



**ENQUIRY
(INDIGENOUS)**

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
80, G.N.ROAD, T.NAGAR
Purchase Department - Piping Centre
CHENNAI - 600 017.
TAMILNADU (INDIA)

PHONE :
GRAMS : BHARATELEC
FAX NO :
E-mail :
Web :

	Collective No.	Enquiry Date	Due Date for Quotation
	4010700030	31.07.2007	10.08.2007 Due Date for
Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order			
RFQ No: 4010700030			

Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	159385160000 PIPE DIA 508.0 X 10.0 SA672GRB70CL22 HTP: 70.00 TDC: TDG:08:03 Length: 6500.00	M	1982.500	1,982.50	31.12.07
20	159385180000 PIPE DIA 610.0 X 10.0 SA672GRB70CL22 HTP: 63.00 TDC: TDG:08:03 Length: 6500.00	M	390.000	390.00	31.12.07
30	159385220000 PIPE DIA 813.0 X 10.0 SA672GRB70CL22 HTP: 47.00 TDC: TDG:08:03 Length: 6500.00	M	344.500	344.50	31.12.07
40	159385230000 PIPE DIA 914.0 X 10.0 SA672GRB70CL22 HTP: 42.00 TDC: TDG:08:03 Length: 6500.00	M	117.000	117.00	31.12.07
50	159385240000 PIPE DIA 1219.0 X 10.0 SA672GRB70CL22 HTP: 31.00 TDC: TDG:08:03 Length: 6000.00	M	126.000	126.00	31.12.07
60	159385250000 PIPE DIA 1626.0 X 12.0 SA672GRB70CL22 HTP: 28.00 TDC: TDG:08:03 Length: 6000.00	M	306.000	306.00	31.12.07

General Note:

Enclosures:

"LD clause has to be confirmed without fail."

<p>The offers should reach us before the time of opening of tenders. The offers will be opened at 14:30 hours on the due date in the presence of the tenderers who may like to be present. Late tenders are liable to be rejected.</p>	<p>Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED</p> <p>MANAGER / PURCHASE (Piping Centre)</p>
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1. This Tender is a **TWO PART BID**.
Part I - Technical cum Commercial.
Part II - Price.
Type and quantum of work is detailed in "SCOPE OF WORK"
2. The quoted price shall be " FIRM " till the complete execution of the scope.
3. Last date for submission of offer **10.08.07 - Time - 13.30 Hours.**
4. Technical cum Commercial Bid Opening Date **10.08.07 - Time - 14.30 Hours.**
5. Price Bid of only the Technically acceptable offers shall be opened at a later date.
Acceptance of offer is also subject to **BHEL's / IBR's approval** for manufacturing.
6. The above bid shall be sent in a sealed cover duly indicating

Enquiry No. & date, Tender Opening date and " PLATE FORMED PIPES - SA 672 GR B 70 CL 22 "

To
SDGM / PROCUREMENT
BHEL - Piping Centre
Old No 93, (New No:80) G N Chetty Road
T Nagar / Chennai 600 017 . PHONE : 28158804 / 28158820

(Technical cum Commercial offer and Priced offer shall be put in separate envelopes with the above mentioned details on it.)

SCOPE OF WORK :

BHEL requires the below mentioned quantities of various sizes of SA 672 GR B 70 CL 22 Pipes and as per TDC-TDG:08:03 and to be delivered to Trichy Stores as per Technical specification detailed out in Technical and Commercial Part of this Bid. The raw material plate is to be arranged by suppliers themselves. Specific Length as indicated below is preferred. Random Length is also acceptable.

LIST OF ITEMS

Enq. Sl.no	Pipe Size	Sp. Length	Specification	Hydro Test (Bars)	Qty. Mtr	Destination	Delivery
01	Dia 508 x 10	6500	SA 672 GRB 70 CL 22	70	1982.5	Trichy	31.12.07
02	Dia 610 x10	6500	SA 672 GRB 70 CL 22	63	390.00	Trichy	31.12.07
03	Dia 813 x 10	6500	SA 672 GRB 70 CL 22	47	344.50	Trichy	31.12.07
04	Dia 914 x 10	6500	SA 672 GRB 70 CL 22	42	117.00	Trichy	31.12.07
05	Dia 1219 x 10	6000	SA 672 GRB 70 CL 22	31	126.00	Trichy	31.12.07
06	Dia 1626 x 12	6000	SA 672 GRB 70 CL 22	28	306.00	Trichy	31.07.07

PART - I : TECHNICAL CUM COMMERCIAL.

Technical :

1. The bidder shall supply the Welded Pipes, as per **SA 672 GR B 70 CL 22** Specification and shall also comply with the following BHEL documents.
Acceptance to BHEL TDC ref : TDG : 08 : 03 & QP : SQAP / 02..
2. Bidders shall clearly indicate their point to point acceptance to the TDC and other requirements and in case any deviations taken shall be clearly indicated. Supplier to certify that all conditions are acceptable except as indicated in their offer. The bidder shall clearly mention the manufacturing process that will be adopted. Also the proposed WPS (Welding Procedure Specification) shall be enclosed. Please avoid taking deviation, which were " not accepted " in previous tender.

Commercial :

1. The prices quoted by the Bidder shall be on F.O.R. Ex-works basis with freight extra for transportation of finished pipes to our stores at Trichy. Price quoted shall be " FIRM " till the execution of the complete scope with raw material plate in their scope. **However payment for freight will be based on per mtr and limited to total freight amount.**
2. The bidder shall confirm in this Part of bid that he has given all the breakups as requested in the price bid (Part II - Price).
(The bidder shall also enclose in Part I a copy of un priced - Price part format to know whether the bidder have taken care of all the points).
3. The bidder shall clearly indicate the applicable Taxes / Duties / CESS. (See Format).
4. Delivery - 31st December 2007.
5. LD @ 0.5 % per week subject to a maximum of 15% for the undelivered portion shall be levied.
6. Bidder shall give a minimum validity of 60 days for the offer.
7. Payment terms - 90 % against despatch with in 60 days and balance 10 % after receipt & acceptance of pipes at Stores with in 60 days from the date of receipt of clear documents.

Note : As a policy any request for LC will not be considered and is not acceptable to BHEL. In exceptional circumstances, LC may be given with suitable loading at prevailing bank rates. All LC opening, extension, negotiation and other charges are to be borne by the vendor.

The following documents shall be submitted for 90% payment.

- a. Invoice (Original).
- b. Excise Gate Pass if applicable.
- c. Lorry Way Bill / Delivery Challan.
- d. Original Test certificate and Inspection reports. (Soft copy also).

The following documents shall be submitted for 10% payment.

- a. Invoice (Original).
- b. Acknowledged copy of invoice / LR for having received and accepted of pipes at stores.



8. In case of incomplete / inadequate information provided against the requirements of this tender the offer shall be liable for rejection.
9. L1 bidder shall not automatically qualify for getting the order and BHEL has the right to negotiate price and delivery and if warranted, BHEL shall also split the order on two or more parties. If split between 2 parties the ratio shall be 60:40. 60% on original L1 bidder and 40% to L2 bidder who has matched with L1 price.

PART - II - PRICE :

In this part of bid, the bidder shall provide the price strictly in the below mentioned format. In this addition to the hard copy, the bidder has to submit in soft copy also in excel format.

<u>Sl.</u> no	<u>Pipe</u> Size	<u>Length</u> in mm	<u>HTP</u> in Bars	<u>Qty.</u> in Mtrs.	<u>Bare Pipe</u> rate per Mtr (Ex-works)	<u>Extra Transportation</u> cost /mtr of Finished pipe to Stores / Trichy
<hr/>						
<hr/>						

- a. Base Price shall include Cost of Raw Material plus conversion cost per Mtr of bare pipe including Testing & IBR Inspection.
- b. Ordering shall be on FOR – Trichy Stores basis .
- c. Percentage of applicable Taxes, Duties and CESS shall be clearly indicated .
- d. Service Tax on transportation if included shall be clearly indicated.
- e. A soft copy of the price format with price details are also to be sent along with price bid. (Preferably in CD).

The Price quoted shall be " FIRM " till complete execution of the scope and bidder shall give **validity** of this price offer for a period of **minimum 60 days** from the date of opening Technical cum Commercial Bid and clarification if any resolved.

LIST OF DOCUMENTS ENCLOSED :

1. TDC : TDG: 08:03.
2. QP No. SQAP / 02.

The above documents from part of this tender document and bidder shall ensure that they have received all these along with tender and confirm.

- **Pre Qualified** is the criteria for consideration for other than the BHEL Approved Vendors. After qualifying for registration, the new Vendors may be considered for future inline with their system and policy. Such Vendors will not be considered in this Enquiry.
- The new Vendors may download Vendor registration forms from BHEL Web Site www.bhel.com and submit all relevant data for formal registration.


Sr. Manager/Purchase

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Sr. Manager/Purchase

**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 670			
Equipment :	Pipes.			
Accepted By:- Engineering	<i>[Signature]</i>			
Materials Management	<i>[Signature]</i>			
OP & C	<i>[Signature]</i>			
Rev : NO:-	03	04	05	06
Date :-	03.10.2005			
Prepared / Revised by	<i>[Signature]</i>			
Reviewed / Approved by	<i>[Signature]</i>			
Issued by Piping Centre / Quality Assurance				Page 1 of 5

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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 based on DCIB's feed back.

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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**

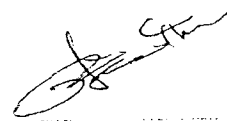
- 3.1 The chemical composition of the steel plates shall be as per ASME SA 515 Gr.60 for B60, Gr.65 for B65 and Gr.70 for B70 except that the carbon percentage shall be limited to 0.25% irrespective of plate thickness.
- 3.2 The steel shall be of fully killed plain carbon steel.
- 3.3 The plate shall 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 PIPES TO ASME SA 672 : TDG:08:03
: 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.

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- 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.

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- | <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.

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9.0 **DIMENSIONAL TOLERANCES**

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- 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.


 BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, MADRAS - 17 QUALITY ASSURANCE & CONTROL DEPT.			STANDARD QUALITY ASSURANCE PLAN FOR PLATE FORMED PIPES CONFIRMING TO SA 672 Gr B 70 CL 22					QP NO: SQAP / 02 REV.NO: 00 DATE: 30-06-2006									
REF: 1) TDC No.: TDG:08 Rev. 03 dated 03.10.2005; 2) IBR-1950 with latest amendments.																	
SI. NO	COMPONENT / OPERATION	CHARACTERISTICS	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	TYPE OF RECORD	INSPECTION AGENCY					REMARKS			
									D	P	W	V	H				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
1.0	RAWMATERIAL																
1.1	Raw material (Plate) Inspection (C = 0.25% max.)	Identification Dimension	Major	Visual, Measurement	100%	ASTM A 20, ASME SA 515 Gr. 70, IBR		Inward Receipt Report	--	3	--	2	--	MTC - Mill Test Certificate			
1.2		Chemical Composition & Mechanical properties	Major	Verification of MTC	One per Heat	ASME SA 515 Gr. 70, IBR		MTC	✓	3	--	2	--	TC - Test Certificate			
1.3		Free from defects	Major	Ultrasonic Test (UT)	100%	ASTM A 435	ASTM A 578 Level-B	UT Report	✓	3	--	2	--	Refer Note 1 & 2			
1.4	Welding Consumables	Chemical Composition & Mechanical properties	Major	Verification of Manufacturer TC	100%	Applicable Specification as per WPS		TC	✓	3	--	2	--	WPS - Welding Procedure Specification			
2.0	INPROCESS CONTROL																
2.1	Welding Procedure Specification (WPS)	Qualification of Welding Procedure Specification	Major	Verification	Each Procedure	As per ASME Sec. IX & IBR		WPS	✓	3	--	2	--	@ - Welders are to be qualified as per ASME sec IX & IBR PQR - Procedure Qualification record.			
2.2	Welder / Machine Performance Qualification.@	Qualification of Welder / Machine Performance.	Major	Verification	Each welder / Machine	As per ASME Sec. IX & IBR		PQR	✓	3	--	2	--				
2.3	Welding of pipes:																
2.3.1	Pipe forming operations	Rolling, Post Bending Edge preparation, Root gap alignment, Edge alignment	Major	Visual, Template, Measurement	100%	Manufacturer Work Instruction		Internal Register / Report	--	3	--	--	--				
LEGEND: 1 - Customer; 2 - BHEL/ BHEL Nominated Agency; 3 - BHEL Vendor; 4 - Subvendor; P - Perform; V - Verification/Review; W - Witness; H - Hold. D - "✓" mark in this column indicates that Document is required.																	
Dr. M. Pugazhaandi <small>Digitally signed by Dr. M. Pugazhaandi DN: cn=Dr. M. Pugazhaandi, o=BHEL, ou=Control Dept., email=pugazhaandi@bhel.co.in, c=IN</small> PREPARED BY : M. PUGAZHAANDI													REVIEWED BY: P. RAVI SHANKAR		APPROVED BY: P. ELANGO VAN		PAGE : 1 of 4

 BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, MADRAS - 17 QUALITY ASSURANCE & CONTROL DEPT.			STANDARD QUALITY ASSURANCE PLAN FOR PLATE FORMED PIPES CONFIRMING TO SA 672 Gr B 70 CL 22					QP NO: SQAP / 02 REV.NO: 00 DATE: 30-06-2006						
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SI. NO	COMPONENT / OPERATION	CHARACTERISTICS	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	TYPE OF RECORD	INSPECTION AGENCY					REMARKS
									D	P	W	V	H	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2.3.2	Welding	Root Welding Root Visual Exam	Major	Visual	100%	As per SA 672 (latest version), IBR & TDG:08		Internal Register / Report	--	3	--	2	--	Refer Note 4
2.3.3	NDE on Welds	Weld Quality	Critical	RT	100%	TDG:08, ASME Sec. V, ASME Sec. VIII Div 1- UW 51		RT Report	✓	3	--	2	--	
2.4	Repair Welding:													
2.4.1	Weld Repair	Repair of weld defects	Critical	Visual, Checking Welding Parameters	Identified weld defects	TDG:08, ASME Sec. V, ASME Sec. VIII Div 1- UW 38		Repair weld Report	✓	3	--	2	--	Refer Note 3
2.4.2	NDE on Repair Welds	Weld Quality	Critical	RT	100%	TDG:08, ASME Sec. V, ASME Sec. VIII Div 1- UW 51		RT Report	✓	3	--	2	--	
2.5	HeatTreatment (after forming and welding)	Stress Relieving (Heating shall be for 1 Hour min.)	Critical	Review of HT chart for ROH, Soaking, ROC	100%	As per SA 672 (latest version), IBR		HT chart	✓	3	--	2	--	ROH - Rate of Heating ROC - Rate of Cooling
2.6	Test Piece Marking	Test piece from welded Pipes for Product Anlysis.	Major	Sampling as per TDG:08	As per SA 672	ASME SA 672		Internal Register / Report	--	3	2	--	--	Random witness - discretion by BHEL
3.0	TESTS													
3.1	Hydro static Pressure test	Parent Metal and Weld Soundness	Critical	Hydro test (HT)	100%	Holding Pressure as per PO / SA 672 (Higher value shall be used)	No Leakage.	HT Report	✓	3	2	--	--	10% by BHEL at Random. Pr. Holding time: 5seconds
LEGEND: 1 - Coustomer; 2 - BHEL/ BHEL Nominated Agency; 3 - BHEL Vendor; 4 - Subvendor; P - Perform; V - Verification/Review; W - Witness; H - Hold. D - "✓" mark in this column indicates that Document is required.														
Dr. M. Pugazhaandi <small>Digitally signed by Dr. M. Pugazhaandi DN: cn=Dr. M. Pugazhaandi, o=BHEL, ou=Quality Assurance & Control Dept., email=pugazhaandi@bhel.co.in, c=IN</small>													PAGE : 2 of 4	
PREPARED BY : M. PUGAZHAANDI					REVIEWED BY: P. RAVI SHANKAR					APPROVED BY: P. ELANGO VAN				



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 BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, MADRAS - 17 QUALITY ASSURANCE & CONTROL DEPT.		STANDARD QUALITY ASSURANCE PLAN FOR PLATE FORMED PIPES CONFIRMING TO SA 672 Gr B 70 CL 22						QP NO: SQAP / 02 REV.NO: 00		DATE: 30-06-2006								
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									D	P	W	V	H					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
3.2	Product Testing																	
3.2.1	Chemical Test for Parent & Weld Metal	Chemical Composition	Major	Chemical Analysis	As per SA 672 (latest version) and TDG:08 Rev. 03 for every Lot of 60m in length	As per TDG:08 Rev. 03 & SA 672	Test Report	✓	3	--	2	--						
3.2.2	All Weld Metal Tensile Test	Tensile Strength of Parent Metal	Major	Tensile test		As per IBR Reg. 259		✓	3	2	--	--						
3.2.3	Transverse Tensile Test for Weld (Transverse)	Tensile Strength of Weld	Major	Tensile test		As per TDG:08 Rev. 03, SA 672 & ASME Sec. IX -QW 422		✓	3	2	--	--						
3.2.4	Transverse Guided Bend Test: (Root + Face)	Weld Ductility	Major	Bend test (2 Tests)		As per TDG:08 Rev. 03, SA 672 & ASME Sec. IX -QW 462 (a)		✓	3	2	--	--						
3.2.5	Macro & Micro Structure Test	Grain Structure	Major	Metal Grain Structure & Weld Penetration		As per IBR & ASME Sec. IX		✓	3	2	--	--						
3.2.6	Impact Test	Toughness	Major	Charpy-V	One set / 60 Metre length.	As per ASTM A 370 Type A & IBR	Test Report	✓	3	2	--	--						
4.0	SURFACE PROTECTION (Both Internal and External Surface of Pipe)																	
4.1	Surface preparation by Power tool cleaning /Rotary wire brush	Degree of cleanliness	Major	Visual	100%	Free from all dirt, oil, grease,rust,scale,weld slag, fluxdeposit,foreign matters etc.,	Internal Register	--	3	--	2	--						
4.2	Application of Resin type translucent Rust Preventive Coating	Coverage	Major	Visual	100%	TDC:08 (Dry type Rust Preventive Coating shall be used)	Internal Register	--	3	--	2	--						
LEGEND: 1 - Customer; 2 - BHEL/ BHEL Nominated Agency; 3 - BHEL Vendor; 4 - Subvendor; P - Perform; V - Verification/Review; W - Witness; H - Hold. D - "✓" mark in this column indicates that Document is required.																		
Dr. M. Pugazhaandi PREPARED BY : M. PUGAZHAANDI													P. Ravi Shankar REVIEWED BY: P. RAVI SHANKAR		P. Elangoivan APPROVED BY: P. ELANGOVAN		PAGE : 3 of 4	

 BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, MADRAS - 17 QUALITY ASSURANCE & CONTROL DEPT.		STANDARD QUALITY ASSURANCE PLAN FOR PLATE FORMED PIPES CONFIRMING TO SA 672 Gr B 70 CL 22					QP NO: SQAP / 02 REV.NO: 00 DATE: 30-06-2006													
REF: 1) TDC No.: TDG:08 Rev. 03 dated 03.10.2005; 2) IBR-1950 with latest amendments.																				
SI. NO	COMPONENT / OPERATION	CHARACTERISTICS	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	TYPE OF RECORD	INSPECTION AGENCY					REMARKS						
									D	P	W	V	H							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15						
5.0 FINAL INSPECTION																				
5.1	Final Dimension Bevel Angle	Measurement (including OD, Out of Roundness, Wall Thickness, Length, End Squareness and Weight)	Major	Visual & Measurement	100% & 10%	As per SA 672 (latest version) & TDC:08 & Drawing & PO		Dimensional Report (with	✓	3	2	--	--	10% witness by BHEL.						
5.2	Pipe Spider / End cap	Transit damage control & Pipe end protection	Major	Visual	100%	As per SA 672 (latest version) & TDC:08 & Drawing & PO		Sketch / Detail & Inspection Report	--	3	2	--	--							
5.3	Marking & Identification	Hard Stamping & Stenciling.	Major	Visual & Verification	100%	Each Pipe shall be Marked as per TDC:08/ PO		Inspection Report	--	3	2	--	--	Refer Note 5						
5.4	Colour Coding	Identification	Major	Visual & Verification	100%	Each Pipe shall be Marked as per TDC:08/ PO			--	3	2	--	--	Refer Note 6						
5.5	Inspection Clearance	Documentation & Certification	Major	Verification	100%	All relevant Documents as per this QAP are required		Inspection Report	✓	3	--	2	2	CHP - Customer Hold Point						
Notes:																				
1	There shall be correlation with raw material test certificates.																			
2	Chemical analysis & Mechanical tests shall be performed in approved laboratories. Calibrated instruments shall be used during testing.																			
3	All welders, welding procedure and weld repair procedure shall be qualified as per ASME Sec. IX. And IBR.																			
4	All weld joints shall be double welded full penetration welds made in accordance with qualified procedure as per ASME Sec. IX..																			
5	Hard Stamping & Stenciling: <i>Out Side of pipe 100 mm away from both ends</i> ; Specification with Grade, Pipe No., Melt / Heat No., P O No., Mfr's Identification & Inspector Seal.																			
6	Colour Coding: Red & Aluminium colour Strip (min 25 mm width) longitudinally throughout the length of pipe.																			
LEGEND: 1 - Customer; 2 - BHEL/ BHEL Nominated Agency; 3 - BHEL Vendor; 4 - Subvendor; P - Perform; V - Verification/Review; W - Witness; H - Hold. D - "✓" mark in this column indicates that Document is required.																				
Dr. M. Pugazhaandi <small>Digitally signed by Dr. M. Pugazhaandi DN: cn=Dr. M. Pugazhaandi, o=BHEL, email=pugazhaandi@bhel.co.in, c=IN</small> PREPARED BY : M. PUGAZHAANDI												REVIEWED BY: P. RAVI SHANKAR			APPROVED BY: P. ELANGO VAN			PAGE : 4 of 4		

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