	Mandatory Appendix Appendix-II-TCPH-APB 3_06 Vacuum Requirements and Surface Treatment	INDUS Ref. No. R34VABP
---	---	------------------------------

Type of document	Tender Document
IDM number (If required)	---
References	---
Current Document phase	Signed
Current Document Version	v1.3
Version date	25-03-2019
Access control	Restricted


Title	Design, Fabrication and Supply of Torus Cryo Pump Housing (TCPH) with Bellows and Other Loose items
Sub-title	<b>MANDATORY APPENDIX : II-TCPH-APB3_06_VACCUM REQUIREMENTS AND SURFACE TREATMENT</b>

Author	ITER-India
Contributors	ITER-India

Distribution list	Public Tender
-------------------	---------------


Written by	Reviewed by	Approved by
ITER-India	ITER-India	ITER-India

<p align="center"> <b>ITER-India, Institute for Plasma Research</b>  <b>Block A, Sangath Skyz, Bhat-Motera Road, Koteswar,</b>  <b>Ahmedabad 380005, Gujarat, India</b>  <a href="http://www.iter-india.org">http://www.iter-india.org</a>   </p>	
---	--

	<p style="text-align: center;">Mandatory Appendix</p> <p style="text-align: center;">Appendix-II-TCPH-APB 3_06 Vacuum Requirements and Surface Treatment</p>	<p style="text-align: center;">INDUS Ref. No. R34VABP</p>
---	--	---

## CONTENTS

1. SCOPE.....	3
2. REFERENCE CODES AND STANDARDS.....	3
3. REQUIREMENTS .....	3
3.1. Cleaning of components and assembly: .....	3
3.2. Clean conditions .....	3
3.3. Baking .....	5
4. ACCEPTANCE OF CLEANLINESS CHECKS .....	5
5. DOCUMENTATION AND RESPONSIBILITY .....	5

	<p style="text-align: center;">Mandatory Appendix</p> <p style="text-align: center;">Appendix-II-TCPH-APB 3_06 Vacuum Requirements and Surface Treatment</p>	<p style="text-align: center;">INDUS Ref. No. R34VABP</p>
---	--	---

## 1. SCOPE

This mandatory appendix covers vacuum, surface treatment and baking requirements for TCPH.

## 2. REFERENCE CODES AND STANDARDS

- ITER Vacuum Handbook V2.3
- Appendices 4 (accepted fluids) of ITER Vacuum Handbook (RDB3\_07)
- Appendix 13 (cleaning and cleanliness) of ITER Vacuum Handbook (RDB3\_07)
- Appendix 14 (Passivation and Pickling) of ITER Vacuum Handbook (RDB3\_07)
- ASME Sec-VIII, Div.2, Part-6

## 3. REQUIREMENTS

### 3.1. Cleaning of components and assembly:

Cleaning procedure for TCPH shall be developed in accordance with requirements specified in ASME Sec-VIII, Div.2, with supplementary requirements of ITER Vacuum Handbook [RDB3\_07] Section 24, Appendices 4 (accepted fluids) and appendix 13 (cleaning and cleanliness).


Pickling and passivation shall be performed immediately after final cleaning in accordance with guidelines provided in Appendix-14, ITER-Vacuum Handbook. Based on manufacturing sequence and feasibility, Bidder may propose the stage of performing pickling and passivation for approval.

### 3.2. Clean conditions

Clean work plan shall be prepared to establish clean conditions to be applied for each stage of manufacturing.

These clean conditions include following requirements:


- The separate clean area dedicated to stainless steel manufacturing shall be prepared.
- Stainless steel components shall not be stored directly on the ground or bare floor. It shall be placed over a clean surface such as wood, plastic (non PVC), etc. No nails or resins are to be present in the wood.
- During manufacturing only stainless steel compatible wire brushes and grinding wheels (Aluminum oxide) shall be used for surface conditioning. In no case, grinding wheel or wire brush used in carbon steel surface is used on stainless steel surface.
- The surfaces of jigs, fixtures and tools that come into contact with the TCPH component shall in general be constructed of stainless steel or should be lined with stainless steel material to prevent any contamination.

	<p style="text-align: center;">Mandatory Appendix</p> <p style="text-align: center;">Appendix-II-TCPH-APB 3_06 Vacuum Requirements and Surface Treatment</p>	<p style="text-align: center;">INDUS Ref. No. R34VABP</p>
---	--	---

- All items (TCPH components, tools, jigs and fixtures etc.) shall be thoroughly degreased, cleaned prior to being introduced into the clean conditions assembly area.
- Only water soluble, non-halogenated, Sulphur and phosphorus free machining fluids approved by ITER are permitted. The list of accepted cleaning fluids is given in Appendix 4 of the ITER Vacuum Handbook.
- Direct contact of carbon steel or zinc coated slings or chains, and the use of tools containing lead, bronze copper or zinc is not permitted.
- Lead or other low melting metals (tin, antimony, mercury, zinc, arsenic, cadmium, etc.) their compounds or materials containing low melting metals as a basic chemical constituent shall not be used in direct contact with the surfaces of the component to be exposed to vacuum at any time. This restriction shall be verified for tooling, fixtures, marking materials, dyes, fluxes, paints, coating and sealing compounds etc. during manufacturing.
- Tooling or equipment that produces oil, grease, flux or any substance considered a harmful contaminant is not permitted. Overhead cranes and lifting equipment shall be arranged to avoid the dripping of oil in the clean conditions assembly area.
- Cutting operations in the clean area are to be minimized. Swarf generated by cutting operations shall be collected. Grinding operations should be minimized.
- After cleaning, all surfaces shall be “metal clean” and free from, oil, grease, ink, paint, dust, rust spots, abrasive particles, chips and any other gross discontinuities. All surfaces show a uniform metallic colour and shall be free from patches of evaporated cleaning agents. The inner volume shall be sealed to avoid any contamination during storage and transport. The design/method for sealing off requires approval by I-I and IO.

### 3.2.1. Handling of Cleaned components

- Final cleaned components shall be handled with the utmost care to preserve the cleanliness condition in preparation for packing.
- All components shall be visually inspected all areas immediately before closing outer shell to check the cleanliness condition is preserved.
- Prior to packing, all components shall be covered with approved plastic film (not PVC) to avoid the accumulation of dust or unwanted debris.
- Handling equipment, such as slings, hooks, etc., are sheathed or protected with approved plastic (not PVC), clean wood etc., to avoid contact of the stainless steel pieces with metallic (non S.S.) surfaces. Any tooling which can come in contact with the stainless steel pieces is to be made of stainless steel or contact through stainless steel only and cleaned before use.

	<p style="text-align: center;">Mandatory Appendix</p> <p style="text-align: center;">Appendix-II-TCPH-APB 3_06 Vacuum Requirements and Surface Treatment</p>	<p style="text-align: center;">INDUS Ref. No. R34VABP</p>
---	--	---

- Appropriate clothing (hand gloves, shoe cover etc.) shall be utilized to maintain clean condition.

#### 3.2.2. Personnel working in clean conditions:

- Personal working in a clean area shall be trained for cleaning procedure and cleanliness requirements. I-I and IO may request for exclusion of person contravening requirement of this appendix.

#### 3.3. Baking

- There is no requirement of baking for TCPH as it is VQC1 (non-plasma facing) components which operate at room temperature.
- The LPE on the welding forming vacuum boundary should be avoided. Otherwise baking is required after the use of LPE as mentioned in APB3\_04 Clause 4.1.

#### 4. ACCEPTANCE OF CLEANLINESS CHECKS

Cleanliness of components shall be verified at the time of final acceptance before final packing. The cleanliness of surfaces shall be checked by:

- Wiping with clean, lint-free cloth - No discoloration is acceptable
- Pouring of demineralized water- the water should spread out evenly across the surface (shall not form globules)
- When visual examination is impossible but surfaces are accessible for a wipe test, sufficient wipe tests in different areas are made in order to evaluate the general cleanliness level of the surface.
- Temper films and discolorations resulting from welding shall be removed by wire brushing/polishing.

#### 5. DOCUMENTATION AND RESPONSIBILITY

- Bidder shall develop cleaning procedure for final acceptance and submit to I-I for approval
- Bidder shall develop and established clean work plan to be followed from start to end of manufacturing.