

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
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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

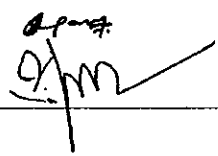
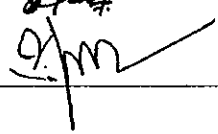
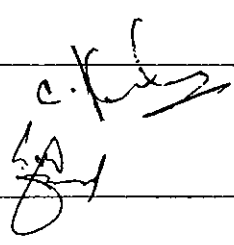
- 9.2 In addition to the above, for the pipes directly despatched to project site, the following details (furnished in the P.O. or separately) shall be paint stencilled & hard punched on both ends of the pipes

- | | | |
|-----------------|----------|----------------|
| ➤ 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 
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**BHARAT HEAVY
ELECTRICALS LIMITED**
PIPING CENTRE, CHENNAI- 17
QUALITY ASSURANCE & CONTROL DEPT.

PAINTING SCHEME FOR LP PIPING
(CW / ACW / ECW / Plant water, Air Piping, etc.,)
PROJECT : CHHABRA - 3 & 4 (2 X 250 MW)
BHEL CUST NOS : 1210, 1211, 7021, 7022.

QPNo: 7021:QPC:12
REV.NO: 00
Dt : 10.11.2008

Sl. NO	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat			Finish coat			REMARKS	
			Primer	No of coats	Paint	No of coats	Shade	Paint	No of coats	Shade		Total DFT Microns
1	2	3	4	5	6	7	8	9	10	11	12	13
1	(a) Internal Surface of CW Pipe (For Pipe dia 1000 mm and above)	Blast Cleaning SSPC SP-10 SA 2½ (Refer Note 1,4)	Zinc rich Primer (Refer Note 2, 4)	1 (50 Microns per coat)	-----	-----	-----	Coal tar Epoxy (Refer Note2, 4)	2 (100 Microns per coat)	-----	(Refer Note2, 4)	260 Microns Primer is more suitable for coal tar epoxy
	(b) Holiday test	Holiday testing by low voltage (75 Volts in Min) Wet sponge Holiday detector or by high Voltage (Voltage per micron of DFT is as recommended by Paint Manufacturer subjected to Minimum of 5V / Micron). Holiday test Equipment to be calibrated before testing.										
2	External Surface of CW -- Buried Piping / Encased in concrete (Temporary Protection for transportation from works to site). Further protection will be done by BHEL Erection Group as per Field Painting Schedule.	SSPC-SP3 / Power Tool Cleaning	Red Oxide Zinc Phosphate (Alkyd base to IS 12744)	1 (30 Microns per coat)				-----	-----	-----	30	
3	External Surface (over ground piping) of CW,ACW, ECW, Plant Water. (For all diameters)	SSPC-SP3 / Power Tool Cleaning	Red Oxide Zinc Phosphate (Alkyd base to IS 12744)	1 (30 Microns per coat)	Synthetic enamel long oil Alkyd to IS 2932	2 (20 microns per coat)	-----	-----	-----	-----	70	Final coats of Paint will be applied a site
4	Galvanised and Stainless steel Piping	No painting										

Notes:

1. Blast cleaning to near white metal to obtain roughness as per Epoxy Paint data sheet and measured by Press-O-Film and recorded.
2. Application of Zinc rich primer, Coal tar Epoxy shall be done as per manufacturer's data sheet recommendation, meeting the thickness requirement as indicated above.
3. Paint application by Brush / Airless / other suitable means as per paint data sheet requirements.
4. Vendor / Sub contractor shall fulfil requirements including witness or verification by BHEL / BHEL nominated inspection agency stages.

PREPARED and REVIEWED BY : G.PANNEER SELVAM . SrMgr / QA

APPROVED BY: P.Elangoan SDGM/QA



TCE Consulting Engineers Limited

LETTER OF TRANSMITTAL FOR VENDOR DOCUMENTS

To, **CLIENT: RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LIMITED** YOUR REF.:
BHEL JOB NO.:TCE.5225A EMAIL
PIPING CENTRE PROJECT: 2x250 MW CHHABRA TPS DATE: 13.11.2008
80/93, G.N. ROAD, T. NAGAR, CHENNAI-600 017 SUBJECT: **LP PIPING PAINTING SCHEME** OUR REF :
Tamil Nadu TCE.5225A/ME/CO/540/003
Tel Nos: 044-28158803
Fax: 0431-2520642 DATE: 17 NOV 2008
Attn: **Mr. R. ELANGO (AGM. COMML) / P.K.A. SELVAM (Sr. Mgr. COMML)**

We are herein conveying our approval/comments on the documents listed below. Approval/comments conveyed herein neither relieves the vendor/contractor of his contractual obligations and his responsibilities for correctness of dimensions, materials of construction, weights, quantities, design details, assembly fits, performance requirements and conformity of the supplies with the Indian Statutory Laws as may be applicable, nor does it limit the purchaser's rights under the contract.

Yours Sincerely
For TCE Consulting Engineers Limited

K.VENKATESH
PROJECT ENGINEER (MECHANICAL)

CODE

- | | |
|---|--|
| <p>A - Document approved as submitted; proceed with fabrication/construction.</p> <p>B - Document approved subject to comments noted; proceed with fabrication/construction considering our comments.</p> <p>C - Our comments are noted on the enclosed marked-up print.</p> <p>D - Our comments are noted in the memo attached to this transmittal.</p> <p>E - Correct original of the document to reflect our comments and resubmit for approval.</p> | <p>F - Correct original of the document to reflect our comments and resubmit for records.</p> <p>G - Documents of this category are for information only and not for approval. Information furnished on the document is noted.</p> <p>H - Document reviewed only against our previous comments and other revisions highlighted and identified by the vendor.</p> <p>I - Document returned without review.</p> <p>J - Print not enclosed.</p> |
|---|--|

CC: Mr. A.K. GOSWAMY AGM-PS/MSX BHEL House Siri Fort New Delhi Ph: 011-26001156 (WITHOUT ENCL.)	CC: Mr. I.J. Pal , Chief Project Engineer (CTPP) RVUNL, B-15, Shastri Nagar, Chhabra Distt. Baran, Rajasthan 325220 Tel. Fax: 07452-218052 (ENCL. WITH 2 COPY)
CC: R.K. LUHADIA ACE TD- RRVUNL, Shed No. 10, Vidyar Bhavan, Jyothi Nagar Jaipur -302 005 Rajasthan) Tel : 0141 - 274038-82, Fax - 0141 - 2740227 (ENCL. WITH 1 COPY)	

TCE CONSULTING ENGINEERS LIMITED

A TATA Enterprise



TCE LETTER REF.: TCE.5225A/ME/CO/540/003

DATE: 17 NOV 2008

SH 2 OF 2

CC File		TCE NO.	TITLE	CODE
1.	QP No. 7021:QPC:12, R0	-	PAINTING SCHEME FOR LP PIPING	A

MEMO

-----#XXX#-----



BHARAT HEAVY

ELECTRICALS LIMITED

PIPING CENTRE, CHENNAI- 17

QUALITY ASSURANCE & CONTROL DEPT.

PAINTING SCHEME FOR LP PIPING

(CW / ACW / ECW / Plant water, Air Piping, etc.,)

PROJECT NAME : - MAITHON RIGHT BANK TPP (2 X 525 MW)

BHEL CUSTOMER Nos : 0656 , 0657 , 6958 , 6959.

QPNO:6958:QPC:12

REV.NO: 00

Dt : 10.06.2009

Sl. NO	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat			Finish coat			REMARKS
			Primer	No of coats	Paint	No of coats	Shade	Paint	No of coats	Shade	Total DFT Microns (Min.)
1	2	3	4	5	6	7	8	9	10	11	12
1	(a) Internal Surface - CW Pipe (for pipe dia - 1000 mm and above)	Blast Cleaning SSPC-SP-10 SA 2½ (Refer Note 1)	Epoxy based Zinc rich Primer (Refer Note 2)	1 (50 Microns Min. per coat)	---	---	---	Coal tar epoxy (Refer Note 2)	2 (100 Microns Min. per coat)	---	250 Microns (Refer Note 3)
	(b) Holiday test (Refer Note 3)	Holiday testing by low voltage (75 Volts Min.) wet sponge Holiday detector or by High voltage (Voltage per micron of DFT is as recommended by Paint Manufacturer subjected to minimum of 5V / Micron). Holiday test Equipment to be calibrated before testing.									
2	External Surface of CW -Buried Piping / Encased in concrete (For pipe dia- 1000 mm and above) (Temporary Protection for transportation from works to site). **Further protection to be done by BHEL Erection Group as per Contract requirement.	SSPC-SP3 / Power Tool Cleaning	Red Oxide Zinc Phosphate (Alkyd base to IS 12744)	1 (30 Microns per coat)	---	---	---	---	---	---	30 Microns
3	External Surface (over ground piping) of CW/ACW, ECW, Plant water (For all diameters)	Blast cleaning to SA2 1/2 (Near white metal) with surface profile 35 - 50 Microns.	Epoxy Polyamide cured Zinc phosphate Primer.	2 (30 Microns per coat)	Epoxy Based MIO Pigmented intermediate coat	1 (100 Microns per coat)	---	***	---	---	160
4	Galvanised and Stainless steel Piping	No painting									

Notes:

1. Blast cleaning to near white metal to obtain roughness as per epoxy paint data sheet.
 2. Application of Epoxy based Zinc rich Primer, Coal Tar Epoxy shall be done as per manufacturer's data sheet / recommendation, meeting the thickness requirements as per this document.
 3. Witness by BHEL / BHEL nominated inspection agency.
- *** Finish coat applied at site as per contract specification.

PREPARED and REVIEWED BY : G.PANNEER SELVAM, SM / QA

APPROVED BY: P.ELANGO VAN, SDGM / QA.

BHARAT HEAVY ELECTRICALS LIMITED. PIPING CENTRE CHENNAI - 17 QUALITY DEPARTMENT.			QUALITY PLAN FOR CW PIPING (STRAIGHT PIPES SIZE NB ≥ 1000 MM) PROJECT: BOKARO-TPS-"A" (1 X 500 MW) BHEL CUSTOMER Nos : 0866, 7013				QP NO : 7013 : QPC : 01 REV. NO : 00 DATE : 18.08.2008 PAGE : 1 of 2			
SL No	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
									M	B
1	STRAIGHT		4	5	6	7	8	9	10	11
1.0	PIPE: IS3589 (Longitudinal /spiral welded pipes)	Chemical Mechanical Soundness	Major	Verification Tensile test Hydraulic test or Radiography Measurement	One/ heat One/ heat 100%	IS 3589 IS 3589 IS 3589		TC TC TC	P P P	V W W
2.0	Coating (internal)	Dimension	Major		10% Random	IS 3589		TC	P	W
(a)	Surface Preparation of pipes	Degree of cleanliness	Major	Visual	100%	Blast clean to near white metal.		HC	P	V
(b)	PRIMER **	Epoxy Resin based Zinc Rich Primer.	Major	Visual & Elcometer measurement	Each pipe	Minimum DFT:50 microns		HC	P	V
(c)	OVER COAT **	Coal tar epoxy finish Paint	Major	Visual & Elcometer measurement	Each pipe	2 coats. DFT:100 microns min Per coat. Total DFT: Primer + Over coat =250 microns min. Dry film thickness 250 microns min.		HC	P	W
(d)	Inspection of Coating	Dry film thickness (DFT) Holiday detection	Major	Visual & Elcometer	Each pipe at 5 spots* min	No Holiday		HC	P	W
			Major	Visual	100%			HC	P	W

10% witness by BHEL & DVC

TC - Test certificate
HC - History card / Register

** Brand Name as approved by BHEL & DVC. Ref page 2

*spots identification by BHEL.

10% witness by BHEL

1	Approved	3	Not required
2	Approved except as noted resubmission not required	4	Not Approved

Legends
M : MANUFACTURER / SUBCONTRACTOR.
B : BHEL/BHEL Authorized Inspection Agency
P : Perform.
W : Witness.
V : Verification.

PREPARED BY	REVIEWED & APPROVED BY	NAME & SIGNATURE
		G.PANNEER SELVAM

SHADAR VALLEY CORPORATION
Electricity Department
This approved is for general use only
and does not relieve the contractor of
responsibility for conformity to specifications
and fittings of parts

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 BHARAT HEAVY ELECTRICALS LIMITED. PIPING CENTRE CHENNAI - 17 QUALITY DEPARTMENT.			QUALITY PLAN FOR CW PIPING (STRAIGHT PIPES SIZE NB ≥ 1000 MM) PROJECT: BOKARO-TPS-"A" (1 X 500 MW) BHEL CUSTOMER Nos : 0666,7013					QP NO : 7013 : QPC : 01 REV. NO : 00 DATE : 18.08.2008 PAGE : 2 of 2		
SL No	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	M	B
3.0	Coating (External) - Over ground piping.									
(a)	Surface preparation of out side surface	Power tool cleaning / Rotary wire brush	Major	Visual	100%	Free from all dirt, oil, grease, rust, scale, weldslag, fluxdeposit, foreign matters etc		HC	P	V
(b)	Primer	Red oxide Zinc Phosphate primer to IS:12744	Major	Visual & Elcometer	100%	Minimum DFT: 50 microns		HC	P	V
(c)	Finish paint	Synthetic enamel IS2932 smoke grey shade No.692 As per IS: 5	Major	Visual & Elcometer Measurement	100%	Minimum DFT: 75 microns*		HC	P	W
4.0	Coating (External) - Buried Piping No painting required for Pipes buried (under ground) - as Coal Tar Tape wrapping shall be carried out at site. Surface shall be cleaned with wire brush / power tool									
5.0	Marking & Identification	Work order NO, Du No, Length, Makers Identification	Major	Visual	100%	Each pipe punched & stenciled As per P.O		HC	P	W

* Total DFT= Primer + Finish 125 microns min

APPROVED PAINT SUPPLIERS

(1) BERGER PAINTS

(2) SHALIMAR PAINTS

(3) ASIAN PAINTS

(4) JENSON & NICHOLSON

(5) CDC CARBOLINE.

1	Approved	3	Not required
2	Approved except as noted resubmission not required	4	Not Approved
V.C. Letter ref:			
TODAR VALLEY CORPORATION Electricity Department			
This approved for general management use and does not relieve the contractor of responsibility for conformity to specifications, correct details and fittings of parts.			

[Signature] 4/8/09