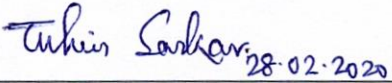
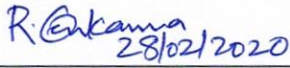
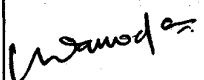
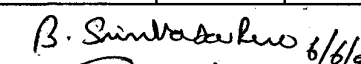
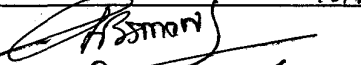
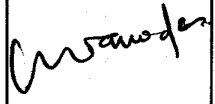
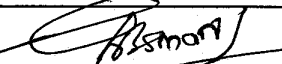
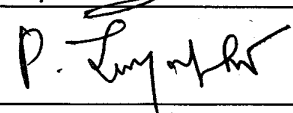
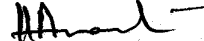


		BHEL, Ranipet - 632 406, India. Quality Assurance Department	
Amendment to Quality Work Instruction (QWI)			
QWI Type: SQP		QWI Title: Sheet / Plate formed Components, Shells, Panels & Funnel Assy / Splitters, Hopper Walls, GD Housing Panels	
QWI No: SQP:ESP:284		QWI Rev No: 01	QWI Rev Date: 06/06/2007
Previous Latest Amendment No: ---		Previous Latest Amendment Date: ---	
Current Amendment No: A1		Effective Date: 28/02/2020	Page: 1 of 1

Clause No (s)	Description of Amendment	Basis for Amendment
2.5.1	Column 6 (Reference Document) & 7 (Acceptance Norms) to be read as: SIP:NP:06 (Visual Inspection) and BHE-NDT-RP-PT-01 (for LPI)	Feedback from OS and IVP Goindwal.
2.5.2	1. Column 4 (Type of Check): To be read as Visual & LPI. 2. Column 6 (Reference Document) & 7 (Acceptance Norms) to be read as: SIP:NP:06 (Visual Inspection) and BHE-NDT-RP-PT-01 (for LPI)	Feedback from OS and IVP Goindwal.

Prepared By	Reviewed & Approved By
 28.02.2020	 28/02/2020
Tuhin Kumar Sarkar AE1 / QA	Venkanna Rupani DM / QA

 Ranipet		MANUFACTURER'S NAME & ADDRESS		STANDARD QUALITY PLAN			QP NO		SQP: ESP: 284	
		BHARAT HEAVY ELECTRICALS LTD BOILER AUXILIARIES PLANT RANIPET-632 406 (INDIA)		ITEM: ESP Sub system: Sheet/Plate formed Components Shells, Panels & Funnel Assy/Splitters, Hopper walls, GD housing Panels.			REV NO		01	
							DATE		06 06 07	
							PAGE NO		01 of 09	
SI No	Component & operation	Characteristics	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format Of Records	Agency M B		Remarks
1	2	3	4	5	6	7	8	9	10	
1.0	Raw Material									
1.1	Sheets & Plates Rolled section, hollows, Tubes	Chemistry & Mechanical Properties	Chemical & tensile test	As per TDC		Respective TDC	TC	P	V	
2.0	In process control									
2.1	Flame cutting	Lamination and cracks	Visual	100%		As per AWS D1.1	R	P	V	
2.2	Joint 'V' Fit up for plates /Back gouging	Fitup Characteristics "V" Root gap, Land /weld soundness	-DO-	100%		AWS D1.1, Drawing and QCP E002 latest	R	P	V	
2.3	Welding	1) Procedure Qualification 2) Personal Qualification	Review of documents	100%		Prequalified welding procedure As per AWS D1.1	R	P	W	
			-DO-	-DO-		AWS D1.1	R	P	W	
LEGENDS:0 M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of Reports W -Witness, TC - Test certificate, DR - Dimensional report,			 PREPARED BY	 REVIEWED BY	QA QC-OLI ENGG	 6/6/07  	 APPROVED BY			

		MANUFACTURER'S NAME & ADDRESS		STANDARD QUALITY PLAN			QP NO :		SQP : ESP : 284	
		BHARAT HEAVY ELECTRICALS LTD BOILER AUXILIARIES PLANT RANIPET-632 406 (INDIA)		ITEM: ESP Sub system: Sheet/Plate formed Components Shells, Panels & Funnel Assy/Splitters, Hopper walls, GD housing Panels.			REV NO:		01	
							DATE		06 06 07	
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Sl No 1	Component & operation 2	Characteristics 3	Type of Check 4	Quantum of Check 5	Reference Documents 6	Acceptance Norms 7	Format Of Records 8	Agency M B 9		Remarks 10
2.4	Weld insp									
2.4.1	Size and finish		VISUAL	-DO-	DRAWING AND SIP; NP;06		R	P	V	REMARKS*: 1) Weld fitup 2) On all Primary stiffeners 100% LPI. On back gouged area 100% LPI. 3) 20% Random LPI on other joints @; In case of defects % shall be increased.
2.5	Weld NDE									
2.5.1	But welds on soundness Structural joints	SOUNDESS	Visual & LPI	See Remarks*	ASW D 1.1		R	P	V	
2.5.2	Fillet weld in structural	-DO-	LPI	10% Random @	-DO-		R	P	V	
3.0	Dimensional control						R	P	V	
3.1	Hopper walls	Length, width and diagonal straightness waviness, stiffener location and orientation	Measurement and visual	100%	Drawing		R	P	W	
LEGENDS: M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of Reports W -Witness, TC - Test certificate, DR - Dimensional report,			 PREPARED BY	 REVIEWED BY	QA  QC-OLI  ENGG 	 APPROVED BY				



MANUFACTURER'S NAME & ADDRESS

BHARAT HEAVY ELECTRICALS LTD
BOILER AUXILIARIES PLANT
RANIPET-632 406 (INDIA)

STANDARD QUALITY PLAN

ITEM: **ESP**
Sub system: Sheet/Plate formed Components Shells,
Panels & Funnel Assy/Splitters, Hopper walls, GD
housing Panels.

QP NO :

REV NO:

DATE

PAGE NO

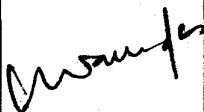
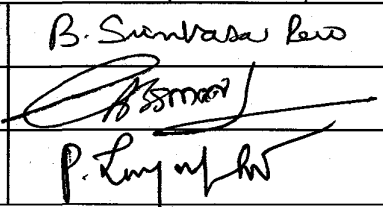
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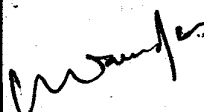
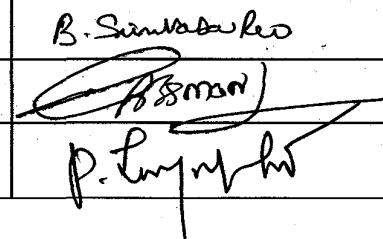
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06 06 07

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SI No	Component & operation	Characteristics	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format Of Records	Agency		Remarks
								M	B	
1	2	3	4	5	6	7	8	9		10
3.2	Roof panels	Position of support insulator, holes, length width, diagonals & straightness, waviness, stiffener location & orientation.	Measurement & visual	DO	DO		R	P	W	
3.3	Casing Shells	Length, width diagonal, straightness, waveness, stiffener location & orientation	DO	100%	DRAWING		R	P	W	
3.4	Top Panels	Length, width diagonal, straightness, waviness, stiffener location and orientation, hole size & location.	DO	100%	DRAWING		R	P	W	
LEGENDS: M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of Reports W Witness, TC - Test certificate, DR - Dimensional report,			PREPARED BY	REVIEWED BY		QA	B. Sambasa Rao		H. Anant	
						QC-OLI	P. Srinivas			
						ENGG	P. Srinivas		APPROVED BY	

		MANUFACTURER'S NAME & ADDRESS		STANDARD QUALITY PLAN			QP NO :		SQP : ESP : 284	
							REV NO:		01	
		BHARAT HEAVY ELECTRICALS LTD BOILER AUXILIARIES PLANT RANIPET-632 406 (INDIA)		ITEM: ESP Sub system: Sheet/Plate formed Components Shells, Panels & Funnel Assy/Splitters, Hopper walls, GD housing Panels.			DATE		06 06 07	
							PAGE NO		04 of 09	
SI No 1	Component & operation 2	Characteristics 3.	Type of Check 4	Quantum of Check 5	Reference Documents 6	Acceptance Norms 7	Format Of Records 8	Agency M B 9		Remarks 10
3.5	Dimensional control contd...									
3.6	Vertical/horizontal splitters; shape	Slope, height location of flat with tacks	Measurement in layout	100%	Drawing		R	P	W	
3.6	Trial assy of hopper lower with heating chamber	Weld gap, overall dimn gap between hopper and heating chamber, matching of poke tube holes.	Measurement and visual	1(one) assy	DO		R	P	W	
3.7	Funnel assy									
3.7.1	Floor assy center line offset if any	Overall dimn length, width diagonal, taper, profile matching holes location ref	Visual measurement template for profile Match marking	100%	Drawing		R	P	W	
LEGENDS: M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of Reports W -Witness, TC - Test certificate, DR - Dimensional report,			 PREPARED BY	 REVIEWED BY	QA QC-OLI ENGG	 APPROVED BY				

 Ranipet		MANUFACTURER'S NAME & ADDRESS		STANDARD QUALITY PLAN			QP NO :		SQP : ESP: 284	
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SI No 1	Component & operation 2	Characteristics 3	Type of Check 4	Quantum of Check 5	Reference Documents 6	Acceptance Norms 7	Format Of Records 8	Agency M B 9		Remarks 10
3.7.2	As a funnel assy flange dimns, level	Over all dimns. bottom/top openings height, diagonals of funnel, and orientation and alignment of corner end plates, verticality.	Visual measurement	100%		DO	R	P	W	
4.0	Final insp: Surface cleaning, painting & preservation, marking	Welding, finish and appearance.	Visual	100%		Drawing, panting schedule PRQA 590(Latest)	R	P	W	
LEGENDS: M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of Reports W -Witness, TC - Test certificate, DR - Dimensional report,			 PREPARED BY	 REVIEWED BY	QA QC-OLI ENGG	 APPROVED BY				

1.0 Note 1.0 GENERAL REQUIREMENT

- 1.1 Any additional requirement for a specific contract shall be referred separately.
- 1.2 Raw materials used shall confirm to the grades specified in the drawing &GMS.
- 1.3 Raw material shall be free from harmful visual defects like cracks, seams, laps, lamination, heavy pitting etc.
- 1.4 Fabricators shall check all the supplied raw materials for dimensions ,bend, camber etc. Straightening wherever necessary must be carried out before assy and welding.
- 1.5 Substitution of materials shall be done with the prior approval of EDC/AQCS.
- 1.6 Plates for flange shall be preferably machine gas cut. Cut edges shall be dressed smooth to remove all the undulations. Gas cut notches if any shall be filled up and dressed. The edges shall be straight and square.

Note: 2.0 INPROCESS CONTROL

- 2.1 The general requirements for process control during fabrication in QCP;002[Latest] read along with amendment 1.

Note:3.0 MARKING, CUTTING AND PREPARATION

- 3.1 Bottom level hopper lower part shall be flat and square and the same shall be assured during assembly.

Note: 4.0 WELDING REQUIREMENT & WELD INSPECTION

- 4.1 Splice joints shall be completed prior to the welding of cover plate.
- 4.2 Sequences of welding shall be so chosen as to minimize the distortion.
- 4.3 NDT as required shall be carried out on splice joints before cover plate welding.
 - 4.3.1 Visual inspection; after fabrication is completed, all welds shall be visually examined for arc strikes, sharp nicks, undercuts and size
- 4.4 Arc strike shall not be done straight on the job. Welder shall have a Separate piece for striking the arc
- 4.5 Welding procedure specification and welders qualification are detailed in SIP; NP;07[latest].
- 4.6 Butt welds in plate to make up the length shall be done carefully with suitable edge preparation. The stiffener angles & channels are to be welded to the casing shell only after completing all the splice joints and correcting weld distortions.
- 4.7 Splice joints if required, shall be in line with the following clauses.

- 4.8 Plates of 6 mm can be jointed using one of the following two alternatives;
- a) Single v preparation of 60-70 degree with 1-2 mm land and 2-3 mm gap Welding shall be done on the v side. Subsequently, the plates to be turned and backside cleaned by wire brush. Then 2nd side welding to be done. If this method of welding is adopted the inspectors hold point shall be joint fit up stage.
 - b) The plates can be jointed by keeping straight butt faces with a gap of 2-3 mm. Welding to be done from the first side. Subsequently, the back side to be fully gouged/ground and then welded. In this type, the inspectors hold Point shall be the stage after back gouging. The back gouging shall be checked visually.
- 4.9 5mm plates shall be joined by straight butt keeping a gap of 2-3mm. Inspectors may have surveillance on joint fit-up but no hold point is required.
- 4.10 In case of stiffener of small sections, used in casing shell, weld preparation may be single "v". Inspectors shall check the back gouging/grinding after first side welding.
- 4.11 Weld the "v" from the reversed side by a min of two layers.
- 4.12 The min strip to be used for weld joint shall be 500mm.
- 4.13 The distance between the nearest stiffener and the splice joint parallel to it shall be min. 50mm.

NUMBER OF JOINTS

<u>CASING SHELL AREA</u> IN .M. sq		<u>MAX.NO OF VERTICAL JOINTS</u>
Less than 4		-NIL-
Above	4 to 8	2
Above	8 to 12	3
Above	12 to 16	4
Above	16 to 20	5
Above	20 to 24	6
Above	24 to 30	8
Above	30	10

- 4.14 Wherever the horizontal joints are not in full length then those joints may be counted along with other vertical joints and the same may be allowed as follows.

<u>CASING SHELL AREA</u> in M sq	<u>MAX. NO. OF JOINTS</u>
Less than 2	-NIL-
Above 2-5	3
Above 5-10	5
Above 10-15	6
Above 15-20	8
Above 20-25	10
Above 25- 30	12
Above 30-32	14
Above 32	16

4.15 The joints shall be uniformly distributed throughout the casing shall be inline with above table.

Note: 5.0 FABRICATION TOLERANCES

Following tolerances shall be applicable on different dimensions of casing shells, roof panels, hopper walls.

- 5.1 Surface of finished casing shell /Hopper wall shall be flat. The manufactures shall take extra care while carrying out the welding and handling/turning the casing shell/hopper wall to avoid out of flatness or waviness. Maximum out of flatness or waviness, as checked by piano wire or straight edge shall not be more than 15mm(i. e. $\pm 7.5\text{mm}$).
- 5.2 Variation in liner dimensions shall not exceed plus or minus 1mm/Metere of nominal dimensions limited to
- a) Length 5mm
 - b) With 3mm
 - c) Diagonal difference 7mm (Max)
 - d) Out of straightness of the sides 3mm.
 - e) Out of squareness of flanges shall not exceed 2mm.
- 5.3 Hole size and pitch on the flange shall be strictly as per drawing. Hole size Variation shall be limited to +2mm variation in distance between hole centers shall not vary more than $\pm 2\text{mm}$.
- 5.3.1 Stiffener placement shall be with in $\pm 5\text{mm}$.
- 5.3.2 The disposition of dia 500mm hole with respect to the longitudinal center line of the panel shall be with in $\pm 3\text{mm}$.
- 5.3.3 Distance between the rectangular hole (for lifting tool) center of dia 400mm opening is $\pm 1.5\text{mm}$.
- 5.3.4 Diagonal difference of dia 400mm opening in middle roof panel (with two sets of Opening). 3mm max.

Note: 5.3.5 FABRICATION & DIMENSIONAL TOLERANCE OF SIDE PANELS AND MIDDLE PANNEL

5.3.5.1 FABRICTION

- 5.3.5.2 Butt welds in plate to make up the length shall be done carefully. All weld distortions shall be corrected before other stiffeners and Sections are welded to the plates.

5.3.5.3 TOLERANCE

- a) Length $\pm 3\text{mm}$
- b) Width $\pm 2\text{mm}$
- c) Distance between guide pin $\pm 2\text{mm}$
- d) Diagonal difference $5\text{mm}(\text{Max})$
- e) Bottom panel walls – position of hole for collecting rapping shall be maintained with in $\pm 3\text{mm}$ from the bottom edge and the side of the panel. Similarly the position of cut-out for emitting rapping drive shall be with $\pm 3\text{mm}$ with respect to top and side of the panel.

Note; DIMENSIONAL TOLERANCE OF FUNNEL ASSY

- 5.3.5.4 Variation in liner dimensions of the funnel wall shall not exceed $\pm 1\text{mm}/\text{meter}$ of nominal dimensions limited to a maximum of 5mm .
- 5.3.5.5 Difference between diagonals shall not exceed $1\text{mm}/\text{metre}$ of approximate nominal diagonals length limited to max.of 7mm .
- 5.3.5.6 Out of squareness of flanges shall not exceed 1mm .
- 5.3.5.7 The level of the flanges is to be ensured by water level. The deviations Permitted is 2mm max.
- 5.3.5.8 The local out flatness allowed in individual panels is 5mm max. Flange holes, pitches of flange holes with in $\pm 1\text{mm}$.

Note: 6.0 Marking*

- 6.1 The following details shall be stenciled with white paint and the stenciled details covered with one coat of transparent varnish at the center of casing shell.
 - . Sub-Contractor code
 - . Work Order Number.
 - . DU Number.
 - . Weight
 - . Project
- 6.2 In addition of above stenciling , following details shall also be welded /punched and bordered in white paint.
 - . Sub-Contractor code
 - . Work Order Number.
 - . DU Number.
