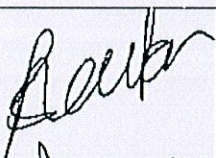
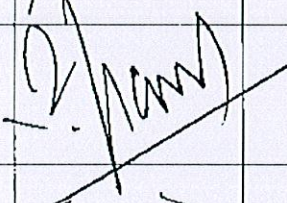
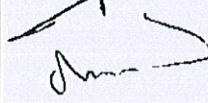
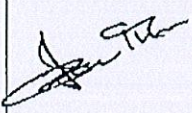
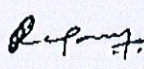
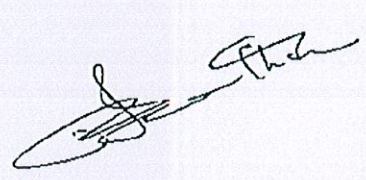


	BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, CHENNAI – 600 017.			
Title :	Technical Delivery Conditions for plate formed pipes to ASME SA 672.			
Specification No:	TDG : 08 Rev : 03			
Project :	ALL PROJECTS			
Material :	ASME SA 515			
Equipment :	Pipes.			
Accepted By:- Engineering				
Materials Management				
OP & C				
Rev : NO:-	03	04	05	06
Date :-	03. 10.2005			
Prepared / Revised by				
Reviewed / Approved by				
Issued by Piping Centre / Quality Assurance				Page 1 of 5

TECHNICAL DELIVERY CONDITION FOR PLATE FORMED : TDG:08:03
PIPES TO ASME SA 672 : 03/10/2005

REV NO	REVISED CLAUSE	DESCRIPTION
2	6.1	Heat Treatment as per specification added.
2	---	Other clauses Re- worded for better clarity.
3	4.1 Modified	Cirseam weld included



TECHNICAL DELIVERY CONDITION FOR PLATE FORMED : TDG:08:03
PIPES TO ASME SA 672 : 03/10/2005

1.0 **SCOPE**

- 1.1 This technical delivery condition specifies the additional requirements for the delivery of Electric Fusion Welded pipes conforming to ASME SA 672
- 1.2 The grades covered are B60, B65 and B70
- 1.3 The class of the pipes shall be C1.22 (Stress Relieved condition).
- 1.4 These pipes are intended for power piping services at stress levels and temperature allowed by ASME B31.1 and IBR.
- 1.5 The pipes shall conform to size, grade and quantity as specified in the enquiry/purchase order.

2.0 **APPLICABLE CODES AND PROCEDURES**

- 2.1 The pipes shall also conform to INDIAN BOILER REGULATIONS, 1950.
- 2.2 All welders, welding procedures shall be qualified as per ASME Section IX, and IBR.
- 2.3 Non-Destructive Examination procedures shall be as per ASME Section V.

3.0 **MATERIAL**

- 3.1 The chemical composition of the steel plates shall be as per ASME SA 515 Gr.60 for B60, Gr.65 for B65 and Gr.70 for B70 except that the carbon percentage shall be limited to 0.25% irrespective of plate thickness.
- 3.2 The steel shall be of fully killed plain carbon steel.
- 3.3 The plate shall be in control rolled or normalised condition. The heat treatment condition of the plate shall be recorded in the Test Certificate.

4.0 **WELDING**

- 4.1 The joints which includes longitudinal and circumferential welds shall be full penetration welds made in accordance with the qualified procedures as per ASME Section IX. Longitudinal seams on adjacent pipe shell shall be offset by at least 90 deg.
- 4.2 One production test coupon per size/per melt shall be made for every 60 meters as per Chapter IX of IBR.

5.0 **NON-DESTRUCTIVE EXAMINATION**

- 5.1 All the plates used for the manufacture of pipe shall be ultrasonically tested. UT testing shall be done as per A435 and acceptance standard shall be as per A-578 Level-B.
- 5.2 The full length of each weld shall be radiographically examined in accordance with ASME SA 672 and accepted as per ASME Section VIII - paragraph UW-51.

TECHNICAL DELIVERY CONDITION FOR PLATE FORMED : TDG:08:03
PIPES TO ASME SA 672 : 03/10/2005

5.3 Weld repairs shall be carried out as per ASME SA 672 and accepted as per ASME Section VIII.

5.4 When two long seam pipes are joined to make the required length, the long seams shall be at least 90deg apart from each other. 100% RT shall be carried out on the circumferential and "T" joint.

6.0 **HEAT TREATMENT**

6.1 All the pipes shall be heat treated as per SA 672 specification.

7.0 **MECHANICAL TESTS**

7.1 Wherever applicable, the plate shall be subjected to tensile test at 350deg C and a bend test as per IBR.

7.2 Mechanical and metallurgical test shall be carried out as per Chapter XII of IBR on each welded test plate. The tests to be conducted are listed below:

<u>Type of test</u>	<u>No. of tests</u>	<u>Reference Standard</u>
a) Tension test for weld seam	1	ASME Section IX-QW-422
b) All weld metal tension test	1	IBR Reg.259
c) Guided bend test (Face & Root)	2 each	ASME Sec.IX-QW-462 (a)
d) Macro & Micro structure test	1 each	IBR & ASME Sec.IX
e) Impact test Charpy-V	1 set	ASTM A370 Type-A

7.3 One test plate may represent a lot of pipes up to 60 meters in length.(also refer 4.2above) Test plate shall be of the same grade of material, same melt, and same thickness of the pipe and shall be subjected the same heat treatment of the pipe.

8.0 **HYDRAULIC PRESSURE TEST**

8.1 Each length of pipe shall be subjected to a hydraulic test pressure as per ASME SA530, but in no case the test pressure shall be less than 1.5 times the design pressure or the HTP value indicated in the purchase order.

9.0 **DIMENSIONAL TOLERANCES**

9.1 The tolerance on length, outside diameter, out of roundness, wall thickness and weight shall be as per ASME SA 672.

9.2 Dimensional report supported with the necessary sketch/details shall be included in Test Certificate.

10.0 WORKMANSHIP

- 10.1 All pipes shall have smooth surfaces, free from loose scales and defects like laps, seams, folds, cracks, pitting etc. The surface imperfection beyond the permissible limit of ASME SA 672 shall be removed mechanically without affecting the minimum thickness and workmanlike finish. All pipes shall be coated with resin type translucent rust preventive or rust inhibitor on the inside and outside.

11.0 COLOUR CODE:-

- 11.1 Each pipe shall be colour coded longitudinally.
SA 672 B60 Cl.22 - Red & White
SA 672 B65 Cl.22 - Red & Blue
SA 672 B70 Cl.22 - Red & Aluminum

12.0 MARKING AND PACKING

- 12.1 P.O.No, SIZE, LENGTH, QTY, SPECIFICATION, GRADE, MELT/HEAT No, MAKER'S MARK AND INSPECTOR SEAL shall be hard punched and paint stenciled on the pipe 100mm away from both ends. All pipes shall be sent as loose with proper sling marks and end stiffeners .

13.0 CERTIFICATES

- 13.1 Three original test certificates typed in English shall be given along with the pipes.
- 13.2 The pipes must be delivered along with test certificates legibly written in English.
- 13.3 The test certificates shall furnish the following details:
- a. Purchase Order Reference.
 - b. Test Certificate Number.
 - c. Specification, grade, size and dimension.
 - d. Steel making process of the plate .
 - e. Heat number of the plate.
 - f. Ladle analysis of plate.
 - g. Heat treated condition of plate.
 - h. Mechanical test results of the plate.
 - i. Mechanical and metallurgical test results of the weld test coupons.
 - j. Radiography test reports with acceptance standard.
 - k. Heat treated condition of pipe.
 - l. Hydraulic test pressure results.
 - m. Ultrasonic test results with acceptance standard.
- 13.4 All the plates and pipes must be inspected at the mills and the test certificates in IBR Form IV and IIIA shall be countersigned by an inspecting authority recognised under Appendix-C of IBR.
- 13.5 The pipes shall be subjected to inspection by authorities nominated by BHEL and the test certificate shall be countersigned by them.

1.0 CODES

The pipes shall be manufactured & supplied as per ASME SA691 meeting Indian Boiler regulations (IBR) requirements. The following requirements shall also be taken care.

2.0 RAW MATERIAL : Plate used shall conform to SA691 requirements.

3.0 WELDING : The joints shall have full penetration welds. The welder & welding procedure shall be Qualified as per ASME Sec.IX & IBR.

4.0 HEAT TREATMENT : All Pipes shall be heat treated as per SA691.

5.0 NON DESTRUCTIVE EXAMINATION

5.1 ULTRASONIC TEST: All plates used shall be ultrasonically tested to ASME SA578 and Accepted as per Level-A of SA578.

5.2 RADIOGRAPHY TEST: All welds shall be radiographically examined as per ASME Sec V and accepted as per UW 51 of ASME Sec VIII.

5.3 HYDROSTATIC TEST: Every pipe shall be hydrostatically tested at the pressure specified in the purchase Order.

6.0 PRODUCT ANALYSIS: Product Analysis of Plate and Weld shall be carried out as per SA691.

7.0 MECHANICAL TESTS

7.1 (a) Transverse Tension test and (b) Guided Bend test for weld seams shall be conducted as per SA691.

7.2 (a) All Weld metal tension test (refer IBR reg.259 Fig.19), (b) Impact test and (c) Micro & Macro structure test shall be conducted meeting IBR requirements.

7.3 Test samples shall be chosen meeting material specification / IBR requirements.

7.4 Any other test as called for in the latest revision of SA691 & IBR shall also be conducted.

8.0 DIMENSIONAL TOLERANCE

The dimensional tolerances of the pipe shall be as per SA691. Dimensional report shall be furnished.

9.0 WORKMANSHIP

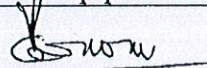
All pipes shall be free from loose scales and defects like cracks, pitting etc and shall meet the requirements of ASME SA691.

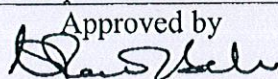
10.0 MARKING, PAINTING & EDGE PREPARATION

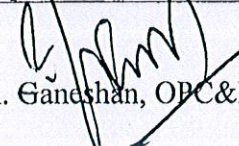
10.1 The Pipes dispatched to **BHEL Stores** shall be Paint stencilled and Hard punched on the Pipes 100mm away from pipe ends as indicated below.

- | | | | |
|--------------|---------------------------|--------------------------|----------------|
| 1) PO Number | 2) Supplier's emblem/code | 3) Specification & grade | 4) Heat number |
| 5) Size | 6) No. of pipes | 7) Inspector's seal | |

All pipes shall have squared ends and protected with translucent rust preventive on the outside.


G.Venkataramani, Engg&Quality

Approved by

G.Panneer Selvam, QA


K. Ganeshan, OPC&MPL



10.2 The Pipes if dispatched directly to project site as **DTS** shall be hard punched and paint stencilled with DU code (14 digit work order du detail) as given by purchase in addition to marking done as per Para 9.1. And also Painting and Edge preparation shall be done as indicated in P.O.

11.0 COLOUR CODING

Pipes shall be longitudinally colour coded as follows:

- a) 1 Cr : Black & Red
- b) 1 ¼ Cr : Green & White
- c) 2 ¼ Cr : Blue & Red

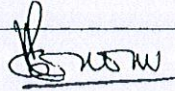
12.0 INSPECTION AND CERTIFICATION (In English only): -

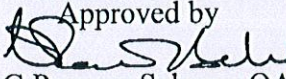
All Pipes are to be Inspected at the manufacturer's works by the Inspection agencies / authorities as per IBR and as indicated in the P.O. Inspection certificate in IBR Form III A (IBR Form IIID for well known Pipe maker) shall be submitted along with the Work Test Certificate countersigned by the above authorities and shall include the following.

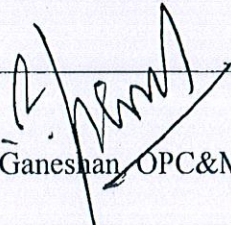
1. Test Certificate Number & date.
2. BHEL P.O Number & P.O. Serial Number
3. BHEL TDC Number
4. Specification, Grade, Size & Dimension.
5. Heat/Melt Number
6. Steel making process, Chemical analysis, Heat treated condition & Ultrasonic test results with acceptance norms for Plates.
7. Product analysis of the Weld.
8. Mechanical and metallurgical test results of the weld test coupons.
9. Heat Treated condition of the Pipe.
10. Radiography test reports with acceptance standard.
11. Dimensional report.

13.0 RECORDS OF REVISIONS

(i) Rev 03 – Entire document has been modified for better clarity.


G.Venkataramani, Engg&Quality

Approved by

G.Panneer Selvam, QA


K. Ganeshan, OPC&MPL