	BHARAT HEAVY ELECTRICALS LIMITED **PIPING CENTRE, CHENNAI – 600 017.**
Title : Specification No: Project : Material : Equipment :	Technical Delivery Conditions for plate formed pipes to ASME SA 672. TDG : 08 Rev : 03 ALL PROJECTS ASME SA 515 Pipes.

Accepted By:- Engineering				
Materials Management				
OP & C				
Rev : NO:-	03	04	05	06
Date :-	03. 10.2005			
Prepared / Revised by				
Reviewed / Approved by				

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

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 Cl.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.

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:

Type of test	No. of tests	Reference Standard
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 diemension.
d. Steel making process of the plate .
e. Heat number of the plate.
f. Laddle 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.