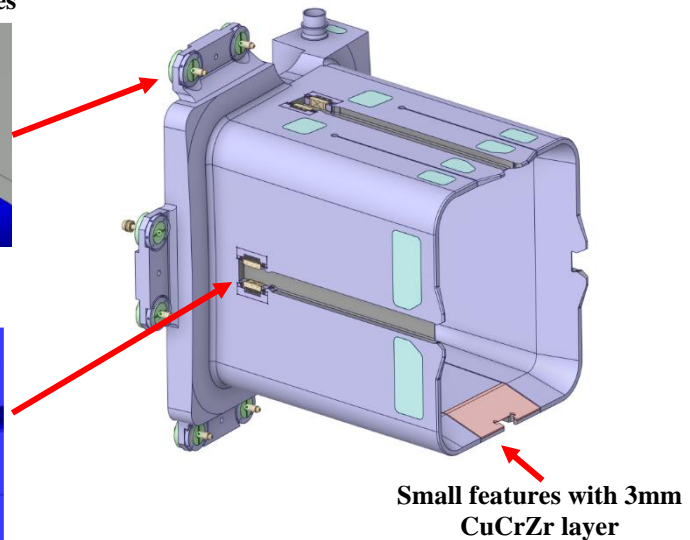
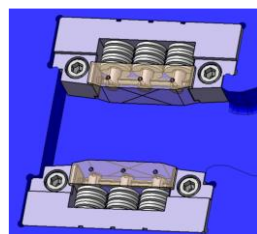


Figure 3-2. DNB Liner and its Standard Parts (for information only)

3.2 HNB Plate 14

The HNB Plate 14 is a stainless steel component with internal cooling in the form of deep drillings and milled water boxes with welded covers. The HNB Plate 14 is attached to the underside of the Shield Block 14 via welding and bolting interface.

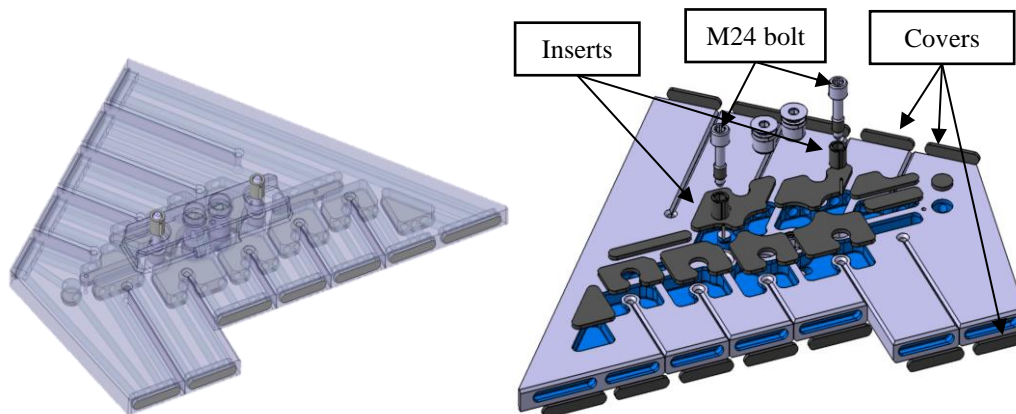


Figure 3-3. Heating Neutral Beam Plate 14 (for information only)

3.3 HNB Plates 15

The HNB Plates 15 consist of stainless steel front and back surfaces with the CuCrZr between. The CuCrZr interlayer is expected to be Hot Isostatic Pressed to the stainless steel.

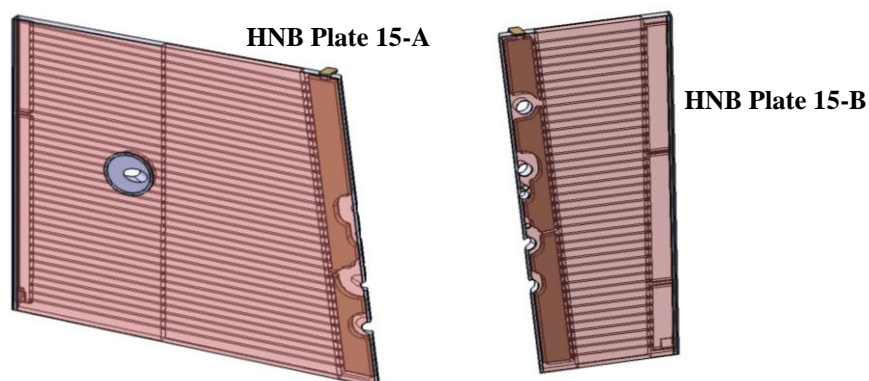


Figure 3-4. Heating Neutral Beam Plates 15 (SS/CuCrZr/SS HIP bonded, for information only)

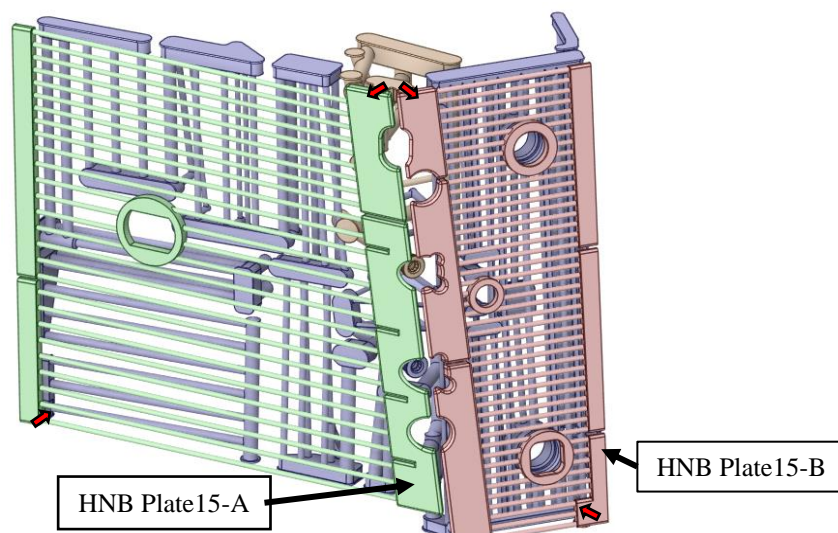


Figure 3-5. HNB Plates 15 Cooling Volume Overview (Deep drilling holes).

3.4 HNB Plate 16

The HNB Plate 16 consists stainless steel and CuCrZr which is expected to be Hot Isostatic Pressed together. The deep drilling holes are drilled directly in a CuCrZr substrate, with a combination of water boxes and drilled holes in the stainless steel underneath.

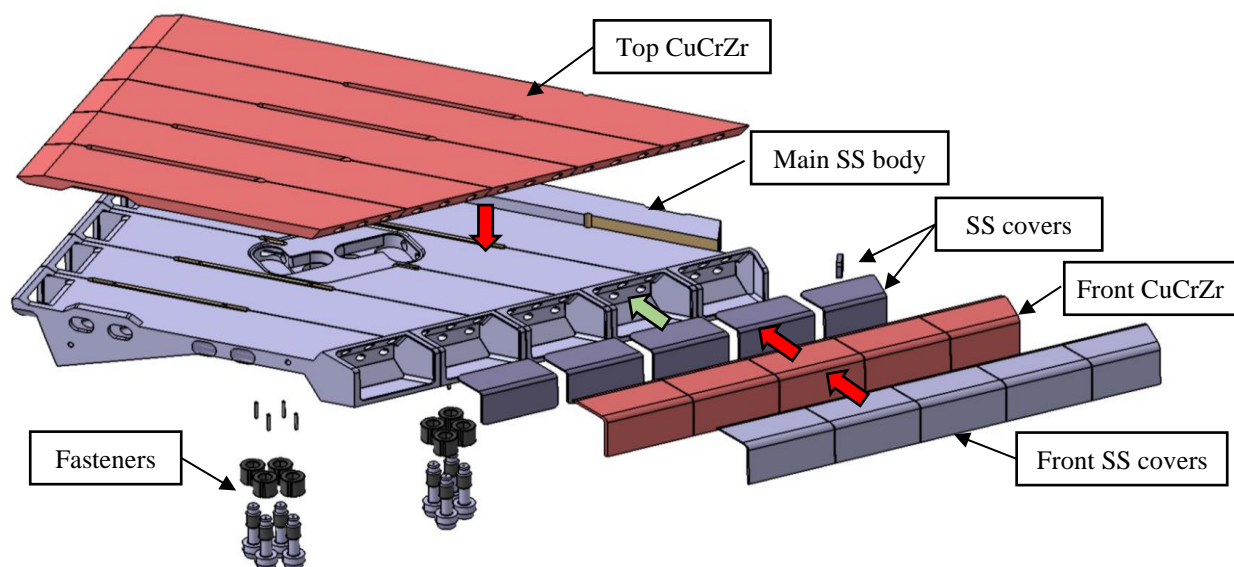


Figure 3-6. Exploded view of the HNB plate 16.

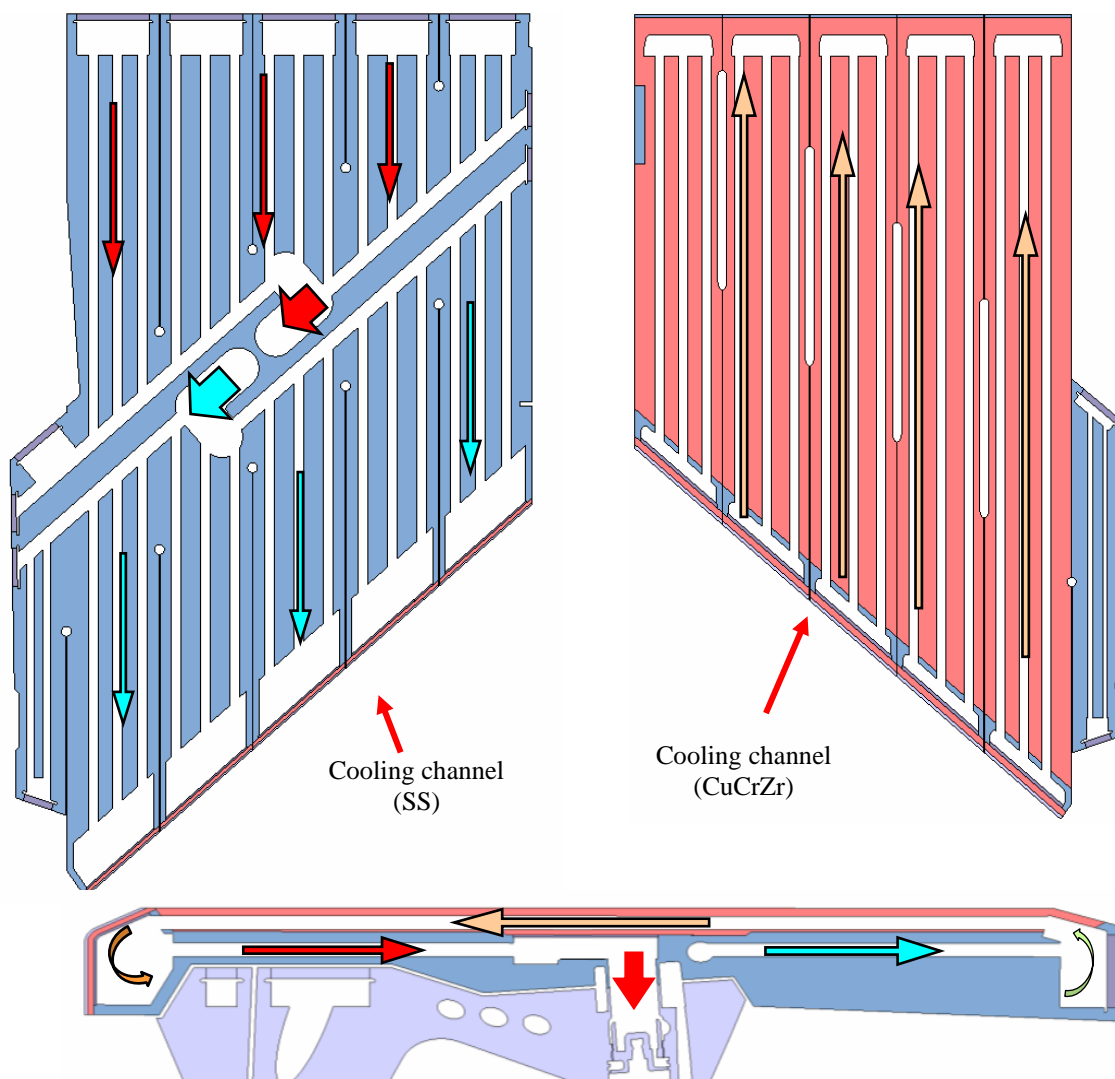


Figure 3-7. HNB plate 16 Cooling Overview (Deep drilling holes).

4 Scope of Work

4.1 Supply Scope

This supply contract will cover the fabrication and delivery of Neutral Beam Port Liners (including provisions for spares), namely:

- Diagnostic Neutral Beam liner, qty 2
- Heating Neutral Beam Plates:
 - Plate 14, qty 4
 - Plate 15, qty 8
 - Plate 16, qty 4
- All Standard Parts for NBPL (the bolts, washers, caps, etc.)

The Neutral Beam Port Liners utilize a Built to Print (BtP) Specification. The IO is responsible for carrying out the Final Design and providing the related 3D models, 2D drawings, and baseline documents. Thereafter the Contractor takes over responsibility for the Manufacturing Design and provides components that fulfils the specified requirements.

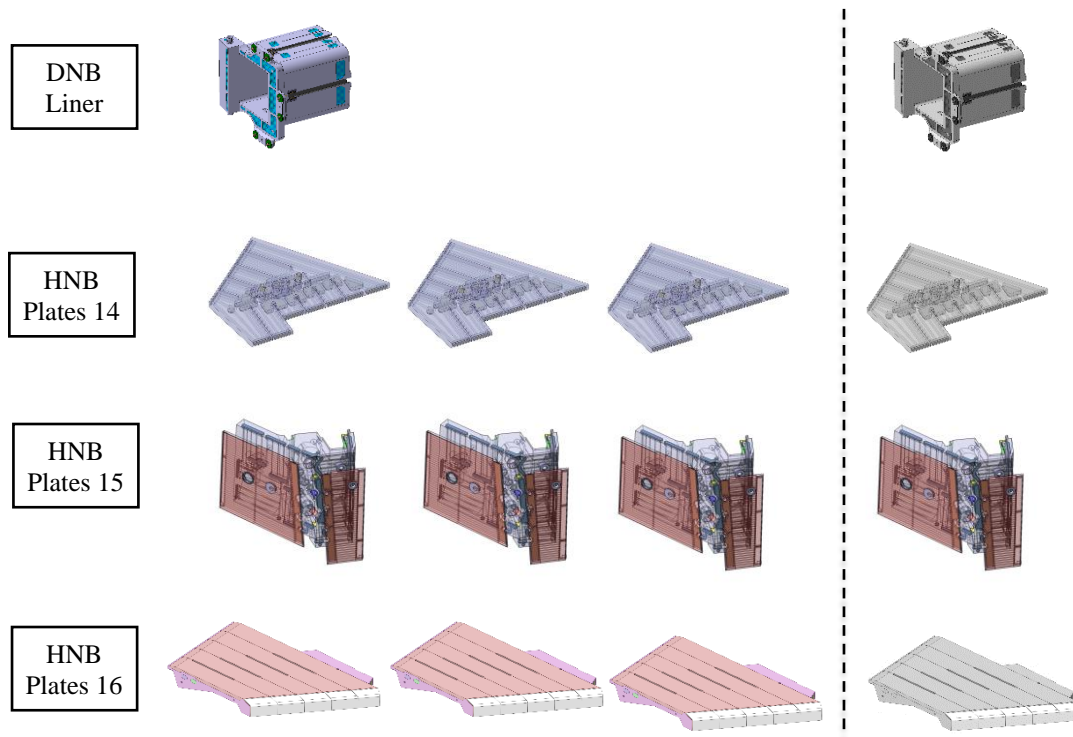


Figure 4-1. Quantity of NBPL components for supply (spares are to the right of the dotted line).

4.2 Integration Scope

This supply contract will also cover the integration of HNB Plates to their corresponding Shield Blocks, specifically:

- HNB Plates 15 are to be Hot Isostatic Pressed onto Shield Block 15 (see Figure 4-2).
- HNB Plate 14 is to be welded and bolted to Shield Block 14 (see Figure 4-3).
- HNB Plate 16 is to be welded and bolted to Shield Block 16 (see Figure 4-3).

Note: Shield Blocks are Free-Issued Items (FII) as input to the contract, though some final machined is needed as part of the contract.

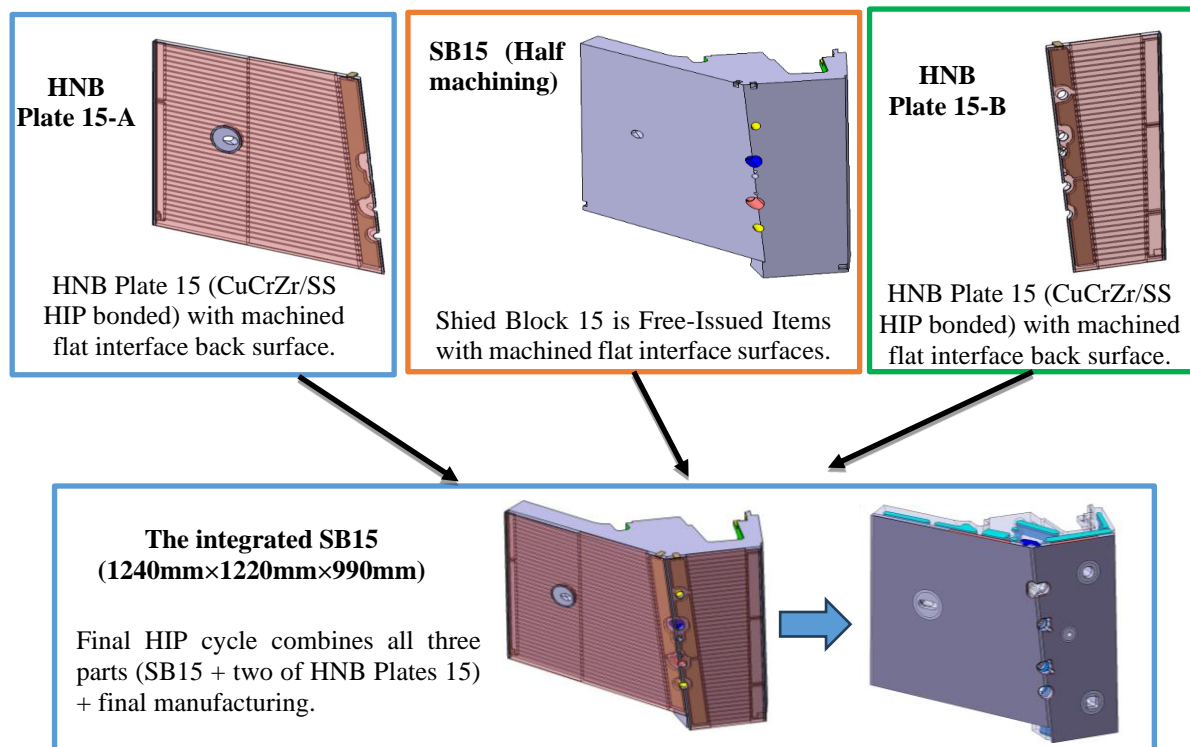


Figure 4-2. Integration with HNB Plates 15 and SB15 via HIP (for information only)

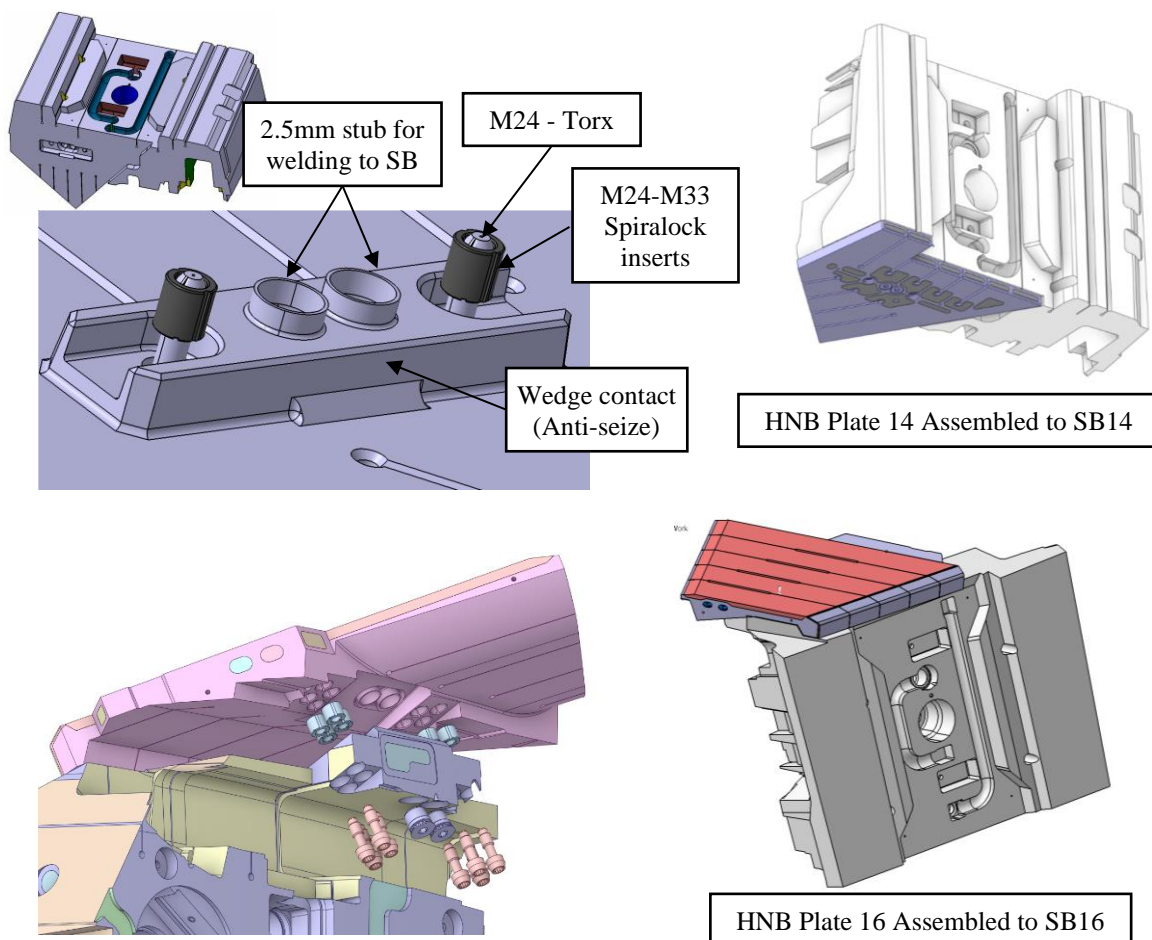


Figure 4-3. HNB Plates 14&16 assembled to corresponding SB (FII) via welding and bolting interface (for information only)

5 Experience Requirements

The ITER Organization is looking for Contractor with demonstrated experience delivering components for ultra-high vacuum applications, with manufacturing processes including:

- Machining,
- Welding,
- Deep drilling,
- Hot Isostatic Pressing,
- Copper and insulation coating,
- Vibrational relaxation of weldments,
- Special treatments (baking, cleaning),
- Cleaning for ultra-high vacuum application,
- Hot Helium Leak Testing.

The Contractor must prove its ability to provide in an organised way the competences specified in the Scope of Work above.

The Contractor should also have available a dedicated clean area, which shall only be operated by trained personnel to approved procedures.

The Tenderer shall have and maintain a valid ISO 9000 certification and shall have the duty to verify and document the equivalent quality level of all its subcontractors and consultants.

6 Award of the Contract

The ITER Organization reserves the right to award one Contract for the whole scope of work or to split the procurement of the different systems in separate Contracts. Further details will be provided at the Call for Tender stage.

Suitable teaming arrangements for multiple companies are possible, where appropriate, to enhance the offering of the tenderer.

The language used at ITER is English. A fluent professional level is required (spoken and written English) with the Contractor liaising with ITER.

7 Candidature – Expression of Interest

Candidature is open to all companies participating either individually or in a grouping (consortium) which is established in an ITER Member State. A consortium may be a permanent, legally-established grouping or a grouping, which has been constituted informally -- but formalized with engagement letters -- 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 consortia will be assessed as a whole. Consortia cannot be modified later without the prior approval of the ITER Organization.

8 Timetable for the Tender Process

The tentative schedule for this tender process is as follows:

Call for Nomination (CfN)	<i>February 2025</i>
Pre-qualification	<i>March 2025</i>
Invitation for Call for Tender	<i>June 2025</i>
Tender Submission	<i>August 2025</i>
Contract signature	<i>February 2026</i>