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Title	Design, Fabrication and Supply of Torus Cryo Pump Housing (TCPH) with Bellows and Other Loose items
Sub-title	MANDATORY APPENDIX : II-TCPH-APB3_01_MANUFACTURING REQUIREMENTS

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	Mandatory Appendix Appendix-II-TCPH-APB3_01 Manufacturing Requirements	INDUS Ref. No. R34VABP
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1. SCOPE

This appendix covers manufacturing requirements for TCPH.

2. REFERENCE

- ASME Sec-VIII, Div.2 Edition 2013
- ASME Sec-V, Edition 2013
- ITER Vacuum Hand book v2.3 (RDB3_07)
- French order of 7th February 2012 [PA Ref No. 18]
- PBS 24 Cryostat for Defined Requirements [PA Ref No. 39]

3. GENERAL REQUIREMENT

TCPH manufacturing shall be complied with requirements specified in part 6 of ASME Sec-VIII, Div.2 and Mandatory appendices.

Bidder shall ensure the minimum number of weld joints for TCPH components to achieve the required dimensional tolerances.

4. SPECIFIC REQUIREMENT

In addition to general requirements, following supplementary requirements related to safety and vacuum shall be followed during manufacturing.

4.1. Safety Requirement

The (Protection Important Activity) PIA shall be clearly identified in the Manufacturing and Inspection Plan (MIP)/Inspection Plan(IP). The safety functions and associated PIA shall be described in a Quality Plan (QP). These documents (MIP/IP & QP) shall be approved by I-I and IO before starting the manufacturing process. Primary list of PIA is described in below table.

Table 1 Primary List of PIA

Stage of Manufacturing	Activity
Material of Construction	Chemical Analysis , Mechanical Testing
Manufacturing	Weld data Package (WPS, PQR, WPQ, NDE)
Final Documentation (Acceptance Data Package)	Acceptance of Complete Manufacturing file

4.2. Vacuum Requirement

The general vacuum requirement for manufacturing are given below. The detailed requirements shall also be referred from II-TCPH-APB3_06 and II-TCPH-APB3_07.

- Vacuum side surface of TCPH shall be free from crevices, blind holes, trapped volumes and inaccessible regions.

- All surfaces of plate forming vacuum boundary shall be such that vacuum boundary becomes parallel to the rolling direction.
- Any Identification, markings, transferring of stamps for material shall be in accordance with requirements of ASME code and traceability procedure of manufacturer.
- All components shall be preferably mark on non-vacuum side surface only with the use of low stress marking methods such as low stress stamping, vibro-etching or electrolytic etching. Marking on vacuum side surface shall only be marked by scribing with clean sharp point.
- All components and work place area shall be maintained as per approved clean work procedure and clean work plan.
- All fluids used for machining and cleaning shall be approved by I-I. Accepted fluids are listed in Appendix-4 of ITER Vacuum handbook.
- Vacuum leak testing of TCPH shall be performed using approved leak testing procedure and qualified personnel.

5. DIMENSIONS AND TOLERANCE

The geometrical and dimensional tolerance requirements are given in part drawings and assembly drawings as defined in II-TCPH-APB3_02.

6. INSPECTION AND TESTING

Inspection and testing requirements are summarized in Table 2 below. However detailed requirements are specified in respective appendices.

Table 2 Inspection and Testing

Test / Inspection	ASME Codes	Mandatory Appendix
Material Inspection	ASME Sec-II Part A, Edition 2013	II-TCPH-APB3_12
Manufacturing, Welding, NDT of welds	ASME Sec-VIII, Div.2, Edition 2013 ASME Sec-IX, Edition 2013 ASME Sec-V, Edition 2013	II-TCPH-APB3_01, II-TCPH-APB3_03, II-TCPH-APB3_04
Dimensional Inspection (component and assembly)	ASME Sec-VIII, Div.2	II-TCPH-APB3_02, II-TCPH-APB3_05
Cleaning Inspection	ASME Sec-VIII, Div.2	II-TCPH-APB3_06

Vacuum Leak Testing	ASME Sec-V	II-TCPH-APB3_07
Factory Acceptance before AI 30ransportation	ASME Sec-VIII,Div.2	II-TCPH-APB3_11

Note: Requirements of Mandatory appendices are supplementary to code requirements.

7. PRELIMINARY LIST OF INTERVENTION POINTS

Preliminary list of notification points and hold points are given in Table 3. The final list will be based on the Bidder's detailed work schedule as per MIP/IP.

Table 3 List of intervention points

Activities	I-I	IO	Comment
List of Bidder and sub- contractors	H	N	
Approval of Quality Plan (Bidder's and It's Subcontractors/Suppliers)	H	H	
Approval of manufacturing drawings, models and reports	H	H	
Delivery and acceptance of base materials and filler materials	H	H	Checking of all the material certificates and marking procedure
Approval of the manufacturing procedures documentation	H	H	Approval of documentation before each manufacturing operation
Approval of Manufacturing and Inspection Plan (MIP/IP) (Bidder's and It's Subcontractors/ Suppliers)	H	H	Approval of documentation before each manufacturing and inspection operation
Jigs and tooling design	H	N	
Approval of the welding qualification documents	H	H	
Approval of the NDE qualification documents	H	H	
Approval of the leak test qualification documents	H	H	
Completion and visual inspection of component/sub-assemblies/assemblies	H	N	
Non Destructive Examinations	H	N	
Final dimensional inspection and Factory leak testing	H	H	All test reports shall be provided to the I-I. All inspector qualification shall

			be provided to the I-I.
Factory Acceptance	H	H	
Approval of final cleaning and packing	H	H	
Acceptance Data Package	H	N	

N: Notification Point

H: Hold Point