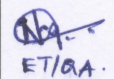
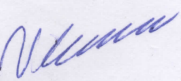
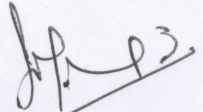
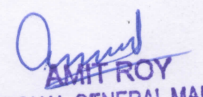
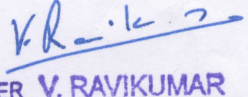
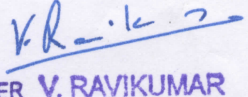


 Tiruchirappalli	QUALITY ASSURANCE	STANDARD QUALITY PLAN	QP NO. : SQP:NP: 02 REV.: 03 DATE : 02/02/2012 PAGE : 1 of 7
		METALLIC EXPANSION JOINTS	

SL. NO.	COMPONENT AND OPERATION	CHARECTERISTICS	Cl.	TYPE OF CHECK	Quantum of Check	REF.DOCUMENT/ ACCEPTANCE STD.	TYPE OF RECORD	Agency **				Remarks
								D	M	TPI	C	

1.0	MATERIAL * Plates, Sheets & Rolled Sections IS 2062 Gr. A & B IS 513 Type D IS 1079 ASTM A36 ASTM A588 Gr.A Corten , STEN 1	Chemical & Mechanical Properties		Review of documents	100%	As per Matl.Spec.	TC		QC			* The material used shall be as per Drg.
2.0	INPROCESS CONTROL#											# Refer QCP 002 for details
2.1	Marking, Cutting, Preparation & Fabrication	Shape, Size and EP		Measureme nt	100%	Drawings Note - 1 & 2	R		QC			
2.2	Welding	Procedure and Personnel Qlfn		Review of Documents/ Records	100%	SIP:NP:07	R		QC			

LEGEND: Cl: Class (A: critical, B: Major, C: Minor) ** TPI: Third Party Inspection, C: Customer. H: Hold Point, W: Witness, V: Verification of Test reports/certificates M: Performed by BHEL (For bought out items M: Performed by Vendor) QC: Quality Control. ND: NDT Lab, SH: Shops * D: Records for Data folders. R: Records	Prepared:  ET/AA	Reviewed:  QA BIKRAMADITYA ROY Deputy General Manager Quality Assurance Bharat Heavy Electricals Limited Trichy - 620 014.	 Engineering V. SRIDHARAN Additional General Manager Non - Pressure Parts/PE (FB) BHEL, TRICHY - 620 014.	 Outsourcing S. MOHANRAM Addl. General Manager Outsourcing BHEL, Tiruchy - 620 014,	 ADDITIONAL GENERAL MANAGER QUALITY CONTROL BHEL, TIRUCHI- 620 014.	 ADDITIONAL GENERAL MANAGER QUALITY ASSURANCE BHEL, TIRUCHI- 620 014.	Approved:  V. RAVIKUMAR ADDITIONAL GENERAL MANAGER QUALITY ASSURANCE BHEL, TIRUCHI- 620 014.
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 Tiruchirappalli	QUALITY ASSURANCE	STANDARD QUALITY PLAN	QP NO. : SQP:NP: 02 REV.: 03 DATE : 02/02/2012 PAGE : 2 of 7
		METALLIC EXPANSION JOINTS	

SL. NO.	COMPONENT AND OPERATION	CHARECTERISTICS	CI.	TYPE OF CHECK	Quantum of Check	REF.DOCUMENT/ ACCEPTANCE STD.	TYPE OF RECORD		Agency **			Remarks
								D	M	TPI	C	

2.3	Weld Inspection	Weld size,Quality Butt joints		Visual LPI	100%	SIP:NP:06 BHE:NDT:PB:PT1/	- R		QC QC				*For single side welds
		Leak test *		Kerosene leak test	100%	SIP:NP:05	R		QC				
3.0	Stress relieve	After Forming for A 588 Corton steel				Note 5	R		QC				
4.0	FINAL INSPECTION												
4.1	Assembly	Over all Dimensions Match marks		Measurement Trial assy.	100%	Drawings Note - 3	R		QC				
4.2	Dimensional Inspection	Length,Width Diagonal		Measurement	100%	Drawings Note - 4	R		QC				
4.3	Painting and Preservation	Paint finish coat thickness		Visual Measurement	-- Random	SIP:PP:22 Note - 6	- .		QC QC				
4.4	Identification And Packing	WO No., DU No. Match marks		Visual	--	Drawings Note - 6	-		QC				

RECORD OF REVISIONS

Rev. No.	Clause No.	Details of revision
00		This document consolidates all requirements of various previ
01		Latest applicable TDC Nos incorporated and totally revised.
02		SIP Nos updated Note-1 deleted. Materials listed in Note-1 included in Clause 1.0 Note-2 to Note-6 renumbered.
	3.1.1	Modified
	4.1.1(III)	Added. Existing Cl. 5.1.1 (III) & (IV) renumbered as 4.1.1 (IV) & (V) respectively
	4.1.1 (V)	Modified
03		S-TEN1- MATERIAL ADDED After forming, SR Cycle added for Round corner Expansion joints .

NOTE - 1 MARKING,CUTTING AND PREPARATION

1.1 PRODUCT DESCRIPTION:

- 1.1.1 The types of expansion joints used, generally with respect to sizes are Full size and Half size.
- 1.1.2 There are two profiles in each type namely Single bellow and Multiple bellows.
- 1.1.3 Corten steel material shall be identified by colour coding with green paint.
- 1.2 Sheets for bellows shall be marked and cut to size by shearing. Gas cutting of sheets shall be avoided.
- 1.2.1 The bend lines shall be marked and checked for correctness before pressing / bending.

1.3 SPLICING NORMS FOR SAW TOOTH EXPANSION JOINTS

- 1.3.1 The Longitudinal joints along the length of the bellow:
 - a. No joint is permitted for single bellow.
 - b. One joint is permitted for double or triple bellows and maximum two joints are permitted for four or more bellows.
- 1.3.2 Longitudinal joint shall be atleast 50mm away from the middle (tip) of any bends in the bellow.
- 1.3.3 Transverse joints across the bellows:
 - a. One cross joint may be permitted to make up the length of 1500 mm.

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b. Max. three joints may be permitted in any one despatchable length of expansion piece.

1.3.4 Longitudinal and transverse joints shall be so displaced that formation of plus (+) joint is avoided. The longitudinal joints on the profiles, which are joined by transverse weld, may be placed on opposite faces (refer sketch - 1)

1.4 SPLICING NORMS FOR ROUND CORNER EXPANSION JOINTS.

1.4.1 No joint is permitted in the corner pieces either in length or in width.

1.4.2 No joint is permitted to make up the bellow profile in straight length pieces.i.e. on the width side (longitudinal joint).

1.4.3 No joints are permitted for the lengths upto 2 M.

1.4.4 The length can be built up with max. of 3 joints.

NOTE:- 2 FABRICATION

2.1 Pressing of bellows shall be done with appropriate tooling, maintaining the different radius of bend. The profile at all areas shall be smooth.

2.2 For Saw tooth expansion joints, Squeezing and welding at corners shall be carried out carefully and there shall not be any appreciable gap between two squeezed profiles at corners. Filling up of gap with fillers or excessive weld metal shall be avoided as this will be detrimental to the performance of bellows.

2.3 All welds on bellow sheets shall be done with small diameter electrodes to avoid burning of sheets. Special care shall also be taken while welding corner pieces with straight pieces. Weld shall be free from defects to avoid leaks at site.

2.4 For round corner bellows, the forming is to be done in single pressing as per relevant drawing and inspected for correctness prior to BENDWRAP forming. The round corners must be formed in the BEND WRAP machine.

2.5 The straight portion may be manufactured in multi pressing maintaining the profile as per drg. However it is preferable to do single pressing to maintain uniform dimension and avoid mismatch.

2.6 The profile shall be checked by shop made template (GO / NO GO) Gauge.

NOTE - 3

3.0 TRIAL ASSEMBLY

3.1 The expansion joints shall be trial assembled at shop to ensure correct matching of expansion pieces during welding at site.

3.1.1 The mismatch for round corner to straight piece welding shall be limited to 2mm (max).

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- 3.2 Before dismantling the assembly necessary match marking shall be done on the walls during trial assembly. Match marks shall be hard punched before dismantling, stenciled and bordered with white paint.
- 3.3 Transport clamps shall be provided in all expansion joints after dismantling and before despatch.

NOTE - 4

4.0 DIMENSIONAL INSPECTION AND TOLERANCES:

- 4.1 All the assemblies shall be inspected as per drawing and shall be checked when the expansion bellow is without transport clamp.
- 4.1.1 The permitted tolerances shall not exceed the limits given below.
- i) Length/Width : 2mm/metre. limited to 5mm max.
 - ii) Pitch : ± 1 mm
 - iii) Bellow height : $+/- 3$ mm in free condition
 - iv) Profile of bellow shall be checked with shop made templates. (GO / -NO-GO).
 - v) The level difference shall be checked as per sketch-2 for straight portion of the bellow and sketch-3 for Round Corner Expansion Bellow.
- 4.2 The results of inspection shall be recorded in the Dimensional Report.

NOTE 5

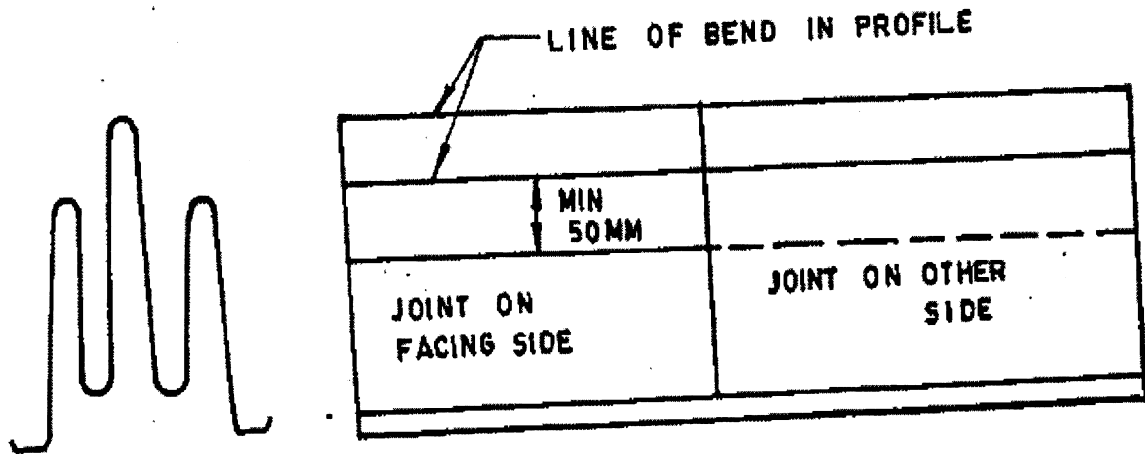
- 5.0 STRESS RELIEVE CYCLE FOR FULL SIZE ROUND CORNER EXPANSION JOINTS of 2.5mm thickness of grade 588 A Expansion Joints only.
- 5.1 Heat up to $720 \pm 10^\circ$ with soaking time of 60 minutes.
Rate of heating 90°C/hr and Rate of cooling 50°C/hr .
Cooling at 300°C in furnace.
Records and Charts to be provided.

NOTE - 6

6.0 SURFACE PREPARATION, PAINTING AND PACKING

- 6.1 Temporary cleats, bridge pieces shall be removed carefully so as to avoid damage to parent material. The completed assembly shall be thoroughly cleaned to remove oil, grease, weld slag, spatter, dust, rust etc.
- 6.2 All expansion pieces shall be packed in crates as per the packing drawing. Transport clamps and end covers shall be provided to avoid damage.

SKETCH.1



SKETCH_ 28-3