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TECHNICAL SPECIFICATION

FOR

**STAINLESS STEEL PLATES, FLATS, FORGINGS, BARS, TUBES, ETC.
FOR GENERAL APPLICATION**

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1.0 SCOPE


This specification establishes the technical requirements for the material, manufacture, inspection, examination, testing and supply of stainless steel plates, flats, forgings, bars, tubes, etc. for general application. The requirements stated herein are additional technical requirements over DIN EN 10028-7 (Plates/Flats) DIN EN 10088-3 (Rods/ Bars), DIN EN 10216-5 (Tubes) for the supply of material number 1.4550/1.4571.

This specification is applicable for 700MWe projects beyond RAPP-7, 8.

2.0 CONTENTS

The requirements of this Specification are presented under the following headings:

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3.0 **STEEL MELTING**

The steel shall be melted in an electric furnaces, vacuum degassed and fully killed


4.0 **SUPPLY CONDITION**

The supply condition of each material/product form shall be specified in the Tender document / Purchase order. However, following supply conditions for each of the product form is envisaged.

- a) Plates upto 4 mm: 2D, Cold rolled, solution annealed, pickled & passivated.
- b) Plates above 4mm: 1D, Hot rolled, Solution annealed, pickled & passivated.
- c) Flats: Cold rolled, Solution annealed, pickled and passivated and 2G condition ie. Ground finished on both the sides. Flats shall be ground smooth and the surface finish shall be Ra less than or equal to 0.8 microns. Surface finish measurement shall be reported with a roughness measurement diagram.
- d) Rods : Either, Cold formed, solution annealed, descaled, pickled and mechanically smoothened with surface condition conforming to symbol 2G, OR Hot formed, solution annealed, descaled, pickled and prepared by machining with surface condition confirming to symbol 1G.
- e) Tubes (Material no 1.4571): Cold finished, solution annealed and pickled with metallicly bright surface condition conforming to symbol CFG as per test category 2. Surface roughness shall be 3.2 microns (CLA) for both internal & external surfaces. Tubes (Material No. 1.4550) : Hot finished, solution annealed, descaled, pickled, with metallicly clean surface condition conforming to symbol HFD as per Test category 2.

5.0 **CHEMICAL COMPOSITION**

Both ladle and product analysis shall be carried out & meet the requirement of relevant material specifications mentioned in clause 1.0 above. Residual copper content shall not be more than 0.3 %, as per product analysis. The cobalt content in the SS materials being used on primary side of Steam Generator shall not exceed 0.03%.

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6.0 MECHANICAL PROPERTIES

Mechanical tests at ambient temperature and high temperature tensile test at 350°C shall be carried out from each heat treated batch and shall conform to the requirements of relevant material specification. Apart from this any other mandatory tests required as per the relevant material specification shall also be carried out. For bars over 100 mm in diameter, the impact and tensile specimens shall be taken in transverse direction.

7.0 CORROSION TEST

The materials shall pass Intergranular corrosion resistance test conducted as per ASTM A 262 Practice E with preceding heat treatment at 650 °C / 30 minutes.

8.0 NON-DESTRUCTIVE EXAMINATION

8.1 Ultrasonic Examination :

Plates with thickness 6mm and above, Tubes, Rods shall be ultrasonically examined to cover 100% of the volume in accordance with the respective product specifications.


Plates with thickness 6mm and above shall be subjected to straight beam & angle beam examination in transverse direction on both the surfaces to cover 100% of the volume.

The forgings shall be examined in accordance with Para 9.1 of PC-M-960

8.2 Liquid Penetrant Examination :

All forgings in finished shape & both the surfaces of plates of thickness 20mm & above shall be examined by liquid penetrant method in accordance with ASTM-E-165 with following additional requirements.

- Penetrants, developers and cleaning agents containing more than 25 ppm each of Sulfur and Halogens shall not be used.
- Application of penetrant and developer from aerosol type of spray cans is preferred.
- The temperature of the area examined shall not be lower than 10 °C.

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d) All traces of penetrant and developer shall be removed after completion of the examination.

8.2.1 Acceptance Standard :

Indications of any shape and size are unacceptable.

8.3 Hydrostatic Test :

Each tube shall be subjected to Hydrostatic test as per the requirement of DIN EN-10216-5

9.0 DIMENSIONAL CHECK AND VISUAL EXAMINATION

Each material shall be visually examined and checked for dimensional requirements as per Purchase Order.

10.0 MIX-UP TEST

Every material shall be tested to detect any inadvertent mix-up.

11.0 REPAIRS


Repair is generally not permitted. Slight surface defects may be smoothly ground and blended without impairing the minimum wall thickness. No other repairs shall be carried out without prior approval of the Purchaser.

12.0 QUALITY SURVEILLANCE

All material shall be subjected to quality surveillance by the Purchaser or his authorized agency during manufacturer. The material shall not be supplied until the shipping release is given by the Purchaser or his authorized agency.

13.0 TEST REPORTS / CERTIFICATES

Five (5) copies of all test reports / certificates shall be sent to the purchaser immediately after completion of tests / inspection, prior to the shipment of the material. One set of test reports / certificates shall be dispatched along with the material. Following reports shall be submitted:

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- (a) Chemical Analysis (Ladle and Product).
- (b) Heat treatment details (heat treatment charts) shall be sent after completion of the contract.
- (c) Results of mechanical properties.
- (d) Intergranular corrosion test report.
- (e) Visual and dimensional test reports.
- (f) Surface roughness measurement diagram for flats as required.
- (g) Result of micrograph and grain size.
- (h) Hardness values.
- (i) Ultrasonic examination and liquid penetrant examination reports.
- (j) Hydrostatic test report.

Final documentation containing all the above shall also be submitted in soft form (pdf format) with proper indexing

14.0 **MARKING AND IDENTIFICATION**

Each product shall be marked with the following information:

- (a) Heat number.
- (b) Direction of rolling (for plates).
- (c) Material designation.
- (d) Supply condition.
- (e) Manufacturer's name.
- (f) Inspection agency / Purchaser's seal.
- (g) Purchase order number.

15.0 **PACKING AND SHIPMENT :**

The materials shall be packed suitably with adequate bracing and blocking to withstand transshipment and tropical storage for two years. The packages shall be released for shipment only after inspection and issue of "shipping release" by the Purchaser or his authorized agency. Each box shall contain the test certificates in respect of the material contained. Details of items packed including material specification, Purchase order number and destination shall be clearly marked on packages.

