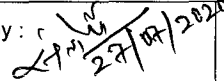
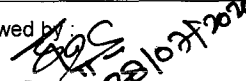
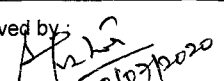
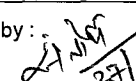
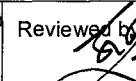
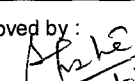


 Heat Exchanger Group BHEL Bhopal		STANDARD QUALITY ASSURANCE PLAN							QAP No.		CDE-20-3477	
									Revision No.		00	
		ITEM		DUCTILE IRON CASTING					Date of Issue		27.07.2020	
									Page		1 of 3	
S.No.	Components & Operations	Characteristics	Class	Type of Check	Quantum of check	Reference Document	Acceptance Norms	Format of Records	Agency			Remarks
1	2	3	4	5	6	7	8	9	1	2	3	11
1.0 IN PROCESS INSPECTION												
1.1	PATTERN	Dimension meeting requirement of Casting drawing	Major	Dimension	100%	BHEL Drawing	BHEL Drawing	IR	P			
1.2	Casting & test pieces	Melting & Pouring (Test piece to be kept as an integral part of casting)	Major	Ladle analysis	Each melt	ASTM A-439 Gr.D2	ASTM A-439 Gr.D2	TC	P	-	-	See Note-1.
		Identification of Casting and test piece	Major	Physical	Each Melt & Heat Batch	BHEL Drawing	BHEL Drawing	IR	P	W	-	Heat No. to be punched on each casting and test piece.
		Heat Treatment (HT) (refer Note-2)	Major	Time & Temperature Control (HT Cycle)	100%	ASTM A-439 Gr.D2	ASTM A-439 Gr.D2	HT Graph	P	V / W(*)	-	Heat Treatment Batch to be punched on each casting and test piece. (*) W – for witness of HT Batch No. on both casting and test piece.
		Parting of test piece from casting	Major	Visual	100%	Mfg. Standard	Mfg. Standard	IR	P	-	-	
1.3	Magnetic Properties	Horse shoe test	Major	Test	100%	ASTM A-439 Gr.D2	ASTM A-439 Gr.D2	IR	P	W (*)		(*) 10% area of each offered casting on each side (randomly selected by BHEL-IA).
1.4	Mechanical & Chemical Test of Test Sample	Mechanical & Chemical Properties	Major	Testing	Each Heat & Heat Treatment batch	ASTM A-439 Gr.D2	ASTM A-439 Gr.D2	TC	P	W	-	See Note-1.

	Prepared by :  Santosh Mahto Dy. Manager (D) CDE	Reviewed by :  Ashok Mahor Sr. Dy. General Manager (D) CDE	Approved by :  S. P. Vatsa Add. General Manager (D) CDE
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								Page		2 of 3		
S.No.	Components & Operations	Characteristics	Class	Type of Check	Quantum of check	Reference Document	Acceptance Norms	Format of Records	Agency			Remarks
1	2	3	4	5	6	7	8	9	1	2	3	
2.0 FINISHED PRODUCT INSPECTION AFTER MACHINING & TESTING												
2.1	Workmanship, Finish & appearance	Surface finish & appearance	Major	Visual	100%	ASTM A-439 Gr.D2 & MSS SP 55:2011	ASTM A-439 Gr.D2 & MSS SP 55 Annexure-B	IR	P	W	-	
2.2	Dimensional conformity after machining.	Measurement	Major	Visual + I	100%	As per BHEL drawing.	As per BHEL drawing.	IR	P	W	-	See Note-6 & 7
2.3	NDT	DPT of machined surface (refer Note-5)	Major	Visual	100%	AA0850132	AA0850132 Level-I	IR	P	W	-	(*) 10% area of each offered casting on each side (randomly selected by BHEL-IA).
2.4	Chemical properties of finished product using Portable Chemical Tester/Spectrometer	Chemical Properties	Major	Testing	100%	ASTM A-439 Gr.D2	ASTM A-439 Gr.D2	IR	P	W	-	See Note-2
2.5	Hydro Test of Body	Leak Proof	Critical	Testing	100%	BHEL Drawing	BHEL Drawing	IR	P	W	-	For doing Hydro, all accessories (blank, gasket, fasteners, Pr. Gauge, etc.) are to be arranged by casting vendor. See Note-8
3.0 IDENTIFICATION, PACKING & DISPATCH												
3.1	Identification /Punching	For co-relation with TC / IR, Punching of Heat No., Heat Treatment Batch No. & MOC	Minor	Visual	100%	Mfg. Standard	Mfg. Standard	IR	P	V	-	

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									Page		3 of 3	
S.No.	Components & Operations	Characteristics	Class	Type of Check	Quantum of check	Reference Document	Acceptance Norms	Format of Records	Agency			Remarks
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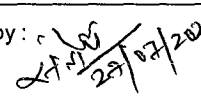
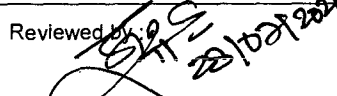
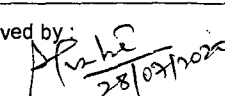
3.2	Verification of TCs	To ensure completeness	Major	Visual	100%	PO, Spec. Drg. & QAP	PO, Spec. Drg. & QAP	IR	P	V	-	See Note-10
3.3	Protection and Packing	Packing in sturdy Wooden boxes to avoid damage during transit	Major	Visual	100%	-	-	IR	P	-	-	

LEGEND : 1: Supplier, 2: BHEL-IA, 3: Customer (NTPC/NPCIL/other if any) / Customer's IA; P-Perform, W-Witness, V-Verification, HT : Heat Treatment, MTC : Mill test Certificates, TC : Test certificate, TCR : Test Certificate Report, IR : Inspection report, IA : Inspection Agency, I : Instrument to be used for check, HP : Hold point, NDT : Non Destructive Testing, DPT : Dye Penetrant Test.

Note

- Mechanical & chemical Testing to be done at any NABL accredited lab. In house instrument / machine can also be used subject to having valid calibration record (calibration done by any NABL approved agency / lab). In house spectrometer (duly calibrated using standard calibration block in presence of BHEL-IA) is also acceptable for chemical testing.
- All instruments (e.g. measuring instruments, portable chemical tester, etc.), HT furnace, etc. are to be with valid calibration record. Calibration to be done by NABL approved agency / lab. BHEL-IA to ensure compliance and record it in the IR with the name of the calibration agency especially for HT Furnace & Portable Chemical Tester/spectrometer.
- Weld repair if any shall not be carried out without prior permission from BHEL.
- No. of items produced by each heat and items heat treated in each heat batch are required to be mentioned in the IR.
- NDT to be performed by ISNT / ASNT Approved Level-II in DPT person only.
- Dimension of all bolting holes (i.e. PCD, pitch & dia of holes) to be checked using CNC make template. BHEL-IA to ensure the same during inspection.
- Vendor to provide procedure for measurement of concentricity of holes for housing door for BHEL review & acceptance.
- Valves shall get hydro tested again at BHEL-Bhopal after complete assembly. Leakage found if any (either on body or door), vendor to rectify / replace the same within maximum 07 days from the date of intimation.
- In case of conflict (if any), this QAP shall govern finally.
- All the inspection report & test certificates shall be part of the final QA Document duly signed and stamped by BHEL-IA. Quantity of set = Three (03) Nos. All reports shall be arranged in sequential manner as per this QAP with proper index sheet at top and same to be submitted to BHEL along-with the supply. BHEL-IA to ensure it while giving final dispatch clearance.

Approval does not relieve supplier from meeting our requirements as per the drawing / specification.

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