

Revision Record:

Rev:01: Source of supply for AS included., Rev:02:12/11/96: Text re-written, Class.No.s introduced for Alloy steel. High temperature test removed. TDC:0: 306/00 merged into this. Rev:03: Cl. 4.0, 6.0, 9.0 modified. Rev 04: Cl 5.0 revised to include Impact test for Bars used for Valves Purchase Orders; Clarity brought in Cl 4.0

1.0 MATERIAL SPECIFICATION: ASME {Latest on date of Purchase Order (PO)}:

CS : SA 105

AS : SA 182 F11 Class 2, F12 Class 2 & F22 Class 3, SA 193 B7 & B16

SS : SA 182 Gr. F 316, SA 479 TP 410 Condition 2.

Additional Requirement: As listed below (supplementary to Specification)

Size and Qty.: As per Purchase order & Drawing.

2.0 CHEMICAL COMPOSITION & PROCESS

Melting: CS & AS: Fully killed. SS: hot finished. Product analysis per heat: CS: $C \leq 0.25\%$.

Steel for making bars to be inspected at Mill & test certificate countersigned by IBR approved Inspecting Authority, if the mill is not approved under IBR as well known steel maker.

Steel for SA 182-F11, F12 and F22 if indigenously procured, to be from following manufacturers approved under IBR for creep resistant steels: i) Alloy Steel Plant, Durgapur, ii) Tata Iron & Steel Company, Jamshedpur & iii) Mahindra Ugine Steel Company, Bombay.

3.0 DIMENSIONS AND TOLERANCES

Dimensional Tolerances : CS & AS: as per SA 29. SS: as per SA 484.

4.0 HEAT TREATMENT(HT)

CS: Normalised at temp 880-920 deg C. AS(SA 182): Normalised and tempered,

SA 193: Quenched and tempered.

5.0 MECHANICAL TESTS

Extent of test: for each size/heat/HT batch.

Additional requirements of tests: Bend test: CS: 1 Sample 19mm. thick(t) x 25.4mm width to be bent 180 deg. around mandrel of radius 6.35 mm. AS(SA 182 only): Sample 25.4mm width to be bent 180 deg. around mandrel of radius =1.5 x t.

Bars meant for Valves Purchase Orders of SA105 and SA182 F22 Cl 3 materials shall be impact tested. 1 / HT batch: SA 370, 2mm. Charpy-U notch, at Room temperature: Acceptance: Avg of 3 specimens: 36J, single Min: 24J.

6.0 NON DESTRUCTIVE TEST

Extent of test: for each product. Stage of test : After heat treatment.

UT: Dia \geq 50mm.: 100% : SA 388. Acceptance: AM 203.2, ASME Sec.VIII Div. 2.

7.0 WORKMANSHIP AND FINISH

Items to be free from scales & defects like laps, seams, folds, cracks, etc. SS to be Pickled & passivated as per ASTM A 380 or machined.

8.0 REPAIR

Repairs by fusion welding are prohibited. Surface defects can be removed by mechanical means and defective areas smoothly dressed up with the adjacent surface. Minimum dimension after repair to meet drawing / Specification.

9.0 MARKING AND PACKING

Details of stamping on each item: dia \geq 25 mm.: with low stress stamps and bordered by paint: Heat number, Specification & grade, Size, Maker's emblem/code & Inspection Authority's seal. Dia < 25 mm: All above details to be painted. Bars to be supplied in bundles < 1 ton, secured suitably for rough handling. Metal tags with details of specification, melt number and maker's emblem to be secured to the bundles.


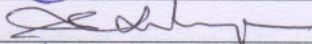
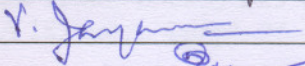
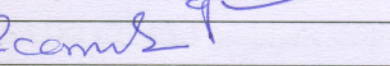

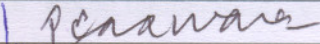
10.0 INSPECTION AND CERTIFICATION

For IBR items, inspection and tests to be witnessed by an IBR approved inspecting agency, in case the shop is not recognised as a "Well known Forger/Steel maker" under IBR. Test certificate in English language countersigned by applicable inspection agency for each product with following details shall accompany the product (in format approved by Boiler inspectorate for IBR items).

1. Purchase Order No.(BHEL), TDC No. & Test certificate number
2. Specification, grade, class, applicable year of code, Heat Number, Drawing No., Quantity & Size
3. Melting & forging/rolling process, Chemistry including incidental elements - Heat wise.
4. Heat treatment details of the material and test bars.
5. Mechanical test results, NDE test results with reference & acceptance standard.
6. Certified copy of TC for starting material if applicable.
7. Cleaning & Surface treatment details.

11.0 END USE

SA 105, SA 182 & SA 479 are for Pressure part components in Boilers & Valves of high temperature service meeting IBR and ASME Section I. SA 193 is for high temperature bolting and for drive shafts.

Prepared	K.Ganesan (QA)	
Reviewed	S.Selvarajan (Product QA)	
	V.Jayaraman (QA)	
	P.Loganathan (Engg)	
	N.Karuppusamy (Purchase)	
	R.Easwaran (QA)	
Approved	V Thyagarajan (QA& Labs)	