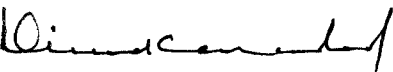
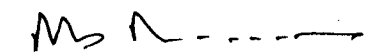
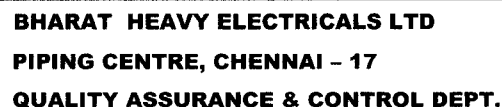
 BHARAT HEAVY ELECTRICALS LTD PIPING CENTRE, CHENNAI - 17 QUALITY ASSURANCE & CONTROL DEPT.				STANDARD QUALITY PLAN ITEM : PIPE CLAMPS MADE OF Gr91 MATERIAL (With BHEL Material)					QP No : QPG:76 Rev No : 03 Date : 04.10.2013			
S.No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY		REMARKS	
									M	B		
1	2	3	4	5		7	8	9	D*	** 10	11	
1.0	Material											
1.10	Plates & Rods : (SA387 Gr91 Class 2 & SA182 F91)	Co-relation & verification of Mill TCs for a) Chemical Composition. b) Mech. Properties c) Heat Treatment d) Hardness e) Soundness f) Dimension & Surface finish	Major	Verification	100%	BHEL drg & Material Spec		Mill TCs	√	P	V	TC - Test Certificate
1.11	Possitive Material Identification.	Chemical check	Major	Spectro/X-Ray fluorescence	100%	Material Specification.		Report	√	P	--	
1.20	Plates & Rods for attachments(SA515 Gr70, SA387 Gr22, etc..)	Co-relation with BHEL's material issue document.	Major	Verification	100%	BHEL Drawing, Material Spec.				P	V	
1.21	Possitive Material Identification for AS items.	Chemical check	Major	Spectro/X-Ray fluorescence	100%	Material Specification.		Report	√	P	--	
1.30	Fasteners (Nut, Bolt, Pin, Stud, Spacer ring etc...)	Co-relation with BHEL's material issue document.	Major	Verification	100%	BHEL Drawing.				P	V	
1.31	Possitive Material Identification for AS items.	Chemical check	Major	Spectro/X-Ray fluorescence	100%	Material Specification.		Report	√	P	--	
2.0	IN-PROCESS INSPECTION											
2.1	Material receiving inspection	Marking & transfer of identification	Major	Visual	100%	BHEL Drawing		HC		P	W	Note 1 HC - History card
2.2	Forming of clamps	Procedure for Hot Forming shall be submitted by Vendor for various types viz..Plate type (Main clamp plate and Pad Plates), Rod type, etc... for BHEL approval and forming shall be carried out as per approved procedure. First lot for each type of clamp shall be witnessed by BHEL.										
						LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER ; B: BHEL P: PERFORM W: WITNESS R: REVIEW AND V: VERIFICATION						
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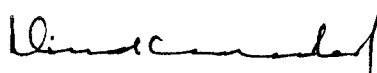
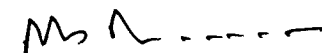
ITEM : PIPE CLAMPS MADE OF Gr91 MATERIAL

(With BHEL Material)

OP No : QPG:76

Rev No : 03

Date : 04.10.2013

S.No	COMPONENT & OPERATIONS	CHARACTRISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS		AGENCY		REMARKS
										M	B	
1	2	3	4	5		7	8	9	D*	**	10	11
2.2.1	Heat Treatment	ROH., ROC, Soaking temp & Soaking time	Major	Review of HT Chart / Log	100%	Refer Note 2		HT Chart	√	P	W*/V	W*: Witness for First of Trail (FOT).
2.2.2	Hardness	Hardness	Major	Measurement	100%	190-250 BHN		Report	√	P	W*/V	
2.2.3	Dimensions	Dimensions	Major	Measurement & Visual	100%	BHEL Drawing		HC	√	P	W*/V	
2.2.4	Bend area	a) Surface quality	Major	Wet MPI	100%	ASME Sec V / ASME B31.1 cl.136.4.3		Report	√	P	W	
		b) Micro Structure	Minor	Insitu Micro	##	No micro fissures, Tempered Martensite structure		Report@@	√	P	V	
2.3 Attachment Welding												
2.3.1	Welding / Welder Qualification	Procedure & Performance Qualification details	Major	Verfication	100%	ASME Sec. IX		WPS , PQR	√	P	V	WPS, PQR shall be approved by BHEL
2.3.2	NDE on EP For Gr91	Discontinuities	Major	LPI/MPI	100%	ASME Sec V / ASME B31.1 cl.136.4.4 / ASME B31.1 cl.136.4.3		Report	√	P	W*/V	
2.3.3	Weld Inspection	Weld profile, Size & Surface quality	Major	Measurement & Visual	100%	BHEL Drawing		HC	√	P	V	
2.3.4	Post Weld Heat Treatment	ROH., ROC, Soaking temp & Soaking time	Critical	Review of HT charts	100%	Refer Note 6		HT chart	√	P	W*/R	
2.3.5	Hardness on Weld	Hardness	Critical	Measurement	100%	245 BHN max for Gr22 & 300 BHN max for Gr91		Report	√	P	W	
2.3.6	NDE after PWHT for Fillet Welds	Soundness	Critical	Wet MPI	100%	ASME Sec V / ASME B31.1 cl.136.4.3		Report	√	P	W	
			LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALLBE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.									
PREPARED BY VIVEKANANDA YELLU SR.ENGR / QA			** M: MANUFACTURER ; B: BHEL P: PERFORM W: WITNESS R: REVIEW AND V: VERIFICATION					APPROVED BY M.S.MURALIDHARAN MGR / QA				
SIGNATURE		PAGE 02 OF 04										



BHARAT HEAVY ELECTRICALS LTD
PIPING CENTRE, CHENNAI - 17
QUALITY ASSURANCE & CONTROL DEPT.

STANDARD QUALITY PLAN

ITEM : PIPE CLAMPS MADE OF Gr91 MATERIAL
(With BHEL Material)

QP No : QPG:76

Rev No : 03

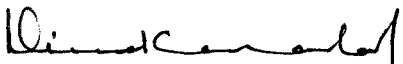

Date : 04.10.2013

S.No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	D*	AGENCY		REMARKS
										M	B	
1	2	3	4	5		7	8	9		**	10	11
3.0	FINAL INSPECTION											
3.1	Dimensional Inspection	Overall Dimensions	Major	Measurement	100%	As per BHEL Drawing. Also refer Note 7 for Tolerance.		Report	√	P	W	IR - Inspection Report
3.2	Possitive Material Identification for all AS components.	Chemical check	Major	Spectro/X-Ray fluorescence	100%	As per Required Material (ASME) Specn.		Report	√	P	W	
3.3	Identification & Painting	Identification, Appearance & DFT.	Major	Visual & Measurement	100%	Painting as per Note 9 & Marking as per Note 10		IR	√	P	W	
3.4	Packing & Protection	Protection	Major	Visual	100%	BHEL Drawing & PO. Also refer Note 11		IR	√	P	V	
4.00	DOCUMENTATION	Verification of Records	Major	Compilation of Records.	100%	As per QPG 76		RM TC, Reports(NDE, Hardness, PMI), HT Charts, IR	√	P	V	

NOTES:

- Seal tranfer on pieces to be cut shall be done by BHEL inspector.
- POST FORMING HEAT TREATMENT For SA387 Gr91** : Normalise at 1040 - 1060 deg.C (minimum soaking time 30 min / inch)& Temper at 750-770 deg.C (minimum soaking time 60 min / inch)
For Gr91, normalizing and tempering shall be carried out within 72 hours after completion of forming.
The clamps shall be kept dry and stress free. The temperature shall be brought down to room temperature after hot forming before normalizing and also after normalizing before tempering.
Tempering shall not be clubbed with PWHT. Normalising and tempering of Gr91 shall be done encompassing the entire component.
a) **The rate of heating & cooling shall be as below.**

Thickness of Material	Max. rate of heating & cooling above 300deg.C
Upto 25mm	220° C/Hr
Over 25-50mm	110° C/Hr
Over50-75mm	75° C/Hr
Over 75mm	55° C/Hr

 PREPARED BY VIVEKANANDA YELLU SR.ENGR / QA SIGNATURE	LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER ; B: BHEL P: PERFORM W: WITNESS R: REVIEW AND V: VERIFICATION	 APPROVED BY M.S.MURALIDHARAN MGR / QA



BHARAT HEAVY ELECTRICALS LTD
PIPING CENTRE, CHENNAI - 17
QUALITY ASSURANCE & CONTROL DEPT.

STANDARD QUALITY PLAN

ITEM : PIPE CLAMPS MADE OF Gr91 MATERIAL
(With BHEL Material)

QP No : QPG:76
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									M	B	
1	2	3	4	5		7	8	9	D*	** 10	11



- 3) The product shall be manufactured as per BHEL drawing .
4) Welding Electrodes and Paints used shall be of BHEL approved make
5) All items shall be inspected and cleared by BHEL/BHEL approved inspecting agencies & Customer (If applicable)

6) **Preheat, Post heat and Post weld heat treatment (PWHT) temperatures (Deg. C) for Gr91 welds**

Base Material	Thickness	Attachment material	Preheat	Post Heat	PWHT	Soaking Time
SA387 Gr91	All	P5A group (Gr22 material)	220 \$\$	280 for 2 Hrs	730-770	1 hour per Inch (min. 1 hour)
		SA387 Gr91	220 \$\$	280 for 2 Hrs	750-770 \$\$	1 hour per Inch (min. 2 hours for Gr91)

\$\$: Pre heat shall be maintained for SA387 Gr91 till welding is completed. After Post heating, Gr91 weldments shall be brought to a temperature of 80-100 deg.C and kept for minnum one hour.
The PWHT shall commence immediately thereafter. Rate of heating & cooling shall be as per Para 2 (a) above.

- 7) Dimensional tolerances shall be as per drawing / P.O. when not specified in drawing / P.O. the tolerances shall be as below:
a) Radius of curvature. : - 1mm + 1mm
b) Distance between both hole centers : - 0mm + 2 mm
c) Over all length : - 0 mm + 2 mm
d) Axis variation of holes : - 0 mm + 1mm
e) Slot width : - 0 mm + 1mm
- 8) Cutting of Gr91 plates & rods shall be done by any one of the following method.
a) Band saw cutting followed by machining (Grinding not allowed).
b) Water jet cutting followed by machining (Grinding not allowed).
- 9) All Clamps shall be Painted as below when not specified in the P.O./Drawing:-
Two coats of 20 microns each of Heat Resistance Aluminium Paint to IS 13183 Gr I, after surface preparation by power tool cleaning (SSPC-SP3).
- 10) The finished components shall be punched with DU code (16 digit work order du details), Heat number, material specification, maker's emblem and Inspectors seal.
In addition, the DU code, Heat no. and Material specification shall also be paint stencilled.
- 11) Threaded portions of the fasteners shall be applied with rust preventive oil to avoid rusting. The total clamp assembly shall be well packed to avoid transit & other damages.

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SIGNATURE	PAGE 04 OF 04			