

1.0 SCOPE

- 1.1 This Technical Delivery Conditions specify the requirements in addition to IS:3589 for electrically welded (ERW \ SAW) steel pipes.
- 1.2 The pipes are intended for water services (under Non-IBR piping system only).
- 1.3 The pipes shall conform to the size, grade and quantity as specified in the purchase order.

2.0 MATERIAL

- 2.1 The plates / coils used for pipe shall meet the requirements as per IS: 3589 Grade Fe 410 MPa including mechanical test requirements.

3.0 DIMENSIONAL TOLERANCES

- 3.1 The tolerances limits are:

OD:- Upto NB 1600 mm: ± 4 mm; Above NB 1600 mm: ± 6 mm

Thickness:- Upto 14mm : $+1.3$ mm / -0.8 mm; Above 14 mm : $+1.4$ mm / -0.8 mm.

Length:- for OD upto 1300 mm : $+10$ mm/ -0 mm;

for OD above 1300 mm : ± 50 mm

Ovality (Difference between major and minor inside diameter) : 0.5% maximum

Squareness of ends: The ends of pipe section shall not vary by more than 3 mm at any point from a true plane perpendicular to the axis of the pipe and passing through the center of the pipe at the end.

- 3.2 Other tolerances shall be as per IS: 3589

4.0 MANUFACTURING

- 4.1 The pipe shall be of longitudinally welded or spirally welded as indicated in the P.O.
- 4.2 The ends shall be edge prepared as indicated in the purchase order.
- 4.3 Circumferential seams shall be 1500 mm apart from each other and from ends.
- 4.4 All pipes shall be completely finished and free from surface, sub surface defects such as pits, cracks, weld spatters & laminations etc..

5.0 NDE

- 5.1 The spiral welds/butt welds of length 100 mm from both the ends of the pipe shall be radiographically tested.

6.0 HYDROSTATIC PRESSURE TEST

- 6.1 Each pipe shall be subjected to a hydraulic test pressure as per IS: 3589 .
(i.e., using the formula $P = 2ST / D$)

7.0 INSPECTION

- 7.1 All pipes shall be inspected by the vendor prior to BHEL / Customers' Inspection. BHEL or BHEL authorized inspector / Customer will select the pipes at random and carryout the inspection. The necessary Material Despatch Clearance Certificate is to be obtained by the vendor prior to the despatch of material.

P.Elangovan, QA
K.Ganeshan, MM

Approved by

C. Karunakaran, Engg
K. Vedaprasad, QC

8.0 PAINTING AND PACKING

- 8.1 Unless otherwise specified in the Purchase Order, all the pipes shall be coated with resin type translucent dry type rust preventive on the outside; pipes of diameter above NB 450 mm, shall be coated inside also.
- 8.2 Spiders are to be provided on both ends of the pipes as per the drawing - if indicated in the enquiry / Purchase Order.

9.0 MARKING

- 9.1 All pipes shall be paint stencilled, hard punched with the following details.

Paint Stencil

- Specification
- Heat number
- Pipe number
- Manufacturer's identification
- Material Code
- Size

Hard punch

- Specification
- Heat number
- Pipe number
- Manufacturer's identification

- 9.2 In addition to the above, for the pipes directly despatched to project site, the following details (furnished in the P.O. or separately) shall be **paint stencilled & hard punched** on both ends of the pipes

- | | | |
|-----------------|----------|----------------|
| ➤ Work order No | ➤ DU No | ➤ Project name |
| ➤ Quantity | ➤ Weight | |

10.0 CERTIFICATES

- 10.1 Three original test certificates typed in English shall be submitted along with the Inspection report.

- 10.2 The test certificate shall furnish the following details.

- a. Purchase Order references.
- b. Test Certificate number.
- c. Specification, grade, size, quantity
- d. Heat number of plate (or pipe number with traceability to heat number)
- e. Chemical composition and mechanical properties
- f. Hydrostatic pressure test report
- g. RT Report.

P.Elangovan, QA
K.Ganeshan, MM

Approved by

C. Karunakaran, Engg
K. Vedaprasad, QC

MANUFACTURING QUALITY PLAN FOR WELDED PIPES										QP NO:				
<Vendor Name & Address>										REV.NO:				
CONFIRMING TO IS 3589 Gr Fe 410										DATE:				
REF:1) BHEL TDC No :TDG:07 Rev.05 dated 16.08.2007										2) SPIDER ARRANGEMENT DRG : 4 - 80 - 999 - 93078 / 00				
										3) EDGE PREPARATION DRG : 4 - 80 - 999 - 93079 / 00				
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	M	B	C*		
1.0	RAW MATERIAL													
1.1	Raw material to Spec.....	Identification Dimension	Major	Visual, Measurement	100%	Applicable Material Specification		Inward Receipt Report	-	P	-	-	MTC - Mill Test Certificate	
1.2		Chemical Composition & Mechanical properties	Major	Verification of MTC	One per Heat			MTC	✓	P	V	-	-	TC - Test Certificate
1.3	Welding Consumables	Chemical Composition & Mechanical properties	Major	Verification of Manufacturer TC	100%			TC	✓	P	-	-	-	WPS - Welding Procedure Specification
2.0	INPROCESS CONTROL													
2.1	Welding Procedure Specification (WPS)	Qualification of Welding Procedure Specification	Major	Verification	Each Procedure	ASME SEC - IX		WPS	✓	P	V	-	@ - Welders are to be qualified as per ASME sec IX.	
2.2	Welder / Machine Performance Qualification.@	Qualification of Welder / Machine Performance.	Major	Verification	Each welder / Machine	ASME SEC - IX		PQR	✓	P	V	-	PQR - Procedure Qualification record.	
2.3	Spiral welded pipes:													
2.3.1	Welding M/c Parameters & WPS	IN-PROCESS check of Welding Parameters	Major	Verification	100%	Vendor Work Instruction & WPS for M/c welding		Internal Register / Report	✓	P	-	-		
LEGEND: M - BHEL Approved Vendor. B - BHEL/ BHEL Nominated Agency; P - Perform; V - Verification/Review; W - Witness; C* - Customer inspection as per tender/PO. D - "✓" mark in this column indicates that Document is required.														
PREPARED BY :										REVIEWED BY :				
For BHEL Use: BHEL Ref No & date :-										PAGE : 1 of 4				

MANUFACTURING QUALITY PLAN FOR WELDED PIPES CONFIRMING TO IS 3589 Gr Fe 410										QP NO: REV.NO:			
<Vendor Name & Address>										DATE:			
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2.4	Longitudinal Welded Pipes												
2.4.1	Pre welding operations	Rolling, Post Bending Edge preparation, Root gap alignment, Edge alignment	Major	Visual, Template, Measurement	100%	Manufacturer Work Instruction		Internal Register / Report	--	P	--	--	
2.5	NDE												
2.5.1	For Pipes ends.	Weld Quality at both ends of the pipe.	Critical	RT	Each Pipe, Both ends, 100 mm long	ASME Sec, VIII Div 1 / UW 51		RT Report	✓	P	V	--	
2.5.2	Butt Joints	Weld Quality	Critical	RT	as per Tender / PO	Weld Full fusion		RT Report	✓	P	V	--	Applicable only if indicated in Tender / PO
2.6	Repair Welding:												
2.6.1	Weld Repair	Repair of weld defects	Critical	Visual, Checking Welding Parameters	Identified weld defects	Manufacturer's Weld Repair Procedure		Internal Register / Report	--	P	--	--	
2.6.2	NDE for Repair Weld	Weld Quality	Critical	RT	100%	ASME Sec, VIII Div 1 / UW 51		RT Report	✓	P	V	--	
3.0	TESTS												
3.1	Hydro test	Soundness of welded pipe	Critical	HT	100%	Holding Pressure as per PO / IS 3589 (Higher value shall be used)	No Leakage.	HT Report	✓	P	W	--	10% Random witness by BHEL.
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				APPROVED BY BHEL				PAGE : 2 of 4					

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1	2	3	4	5	6	7	8	9	D	M	B	C*	15
3.2	PRODUCT TESTING												
3.2.1	Test Piece Marking	Test piece from welded Pipes for Product Analysis.	Major	Sampling	As per IS 3589	IS-3589-(latest version)		Internal Register / Report	--	P	V	--	Random witness discretion by BHEL
3.2.2	Chemical Test for Parent Material	Chemical Composition	Major	Chemical Analysis	As per IS 3589 (latest version) and BHEL TDC	As per IS 3589 (latest version) and BHEL TDC		Test Report	✓	P	V	--	
3.2.3	Tensile Test for Parent Metal (Longitudinal or Transverse)	Tensile Strength of Parent Metal	Major	Tensile test					✓	P	W	--	
3.2.4	Transverse Guided Bend Test: (Root + Face)	Weld Ductility	Major	Bend test					✓	P	W	--	
3.3	Dimension of welded Pipe	Conformance to requirements	Major	Visual & Measurement	100%	As per IS 3589 (latest version) & BHEL TDC & PO, Drawing		Internal Register	--	P	--	--	Refer Note 1
4.0	SURFACE PREPARATION & PAINTING												
4.1	If Special Painting is not indicated in Tender / PO	--	Minor	Visual	100%	Dry type Rust Preventive Coating shall be used for all sizes of Pipes inside and out side.		Internal Register	--	P	V	--	
LEGEND: M - BHEL Approved Vendor. B - BHEL/ BHEL Nominated Agency; P - Perform; V - Verification/Review; W - Witness; C* - Customer inspection as per tender/PO. D - "✓" mark in this column indicates that Document is required.													
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1	2	3	4	5	6	7	8	9	D	M	B	C*	15	
4.2	If Special Painting is indicated in Tender / PO								✓	P	W	-		
Surface Preparation, Painting & Testing as per Project specific Painting scheme as indicated in Tender / PO.														
5.0	FINAL INSPECTION													
5.1	Final Dimension Bevel Angle	Measurement (including ovality, End Squareness)	Major	Visual & Measurement	100% & 10%	As per IS 3589 (latest version) & Applicable TDC & Drawing & PO		Internal Register / Report	✓	P	W	-	10% witness by BHEL.	
5.2	Pipe Spider / End cap	Transit damage control & Pipe end protection	Major	Visual	100%	Applicable TDC & Drawing & PO		Internal Register	--	P	V	-		
5.3	Marking & Identification	Hard Stamping & Stenciling	Major	Visual & Verification	100%	Each Pipe shall be Marked as per applicable TDC / PO		Internal Register	--	P	V	-	Refer Note 2	
5.4	Inspection Clearance	Documentation & Certification	Major	Verification	100%	All relevant Documents as per this QAP are required		Inspection Report	✓	P	-	-		
Notes:														
1	Tolerance on OD: upto NB 1600 mm +/- 4 mm, Above NB 1600 mm +/- 6mm.; Tolerance on Length : as per TDC or Tender / PO.													
	Tolerance on thickness : upto 14mm +1.3mm / - 0.8mm, Above 14mm +1.4mm / -0.8mm.; Tolerance on Squareness of Ends : 3 mm Max.													
	Tolerance on ovality : Difference between major and minor outside diameter shall not exceed 0.5% of Nominal OD													
2	Hard Stamping: Out Side of pipe at the ends ; Specification, Pipe No., Heat No., Mfr's Identification & (If directly despatched to Project site; Project Name, WO No., DU No., Quantity & Weight).													
	Stenciling: Out Side of pipe at both ends ; Specification, Pipe No., Heat No., Mfr's Identification, Material Code, Size & (If directly despatched to Project site; Project Name, WO No., DU No., Quantity & Weight).													
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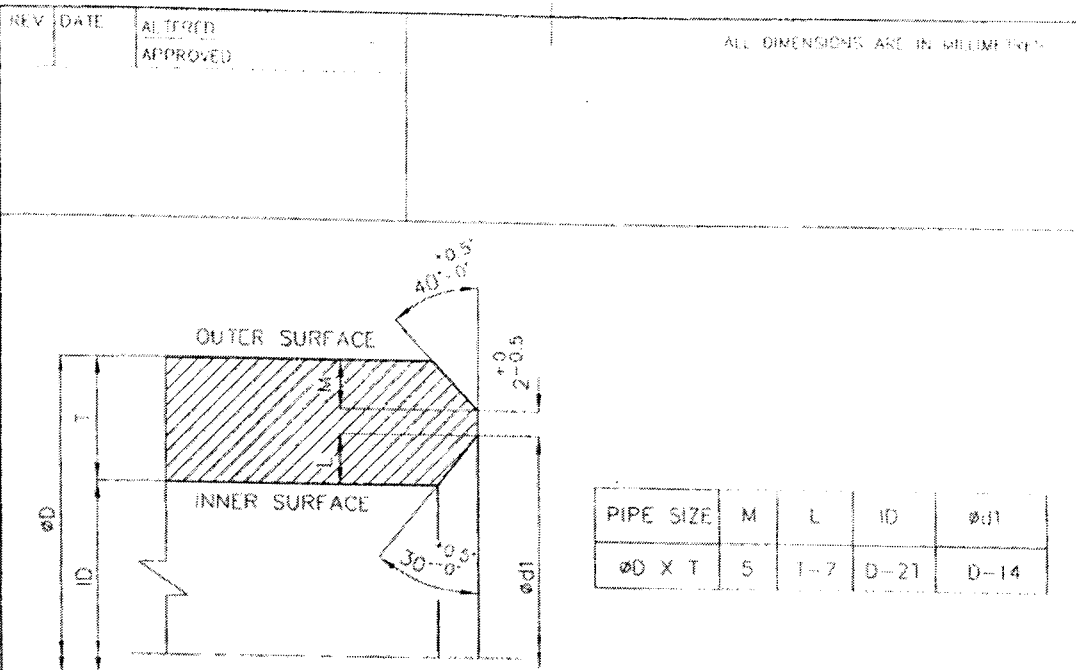
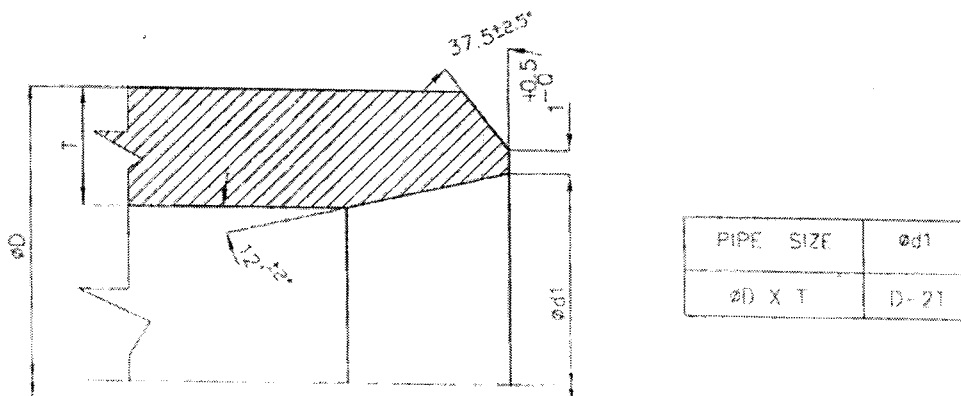
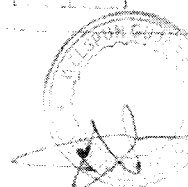


FIG-A E.P. DETAIL FOR PIPES OF THICKNESS
ABOVE 14mm



STYLE-D E.P. DETAIL FOR PIPES OF THICKNESS
14mm AND BELOW

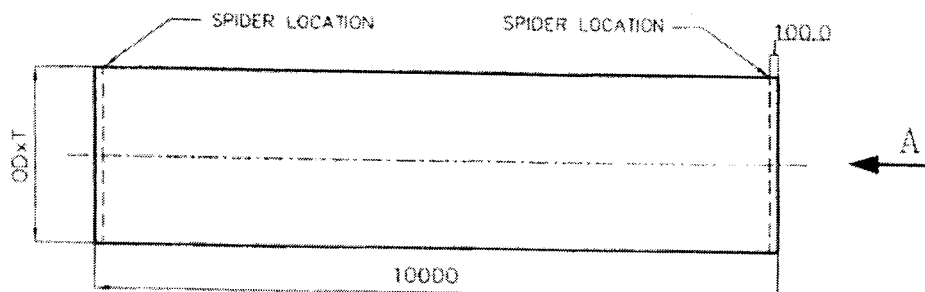
 BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	NAME	SIGNATURE	DATE	NO OF VAR
		CHD	C. K. KARAN	<i>[Signature]</i>	11.04.08	
DEPT. GRADE OF CODE UNTOL. DIM C / M / F		APPD	C. K. KARAN	<i>[Signature]</i>	11.04.08	NO OF ITEMS
		SCALE: NTS WEIGHT (KG) REF TO ASSY. DTD. DRG.				
TITLE EDGE PREPARATION DETAIL FOR PIPE DIA > 1000			CARD CODE U 01	DRAWING NO. 4-80-999-93079		REV 00



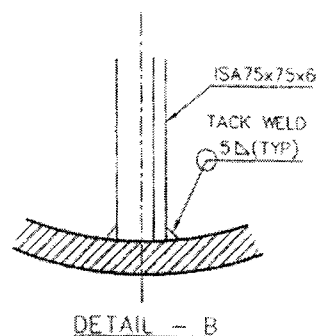
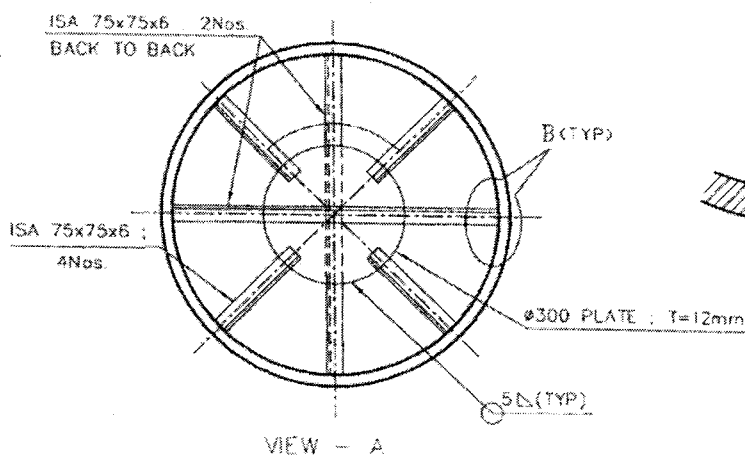
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REV	DATE	ALTERED
		APPROVED

ALL DIMENSIONS ARE IN MILLIMETRES



SPIRAL/LONGITUDINAL WELDED PIPE
(2 LOCATIONS IN 10 MTR PIPE)



BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017				DRN CHD APPD	NAME C. KUMAR C. K. KARAN C. K. KARAN	DESIGN DATE 11 04 08 11 04 08 11 04 08	NO. OF VAR	
DEPT	GRADE OF UNTO. DIM	SCALE	WEIGHT (KG)	REF TO ASSY / OLD DNG				ITEM NO.
CODE	C / M / F	N.T.S.						NO. OF ITEMS
TITLE SPIDER ARRANGEMENT FOR FOR PIPE DIA > 1000				CARD CODE U 01	DRAWING NO 4-80-999-93078			REV 00

Size AA

