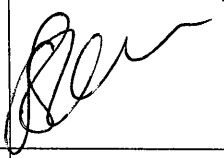






	<b>BHARAT HEAVY ELECTRICALS LIMITED</b> <b>PIPING CENTRE, CHENNAI – 600 017.</b>			
Title :	Technical Delivery Conditions for Forgings/Rounds, Nozzles, stubs, Matching Piece – SA105,SA182.			
Specification No:	TDG : 104 Rev : 01			
Project :	ALL PROJECTS.			
Material :	ASME SA105 & SA182.			
Equipment :	Forgings			
Accepted By:- Engineering				
Materials Management				
OP & C				
Rev : NO:-	01	02	03	04
Date :-	08.08.2003			
Prepared / Revised by				
Reviewed / Approved by				
<u>Issued by Piping Centre / Quality Assurance</u>				Page 1 of 5

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FORGINGS / ROUNDS, NOZZLES, STUBS, MATCHING PIECE  
SA105, & SA182

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: TDG : 104 : 01  
: Dt: 08.08.2003

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

*B. Gary*

1.0 **CODES**

Materials shall meet Indian Boiler Regulations, (IBR) in addition to the latest standards 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 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.

2.1 **PROCESS**

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

3.0 **FORGINGS.**

- (A) Carbon content of SA 105 fittings shall be restricted to 0.25% max.
- (B) All forgings shall be tested by MPI as per ASTM E-709.
- (C) One Test piece for each specification, heat, heat treatment lot and size shall be subjected to Tension Test as per applicable standard.  
Bend test : CS : 1 sample 19mm thick (t) and 25mm width to be bent 180 deg around mandrel of radius 6.35mm. AS(SA182): Sample 25.4 mm width to be bent 180 deg around mandrel of radius =1.5 t. Test on representative sample acceptable.
- (D) Dimensions shall be as per Purchase Order.
- (E) Hardness test shall be carried out on each forgings of P91/F91, for other forgings on 10% of the forgings.
- (F) All forgings shall be ultrasonically tested as per SA388 and acceptance norms shall be AM 203.2 of ASME Sec VIII Div 2
- (G) **SUPPLEMENTARY TEST:-** The test shall be carried out as indicated below, and the results shall be reported in the Test Certificate .

Specification	Product Analysis	Tension Test
	One / heat / HTlot/ size	One / heat / HTlot/ size
SA 105	Required	Required
SA 182F11/F12/F22/F91	<u>Required</u>	<u>Required</u>

(H) Unless otherwise specified in the P.O SA 234 WP11/12/22 forgings shall be supplied as per class 1, SA182 F11/12 shall be supplied as per class2, SA182 F22 shall be of Cl 3 only.

(I) Metallography:- Metallography shall be carried out one per heat, per size, per heat treatment lot of P91/F91 fittings.

#### 4.0 **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 removed by mechanical means and defective areas smoothly dressed up with the adjacent surface, Minimum dimension after repair to meet drawing / Specification.

#### 5.0 **MARKING, COLOUR CODING & PACKING**

All forgings 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

#### 6.0 **PACKING**

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

#### 7.0 **INSPECTION & CERTIFICATION :-**

All forgings 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 forgings 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
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. Laddle and product Analysis of Raw Material.

- \*10. Supplementary Test S1/S2 ; S2/S3/S4 as applicable
- \*11. Heat Treatment Chart.
- \*12. NDE report. (VISUAL,MPI,UT)
- \*13. Tensile Test Report
- \*14. Bend Test Report.
- \*15. Hardness Test Report
  
- \*16. Metallography as applicable
- \*17. Dimensional conformance.
- \*18. Starting material details.
  
- \*19. Guarantee of HTP shall be given as follows:- “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.

*Report*