

		STANDARD MANUFACTURING QUALITY PLAN						MQP. NO.: PESD/QA/MP/042					
								REV NO: 00		DATE: 16/04/19			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: KNOCK OUT DRUM (PRESSURE VESSEL)			PAGE 1 OF 6					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
1.0 RAW MATERIALS & BOUGHT OUT ITEMS													
1.1	Plates	Chemical & Mech. Properties, Heat Treatment and UT (SA435) for plates thickness > 16 mm, Impact test	Major	OEM certificate review	100%	Approved drawing/datasheet/specifications		MTC	✓	2	2	1&3	Note: 6, 7 & 8
1.2	Structural Steels	Chemical & Mech. Properties	Major	OEM certificate review	100%			MTC	✓	2	2	1&3	
1.3	Pipes	Chemical & Mech. Properties, Hydro Test/NDE, Impact test	Major	OEM certificate review	100%			MTC	✓	2	2	1&3	
1.4	Flanges and counter-flanges	Chemical & Mech. Properties, Ratings, Dimensions	Major	OEM certificate review	100%			MTC	✓	2	2	1&3	
1.5	Fittings	Chemical & Mech. Properties, Hydro Test/NDE, Dimensions	Major	OEM certificate review	100%			MTC	✓	2	2	1&3	
1.6	Gaskets	Chemical & Mech. Properties, Dimensions	Major	OEM certificate review	100%			MTC	✓	2	2	1&3	
1.7	Fasteners	Chemical & Mech. Properties, Hardness, Dimensions	Major	OEM certificate review	100%			MTC	✓	2	2	1&3	Note: 12
1.8	Electrodes	Chemical & Mech. Properties	Major	OEM certificate review	100%			Batch Certificate	✓	2	2	1&3	
1.9	Paints	Paint properties	Major	OEM certificate review	100%			Batch Certificate	✓	2	2	1&3	
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1.10	Instruments*	Material Calibration/tests and WP/EP as per datasheet	Major	OEM certificate review	100%	Approved drawing/datasheet/specifications		MTC & calibration Report	✓	2	2	1&3	*As Applicable
1.11	Valves	Chemical & Mech. Properties, Hydro Test/NDE	Major	OEM certificate review	100%			MTC	✓	2	2	1&3	
1.12	Dish Ends	Chemical & Mech. Properties, HT Chart, NDE	Major	OEM certificate review	100%			MTC	✓	2	2	1&3	
2.0 INPROCESS INSPECTION													
2.1	Welding	Procedure, Welder Qualifications	Major	Review	100%	ASME Section IX		WPS/PQR/ WPQ	✓	2	2	1&3	
2.2	Shell Fabrication	Identification of Material & transfer of attestation marks	Critical	Visual	100%	Approved drawing/datasheet/specifications		IR	✓	2	2	1&3	
2.2.1		Dimensional conformity of shell after rolling	Major	Measure ment	100%	Approved drawing	ASME Sec.VIII, Div- I	IR		2	2	1&3	
2.2.2		Fit Up of shell Longitudinal seam	Critical	Measure ment	100%	Approved drawing	ASME Sec.VIII, Div- I, UW 33	IR		2	2	1&3	
2.2.3		PT after back chip of L seam weld	Critical	NDE	100%	ASME Section V, Article 6	ASME Section VIII, Appx. 8	IR	✓	2	2	1&3	
2.2.4		RT of above L seam weld	Critical	NDE	Approved drawing	ASME Section V, Article 2	ASME Sec.VIII, Div- I, UW 51	IR	✓	2	2	1&3	RT Film review
2.2.5		Dimensional Exam. of shell including ovality	Major	Measure ment	100%	Approved drawing & ASME Sec.VIII, Div- I, UG 80		IR	✓	2	1&3		
2.2.6		PT of final weld (L seam weld)	Critical	NDE	100%	ASME Section V, Article 6	ASME Section VIII, Appx. 8	IR	✓	2	1&3		
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2.3	Shell with Nozzle Fabrication	Identification of material & transfer of attestation for Nozzle pipe, flange, fittings, pads, lugs etc.	Major	Visual	100%	Approved drawing/datasheet/specifications		IR	✓	2	2	1&3	
2.3.1		RT of Nozzle seam weld (if fabricated from Plate)	Critical	NDE	100%	ASME Section V, Article 2	ASME Sec.VIII, Div- I, UW 51	IR	✓	2	2	1&3	RT Film review
2.3.2		Fit up of Nozzles (pipes, flanges & fittings) to shell before welding	Critical	Measure ment	100%	Approved drawing	ASME Sec.VIII, Div- I, UW 33	IR	✓	2	1&3		
2.3.3		Nozzle Orientations	Major	Measure ment	100%	Approved drawing		IR	✓	2	1&3		
2.3.4		MPI/PT exam. of Nozzle welds (root weld)	Critical	NDE	100%	ASME Section V, Article 7/6	ASME Section VIII, Appx. 6/8	IR	✓	2	1&3		
2.3.5		PT after back chip of weld	Critical	NDE	100%	ASME Section V, Article 6	ASME Section VIII, Appx. 8	IR	✓	2	1&3		
2.3.6		MPI/PT exam. of Nozzle welds (Final Weld)	Critical	NDE	100%	ASME Section V, Article 7/6	ASME Section VIII, Appx. 6/8	IR	✓	2	2	1&3	
2.3.7		Dimensional examination of fabricated shell	Major	Measure ment	100%	Approved drawing	ASME Sec.VIII, Div- I	IR	✓	2	2	1&3	
2.4	Dished Ends	Profile Check, Thinning, Ovality and Stress Relieving (SR in case of cold formed dish ends)	Major	Measure ment & NDE	100%	Approved drawing & ASME Section V, Article 7/6	ASME Sec.VIII, Div- I, Appx. 6/8	IR & HT Chart	✓	2	1&3		MPI/PT on outer surface after forming

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2.4.1		RT of seam weld of Dish Ends (if applicable)	Critical	NDE	100%	ASME Section V, Article 2	ASME Sec.VIII, Div- I, UW 51	IR	✓	2	2	1&3	RT Film review
2.4.2		Fit up of nozzles, couplings, Lugs to Dish Ends before welding	Critical	Measure ment	100%	Approved drawing		IR	✓	2	1&3		
2.4.3		Nozzle Orientations	Major	Measure ment	100%	Approved drawing		IR	✓	2	1&3		
2.4.4		MPI/PT exam. of Nozzle welds (root weld)	Critical	NDE	100%	ASME Section V, Article 7/6	ASME Section VIII, Appx. 6/8	IR	✓	2	1&3		
2.4.5		PT after back chip of weld	Critical	NDE	100%	ASME Section V, Article 6	ASME Section VIII, Appx. 8	IR	✓	2	1&3		
2.4.6		MPI/PT exam. of Nozzle welds (Final Weld)	Critical	NDE	100%	ASME Section V, Article 7/6	ASME Section VIII, Appx. 6/8	IR	✓	2	2	1&3	
2.4.7		Dimensional examination of fabricated Dished Ends	Major	Measure ment	100%	Approved drawing	ASME Sec.VIII, Div- I	IR	✓	2	2	1&3	
2.5	Final Assembly	Fit up of Dished Ends to Shell (Test coupon shall be made available with the job)saddles & support Pads to shell	Critical	Measure ment	100%	Approved drawing	ASME Sec.VIII, Div- I, UW 33	IR	✓	2	1&3		
2.5.1		PT after back chip of welds	Critical	NDE	100%	ASME Section V, Article 6	ASME Section VIII, Appx. 8	IR	✓	2	1&3		
2.5.2		PT of completed weldments (Outside)	Critical	NDE	100%	ASME Section V, Article 6	ASME Section VIII, Appx. 8	IR	✓	2	1&3		
2.5.3		RT of Circumferential seam welds	Critical	NDE	Approved drawing	ASME Section V, Article 2	ASME Sec.VIII, Div- I, UW 51	IR	✓	2	2	1&3	RT Film review
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3.0 FINAL INSPECTION & TESTING													
3.1	Complete vessel assly.	Plates, Pipes and fittings thickness	Major	Measure ment	100%	Approved drawing/specifi cations	ASME Sec.VIII, Div- I	Thickness report	✓	2	1&3	-	
3.2		Dimensional Examination	Major	Measure ment	100%			IR	✓	2	1&3	-	
3.3		R.F. Pads by Pneumatic Test	Critical	Visual	100%	Approved drawing /datasheet/specifications ASME Sec.VIII, Div- I, UG 100		Test Report	✓	2	1&3	-	Soap Sol. Test
3.4		Hydrostatic Test for Complete Vessel	Critical	Visual	100%	Approved drawing /datasheet/specifications / ASME Sec.VIII, Div- I, UG 99		Test Report	✓	2	1&3	-	
3.5		PMI*	Major	Visual	Random	Approved Drawing /Datasheet/Specifications		IR	✓	2	1&3	-	*for SS and AS components
4.0 PRESERVATION & PACKING													
3.6	Complete vessel assly.	Surface Preparation (Blast Cleaning)	Major	Visual & Match Card	100%	Approved Drawing /Datasheet/Specifications		Log Book	✓	2	2	1&3	SA 2.5 Copper Grit
3.7		Painting of Surface (Shade, DFT) , Markings	Major	Visual & measure ment	100%			IR	✓	2	1&3		
4.1		Preservation (N2 Gas fill)	Major	Visual & TC review	100%			IR & TC	✓	2	2	1&3	N2 Gas TC review
4.2		Packing*	Major	Visual	100%			Packing list	✓	2	2	1&3	*Sea worthy Packing for Export Orders

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5.0	SPARES												
5.1	Items as per list	Chemical & Mech. Properties, Hardness, Dimensions, Quantity	Major	Visual & TC review	100%	Approved drawing/datasheet/specifications	MTC/IR& Packing List	✓	2	1&3			

Abbreviations:-

MTC	–	Material Test certificate	WPS	–	Welding Procedure Specification	PQR	–	Procedure Qualification Record
WPQ	–	Welder Performance Qualification	DFT	–	Dry Film Thickness	TC	–	Test Certificate
NDE	–	Non Destructive Examination	PMI	–	Positive Material Identification	TPIA	–	Third Party Inspection Agency
IR	–	Inspection Report						

NOTE:

1. This standard MQP should be read along with specification (latest revision), approved drawings & approved data sheet.
2. Specification/drawing/data sheet shall prevail over quality plan for contradiction if any between Quality plan and drawing/specification.
3. All test certificates/reports reviewed and certified by TPI/BHEL shall be submitted to BHEL as documentation package.
4. Any project/customer specific requirements, which shall be notified, have to be fulfilled by the vendor at the time of execution of order.
5. Welding shall be done as per WPS and Drawing requirement, full penetration shall be ensured for all nozzle welds.
6. Plates used shall conform to latest issue of SA-20 with additional requirements mentioned herein.
7. One product analysis of each heat shall be carried out and reported. Chemical analysis shall be as per applicable specification with carbon content not exceeding 0.23% and Carbon Equivalent (Ce) shall not exceed 0.43.
8. Charpy V-notch impact testing as per S-5 of spec. SA-20 to be carried out at design temperature.
9. All root runs / Single pass welds shall be carried out by TIG Welding.
10. Vessels shall be post weld-heat treated as a complete unit and no welding shall be permitted once post weld heat treatment is performed.
11. All 'T' – joint shall be radiographed as per approved drawing.
12. All bolts/studs/nuts shall be galvanized and all internal nuts & bolts shall be of stainless steel construction.

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