



**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

REF: 1) TDC No.: TDG:08 Rev. 03 dated 03.10.2005;
2) IBR-1950 with latest amendments.

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
1	2	3	4	5	6	7	8	9	D	P	W	V	H		
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 - Coustomer; 2 - BHEL/ BHEL Nominated Agency; 3 - BHEL Vendor; 4 - Subvendor; D - "✓" mark in this column indicates that Document is required.															
P - Perform; V - Verification/Review; W - Witness; H - Hold.															
Dr. M. Pugazhaandi															
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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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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	Heat Treatment (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 Analysis.	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
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3.2	Product Testing													
3.2.1	Chemical Test for Parent & Weld Metal	Chemical Composition	Major	Chemical Analysis		As per TDG:08 Rev. 03 & SA 672			✓	3	--	2	--	
3.2.2	All Weld Metal Tensile Test	Tensile Strength of Parent Metal	Major	Tensile test	As per SA 672 (latest version) and TDG:08 Rev. 03	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		Test Report	✓	3	2	--	--	
3.2.4	Transverse Guided Bend Test: (Root + Face)	Weld Ductility	Major	Bend test (2 Tests)	for every Lot of 60m in length	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	--	
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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 Sketch / Detail) & Inspection Report	✓	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		--	3	2	--	--						
5.3	Marking & Identification	Hard Stamping & Stenciling.	Major	Visual & Verification	100%	Each Pipe shall be Marked as per TDC:08/ PO		--	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: Out Side of pipe 100 mm away from both ends; 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.																		
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