	<p style="text-align: center;">Mandatory Appendix</p> <p style="text-align: center;">Appendix-II-TCPH-APB 3_12 Material procurement and Acceptance</p>	<p style="text-align: center;">INDUS Ref. No. R34VABP</p>
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Sub-title	<b>MANDATORY APPENDIX : II-TCPH-APB3_12_MATERIAL</b>

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## 1. SCOPE

This mandatory appendix covers requirements for material procurement of TCPH.

## 2. REFERENCES

- ASME Sec-VIII, Div.2 Edition 2013
- ASME Sec-II A, Edition 2013
- ITER Vacuum Hand book V 2.3 (RDB3\_07)
- ASTM E45-05 (2005)
- ASTM A342-04 (2004)
- ASTM E 112-96 (2004)
- EN 10204:2004
- Preliminary Safety Report (RPrS) (3ZR2NC v3.0)

## 3. GENERAL REQUIREMENTS

The materials shall be in accordance with requirements specified in ASME Section II Part-A Ed. 2013. Material shall be certified as per EN 10204:2004 type 3.1.

The procurement of materials shall be performed in accordance with Quality Assurance Program of Bidder.


The materials for the TCPH components are shown in Table 1. Major component material is of dual mark stainless steel grade 304/304L. The material product form specified in table is tentative and can be change based on manufacturing feasibility with considering design requirements.

*Table 1 Material for TCPH*

Material Grade	Product form	Code	material Specification
Dual marked SS 304/304L	Plate	ASME Sec-IIA	SA-240
Dual marked SS F304/304L	Forging	ASME Sec-IIA	SA-182/SA-965
SS TP304L	Seamless Pipe	ASME Sec-IIA	SA-312

## 4. BASE MATERIAL

In addition to requirements specified in applicable material specification, following additional restrictions and supplementary requirements for plates, pipes and forgings shall be applicable as specified.

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#### 4.1. Surface Preparation:

The surface roughness (CLA) shall be less than 6.3 microns as measured by a stylus probe type instrument.

#### 4.2. Magnetic permeability:

Relative magnetic permeability for shall be measured using ASTM A342 and shall be  $\mu \leq 1.05$ .

#### 4.3. Ultrasonic Examination:

Each plate shall be 100% ultrasonically tested in accordance with the requirements of SA-578. The acceptance criteria shall be Level B of SA-578.

Each forging shall be 100% ultrasonically tested in accordance with SA-388. The acceptance criteria shall be as per Para 3.3.4 of ASME Section VIII Division 2.

#### 4.4. Chemical composition

In addition to chemical composition specified in respective material specification in Table 2, following restrictions shall be applicable to plate and forgings.


*Table 2 More stringent requirements for impurity's elements*

Element	Plates & Forgings (Max %)	Pipes & Tubes
P	0.030	0.045
S	0.015	0.03
Nb	0.10	0.10*
B	0.0018	0.0018*
Co	0.05	0.05*
Ta	0.01	0.01*

\* Due to relatively small quantity of pipes & tubes higher Co and Ta content could be accepted by IO Nuclear Integration and Safety Department via Deviation Request.

#### 4.5. Grain size

The grain size number determined in accordance with ASTM E112 shall be greater than 2. The grain size homogeneity shall be  $\pm 1$  around the true average value.

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Non-metallic inclusions for Plates, Forgings and Pipes amount and definition shall meet standard ASTM E45-05.

Micro inclusions (indigenous inclusions detectable by Micro Examination methods): Method D is applicable. Severity level number shall be at most 2 for types A, B, C and D. The tolerance for acceptance may be a half-class above the set limit to the extent of 2% of the fields counted.

Macro inclusions (exogenous inclusions from entrapped slag or refractories): they are strictly forbidden and are cause of rejection.

In case of plate materials utilized for the "T" type of welds, cleanliness of material specifically for  $S < 0.01$ . Additionally, Tensile test to be verified across the thickness direction.

## 5. FILLER MATERIAL

Details of welding filler material requirements are specified in Appdndix-II-TCPH-APB3\_03 Welding requirements

## 6. OTHER MATERIAL

Supporting materials used for jigs, temporary supports, lifts, etc. shall be compatibility with TCPH material. The use of materials which can affect the main materials (e.g. corrosion attack during storage, etc.) is not allowed.

Temporary attachments welded to TCPH shall be of same grade and ASME traceable material. Special care shall be taken when welding and/or removing attachments to prevent any damage to the base material.

The list of possible supporting materials shall be prepared by Bidder and submitted to I-I for approval.

## 7. DOCUMENTATION AND RESPONSIBILITY

The Bidder shall submit material procurement specification to I-I for approval before start of any procurement activity.

Bidder shall submit material supplier's documents (Manufacturing and Inspection Plan (MIP/IP), Quality Plan NDE and other testing procedures) to I-I for approval

Bidder shall submit CMTR to I-I for approval.

Bidder shall ensure the traceability of material from start of material production to finished product.

In case of material used from stock items or procured from stockiest, Bidder shall submit the proposal along with all possible re-tests. Final CMTR along with testing details shall be submitted to I-I for approval.