

APPENDIX-VI: TECHNICAL SPECIFICATION FOR STAINLESS STEEL 304L PLATES

1. **Material:** Austenitic stainless steel plates, generally conforming to ASTM – A 240, AISI 304L.
2. **Size & Quantity:** As required.
3. **Chemical Composition:** Chemical composition shall be as per ASTM A-240 Grade 304L. It may be noted that elements such as Carbon, Phosphorous, Sulphur, Silicon and other impurities content in the basic material shall be maintained much on the lower side so as to realize low corrosion rate as specified in Para (10).
Delta Ferrite in the product shall be maximum 0.25%
4. **Inspection & Testing:**
The material shall be inspected prior to dispatch. All tests as mentioned in this specification shall be carried out by the supplier at government/BARC approved laboratory.
5. **Sampling:**
Samples shall be drawn from each Heat on random basis. For different thicknesses and solution annealing batches, separate samples shall be drawn for check testing. The acceptance will be on the basis of the satisfactory test results carried out on these samples.
6. **Mechanical Properties:** Mechanical properties shall confirm to the requirements of ASTM A-240 & 480.
7. **Finish & Surface Quality:** The plates shall have No.1 finish and shall be in hot/cold rolled; solution annealed, de-scaled/pickled and passivated condition. Plates shall be completely free from surface defects like roll/grind/deep-scratch marks, anneal pits, over pickling etc. The edges of the plates shall be free from any kind of cracks and burrs. Pickling & passivation of all the plates shall be carried out as per the provisions of ASTM A 380.
8. **Flatness:** Roller straightened plates shall have a flatness as per provisions of ASTM A-480.
9. **Corrosion Requirement:** Samples from each heat/lot of material or part thereof representing same melt, heat treatment batch and same thickness plate shall undergo Inter-granular corrosion (IGC) tests as per Practice 'A' and 'C' of ASTM A – 262. The material acceptance criteria shall be as given below:
 - (a) Practice 'A': Micro structure shall be 'Acceptable Etch' structure free from end grain pitting.
 - (b) Practice 'C': The average corrosion rate of IGC Pr 'C', after 5 cycles of boiling, should not be more than 12 mills per year (mpy). It may be noted that any leg of corrosion cycle will not show abruptly high value (18 mpy max).
10. **Grain Size:** Grain size shall be within 5 – 8 when determined as per ASTM E-112.
11. **Ultrasonic Examination:**
Each plate (≥ 10 mm thick) shall be ultrasonically tested for 100% surface area coverage, with a 10% overlap for each pass, by angle beam and as well as by normal beam techniques as per ASTM A-577 & A-578. The equipment shall be capable of resolving 3 mm diameter Flat Bottom Hole (FBH) for normal beam test and 12.5 mm long x 3 mm wide and 5% deep notch up to 10 mm thick & 3% deep notch for higher thickness plates for angle beam test. Sensitivity shall not be less than 50% amplitude, but not more than 75% of screen height. For angle beam, the defect signal shall be from one full skip position. The examination and acceptance standard for angle beam and straight beam tests shall conform to the above calibrated defect standard. All recordable indications as per the above standard shall be mapped and these reports shall form part of documentation given by the supplier. Plates in thickness less than 8 mm may be examined from both the sides or twin probe may be used for normal beam in lieu of both sides scanning.

12. **General Requirements:**

- a) Each plate shall be inspected before shipment, by purchaser at supplier's premises.
- b) Material inspections tests and tolerance requirements shall be as per ASTM A – 240 & A 480, in addition to the ones mentioned in this specification.
- c) Purchaser reserves the right to check test random samples from the plates being offered. Shipping clearance shall be given subject to satisfactory results of check testing.
- d) Efforts shall be made to restrict the number of heat in a particular size to a minimum.

13. **Test Reports/ Documents:**

Manufacturer's test certificates pertaining to physical dimensions, chemical composition, mechanical properties, hardness, ferrite content, grain size, IGC tests for corrosion rates, UT examination etc. shall be furnished by the supplier.

14. **Marking & Packing:**

Each plate shall bear clear identifiable marking, w.r.t H. No., batch No. grade, size etc. Markings shall be made using either electro-chemical etching or vibratory tools. Packing of the plates shall be done in a manner to avoid damage to the plate surface/ edges during shipment and handling.