

# BHARAT HEAVY ELECTRICALS LIMITED

## PIPING CENTRE, CHENNAI – 600 017.

Title : Technical Delivery Conditions for socket welded – fittings SA105 & SA182.

Specification No: TDG : 103 Rev : 01

Project : ALL PROJECTS.

Material : ASME SA105 & SA182

Equipment : Socket welded fittings.

Accepted By:-

Engineering

Materials  
Management

OP & C

Rev : NO:-

01

02

03

04

Date :-

08.08.2003

Prepared /  
Revised by

Reviewed /  
Approved by

SOCKET WELDED-FITTINGS  
SA105, & SA182

: TDG : 103 : 01  
: Dt : 08.08.2003

Revision	Date	Description
01	08/08/2003	Fully revised for better clarity. Cl 2.0 a) added.

*B. Singh*

1.0 CODES

The fittings shall meet Indian Boiler Regulations, (IBR) in addition to the standards specified in the Purchase Order (PO).

2.0 RAW MATERIALS

- (a) Steel for SA 182 F11, F12 & 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.
- (b) The raw materials shall be ultrasonically tested (UT) as per SA 388 and AM 203.2 of ASME Sec . VIII Div.2.

3.0 PROCESS

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

4.0 FITTINGS:

- (A) Carbon content of Carbon steel fittings (SA 105) shall be restricted to 0.25% max.
- (B) All ferrous fittings shall be tested by MPI as per ASTM E-709 and SS fittings shall be LPI tested as per ASTM E 165.
- (C) One fitting of each specification, heat, heat treatment lot and size shall be subjected to Tension Test as per applicable standard. Test on representative sample acceptable.
- (D) Hardness test shall be carried out on each fittings of F91; for other fittings on 10% of the fittings.
- (E) Dimensions shall be as per ASME B 16.11
- (F) SUPPLEMENTARY TEST:- The test shall be carried out as indicated below, and the results shall be reported in the Test Certificate .

Specification	Product Analysis One / heat /heat lot/size.	Tension Test One / heat /heat lot/size.
SA 105 SA 182F11/F12/F22/F91	Required Required	Required Required



- (G) Metallography:- Metallography shall be carried out one per heat, per size, per heat treatment lot of F91 fittings.
- (H) Unless otherwise specified in the P.O fittings shall be supplied as SA182 F11/12 shall be supplied as per class 2, SA182 F22 shall be of Cl 3 only.

## 5.0 WORKMANSHIP, FINISH AND REPAIR

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

## 6.0 MARKING, COLOUR CODING & PACKING

All fittings shall be PUNCHED OR ETCHED with specification, Grade, Heat Number and Inspection Authorities Seal.  
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

SA 182 F 304	=	Blue & Yellow
316	=	Black & Green
321	=	Blue & Brown
347	=	Yellow & Black

### PACKING

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

## 7.0 INSPECTION & CERTIFICATION :-

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

1. Test Certificate Number & date.
2. BHEL P.O Number & Amendment Number
3. BHEL P.O. Serial Number
4. BHEL TDC Number
5. Size-wise Quantity

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6. Specification, Grade & Year of code.
  7. Heat/Melt Number
  8. Steel making / forming process
  9. Laddle Analysis of Raw Material and product analysis of fittings wherever applicable.
  - \*10. Supplementary Test S2/S3/S4 as applicable.
  - \*11. Heat Treatment Chart.
  - \*12. NDE report. (VISUAL.MPI, LPI,UT)
  - \*13. Tensile Test Report
  - \*14. Hardness Test Report
  - \*15. Metallography as applicable
  - \*16. Dimensional conformance.
  - \*17. Starting material details.
  - \*18. Guarantee of HTP shall be given as follows:- "Fittings 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.

*[Handwritten signature]*