



1.0 **CODES**

Materials shall meet Indian Boiler Regulations, (IBR) in addition to the latest Version of SA105 & SA182 as on date specified in the Purchase Order (PO).

2.0 **RAW MATERIAL**

Steel for SA 182 F11, F12 & F22 if indigenously procured, to be procured from following manufacturers i) Alloy Steel Plant , Durgapur, ii) Tata Iron & Steel company, Jamshedpur & iii) Mahindra UGINE Steel Company , Mumbai, who are approved by IBR for creep resistant steels.

2.1 **PROCESS**

Process of manufacture, Heat Treatment, Hardness Test etc., shall conform to applicable standards.

3.0 **FORGINGS.**

3.1 Carbon content of SA105 items shall be restricted to 0.25% max.

3.2 Product analysis shall be carried out on One piece / Heat / HT lot / Size.

3.3 Corrosion test (IGC) shall be carried out on one piece / Heat / HT lot / Size for SA 182 F 316.

3.4 All AS items shall be tested by MPI as per ASTM E-709 & SS items by LPI as per E 165.

3.5 Tension test shall be carried out on one Test piece for each specification, heat, heat treatment lot and size.

3.6 Bend test for CS (SA 105) : One sample of 19 mm thick and 25mm width to be bent 180 deg around mandrel of radius 6.35mm.

3.7 Bend test for AS (SA182): One Sample of 25.4 mm width and thickness = t to be bent 180 deg around mandrel of radius = 1.5 t. Test on representative sample is also acceptable.

3.8 Dimensions shall be as per Purchase Order.

3.9 Unless otherwise specified in the P.O, items of SA182 F11/12 shall be supplied as per class 2 and SA182 F22 shall be supplied as per class 3 only

Reviewed By :- A.P.Madhavan kutty/Engg K.Ganeshan/MM	T.R.Suchindrababu/OP&C P.Elangovan /QA	Approved By G.R.Srinivasan Quality
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- 3.10 Metallography:- Metallography shall be carried out one per heat, per size, per heat treatment lot of F91 items.
- 3.11 Hardness test shall be carried out on all items of F91, and 10% on other material grades.
- 3.12 All items shall be ultrasonically tested as per SA388 and acceptance norms shall be as per AM 203.2 of ASME Sec VIII Div .2

4.0 **WORK MAN SHIP, FINISH AND REPAIR**

All items shall have smooth, workman like finish, and to be free from scale & defects like laps, seams, folds, cracks, etc. Surface defects can be removed by mechanical means and defective areas smoothly dressed up with the adjacent surface. Minimum dimension after repair shall meet drawing / Specification.
Repairs by fusion welding are prohibited.

5.0 **MARKING, COLOUR CODING & PACKING**

All items shall be PUNCHED OR ETCHED with specification, Grade, Heat No, maker's emblem and bear Inspection Authorities Seal.
The Colour Coding shall be as below.

COLOUR CODING:-

SA105	=	Blue
SA182 F11	=	Green & White
SA182 F12	=	Black & Red
SA182 F22	=	Blue & Red
SA182 F91	=	Brown & Red
SA182 F316	=	Black & Blue

6.0 **PACKING**

All items shall be suitably packed in boxes / crate to avoid transit / other damages.

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7.0 INSPECTION & CERTIFICATION :-

All items are to be Inspected at the manufacturer's works by the Inspection agencies / authorities as per IBR and as indicated in the P.O. Inspection certificate in IBR Form IIIC (for items under IBR purview) shall be submitted along with the Work Test Certificate countersigned by any of the above authorities and shall include the following.






1. Test Certificate Number & date.
2. BHEL P.O Number & Amendment Number(if any)
3. BHEL P.O. Serial Number
4. BHEL TDC Number
5. Size-wise Quantity
6. Specification, Grade & Year of code.
7. Heat/Melt Number
8. Steel making / forming process
9. Ladle and product Analysis of Raw Material.
- *10. Product analysis report.
- *11. Heat Treatment Chart.
- *12. NDE report. (VISUAL.MPI, LPI, UT)
- *13. Tensile Test report
- *14. Bend Test report.
- *15. Hardness Test report
- *16. Intergranular corrosion test report for SS
- *17. Metallography report for F 91.
- *18. Dimensional conformance.
- *19. Starting material details.

*20. Guarantee of HTP shall be given in the test certificate as follows if hydro test is not carried out :- "Forgings are capable of with standing without failure, breakage or impairment of their serviceability a hydrostatic test pressure equal to that prescribed for the specified matching pipe of equivalent material".

*Details furnished in the Tests certificate in lieu of chart/report is acceptable.

Records of Revisions:- Revision 02

Material specification SA 182 F316 added.

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