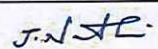
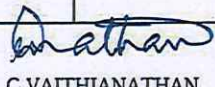


		MANUFACTURER'S NAME & ADDRESS: BHEL APPROVED SUB CONTRACTORS		QUALITY PLAN FOR FABRICATION OF CS/AS/SS DUCT SPOOL				PROJECT: CS/AS/SS DUCT SPOOL FOR IOCL HALDIA CUSTOMER : IOCL Haldia MAIN-SUPPLIER: BHEL-PIPING CENTRE BHEL CUSTOMER Nos: 7419						
				PR No: A886-000-WP-PR-3045-2257		QP No:7419:QPC:01-001 Rev No: 00 Date : 15.05.2019								
S.No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS		AGENCY			REMARKS
					M	C&N				D*	M	C	N	
1	2	3	4	5	6		7	8	9	D*	10		11	
1.0	RAW MATERIAL: a. All Raw materials shall be from approved ^{manufacturers} vendors of EIL. with type 3.1 certification & with type 3.2 CERTIFICATION if the material is procured from the approved STOCKIS / TRADERS b. The test certificate received from RM manufacturer shall meet respective specification requirements and Certification shall be EN10204 Type 3.2 or similar.													
1.1	Seamless Steel Pipes/Tubes*	i).Chemical test ii).Mechanical test iii).Soundness (UT/Hydro)	Critical	TC verification & correlation	100%	100%	ASTM/ASME Material specification	Mfg Tc	✓	V	V	V	* Refer Note 1	
1.2	Bars/Forging / Rounds/Flanges/Caps*	Chemical test, Mechanical test, NDE etc.	Critical	TC verification & correlation	100%	100%	ASTM/ASME Material specification	Mfg Tc	✓	V	V	V	UT shall be done for dia / thick above 40mm * Refer Note 1	
1.3	Plates*	Chemical test, Mechanical test, NDE etc.	Critical	TC verification	100%	100%	ASTM/ASME Material Specification	Mfg Tc	✓	V	V	V	UT shall be done for thick above 25mm * Refer Note 1	
1.4	Fittings*	Chemical test, Mechanical test, NDE etc.	Critical	TC verification & correlation	100%	100%	ASTM/ASME Material Specification	Mfg Tc	✓	V	V	V	* Refer Note 1	
 J NANTHINI, Sr.ENGR/QA		 VIVEKANANDA YELLU, Dy.MGR/QA		 C VAITHIANATHAN, AGM/Q		LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M: MANUFACTURER; C:BHEL/BHEL AIA ; N: CUSTOMER APPROVED TPIA. P: PERFORM W: WITNESS AND V: VERIFICATION.				FOR TUV SUD USE:  Yashpal Kapoor Dt. 17.05.2019				
MANUFACTURER		MANUFACTURER		MANUFACTURER		REVIEWED BY		APPROVED BY		APPROVAL SEAL				

		MANUFACTURER'S NAME & ADDRESS: BHEL APPROVED SUB CONTRACTORS		QUALITY PLAN FOR FABRICATION OF CS/AS/SS DUCT SPOOL				PROJECT: CS/AS/SS DUCT SPOOL FOR IOCL HALDIA CUSTOMER : IOCL Haldia MAIN-SUPPLIER: BHEL-PIPING CENTRE BHEL CUSTOMER Nos: 7419						
				PR No: A886-000-WP-PR-3045-2257		QP No:7419:QPC:01-001 Rev No: 00 Date : 15.05.2019								
S.No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS		AGENCY			REMARKS
					M	C&N				D*	M	C	N	
1	2	3	4	5	6		7	8	9	D*	10			11
2.3	Weld Repair	Soundness	Major	RT	100%	100%	ASME Sec-V / ASME Sec VIII UW-51	Report	✓	P	V*	-	* - Review of RT films	
2.4	PWHT	ROH, ROC, Soaking Time/Temp Control	Critical	Review of HT chart	100%	100%	As per Qualified WPS / ASME Sec-I / EIL Welding Specification Charts **	HT Chart	✓	P	V	-	** - Refer Annexure 2 for EIL Welding Specification Charts	
2.5	Mechanical test on Test coupon	All weld tension test	Major	Mechanical	100%	100%	ASME Sec IX, QW150	Report	✓	P	V	-		
2.6	Seal welds of screws, Erection Lugs and hand hole plates	Soundness	Major	MPI/LPI	100%	10%	ASME Sec-V / ASME B31.1 Cl 136.4.3 / Cl 136.4.4	Report	✓	P	V	-		
2.7	Weld Hardness on butt joints	Soundness	Major	Measurement	100%	100%	CS-200BHN max.; AS P11 & P12-225BHN max.	Report	✓	P	V	-		
2.8	Dimensional Inspection	Length, Diagonal, offset, EP, Weld end thickness, location/ orientation/height of stubs, RG plug, Flow Direction	Major	Measurement & Visual	100%	100%	Mfg. Drawing	Report	✓	P	W	V		
 J NANTHINI, Sr.ENGR/QA		 VIVEKANANDA YELLU, Dy.MGR/QA		 C VAITHIANATHAN, AGM/Q		LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M: MANUFACTURER; C:BHEL/BHEL AIA ; N: CUSTOMER APPROVED TPIA. P: PERFORM W: WITNESS AND V: VERIFICATION.			FOR TUV SUD USE: 					
MANUFACTURER		MANUFACTURER		MANUFACTURER		REVIEWED BY			APPROVED BY Yashpal Kapoor Dt. 17.05.2019			APPROVAL SEAL		

S.No		COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY			REMARKS
1		2	3	4	5	M	C&N	6	7	8	9	D*	10	11
2.0 INPROCESS CONTROLS:														
2.1 FABRICATION OF PLATE FORMED PIPES														
2.1.1	Material receiving inspection	Marking & transfer of identification	Major	Visual	100%	100%	As per Drawing	HC	✓	P	V	-	Refer Note 2	
2.1.2	Cutting & Edge Preparation	a) Dimension b) NDT for Edge Preparation	Minor	Measurement LPI	100%	100%	ASME Sec-V / ASME B31.1 Cl 136.4.4	HC Report	✓	P	V	-	HC - History Card	
2.1.3	Rolling to form pipe By cold forming process	Profile & Dimension	Major	Template check &	100%	100%		Register		P	V	-	Refer Note 3	
2.1.4	Welding	Procedure & Performance qualification	Major	Document Review	100%	100%	ASME sec IX /AWS D1.1 & EIL Welding Specification Charts**	WPS, PQR	✓	P	V	-	** Refer Note 4	
2.1.5	Back chip after root run for LS joints (if applicable)	NDE	Major	LPI	100%	100%	ASME Sec-V / ASME B31.1 Cl 136.4.4	HC, LPI Report	✓	P	V	-		
2.1.6	Weldment with test coupon@@	Weld profile & Surface defects	Major	Visual	100%	100%	ASME B 31.1 Cl 136.4.2	HC	✓	P	V	-	@@One test coupon for each 61m of weld length.	
2.1.7	Pipe after Rolling	Profile & Dimension	Major	Visual & Measurement	100%	100%	As per BHEL Drawing	HC	✓	P	V	-		
2.2 NDE for Plate Formed Pipes and Duct Spool Fabrication before PWHT (NDE shall be carried out using qualified operator as per SNT TC 1A)														
2.2.1	Carrier plate root back gouging	Discontinuities	Minor	MPI (LPI incase of SS)	100%	100%	ASME Sec-V / ASME B31.1 Cl 136.4.3	Report	✓	P	V	-	For t > 25mm only	
2.2.2 (a)	All pressure bearing and Structural steel welds	Soundness	Major	LPI	100%	100%	ASME Sec-V / ASME B31.1 Cl 136.4.4	Report	✓	P	V	-		
2.2.2 (b)	All pressure bearing butt welds	Soundness	Major	RT or UT	RT LS-100% CS-10%	RT -5%	ASME Sec-V / ASME B31.1 Cl 136.4.5 or Cl 136.4.6	Report	✓	P	RW*	-	* - For RT- Review of RT films	
2.2.2 (c)	All fillet welds	Soundness	Major	MPI (LPI incase of SS)	20%	20%	ASME Sec-V / ASME B31.1 Cl 136.4.3	Report	✓	P	V	-		
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M: MANUFACTURER; C:BHEL/ BHEL AIA ; N: CUSTOMER APPROVED TPJA . P: PERFORM W: WITNESS AND V: VERIFICATION.														
FOR TUV SUD USE:														
J NANTHINI, Sr.ENGR/QA VIVEKANANDA YELLU, Dy.MGR/QA C VAITHIANATHAN, AGM/Q														
Yashpal Kapoor Dt. 17.05.2019														
REVIEWED BY APPROVED BY APPROVAL SEAL														

		MANUFACTURER'S NAME & ADDRESS: BHEL APPROVED SUB CONTRACTORS		QUALITY PLAN FOR FABRICATION OF CS/AS/SS DUCT SPOOL				PROJECT: CS/AS/SS DUCT SPOOL FOR IOCL HALDIA CUSTOMER : IOCL Haldia MAIN-SUPPLIER: BHEL-PIPING CENTRE BHEL CUSTOMER Nos: 7419					
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S.No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY			REMARKS
					M	C&N				M	C	N	
1	2	3	4	5	6		7	8	9	D*	10		11
3.0	FINAL INSPECTION												
3.1	Verification of completion	Verification of records	Major	Verification	100%	100%	Mfg. Drawing/ In process records	Report	✓	P	V	V	RW : Random Witness As per EIL Spec 6-81-0001 Rev2 Refer Note 5 Refer Note 6 & 7
3.2	PMI for all Alloy steel & Stainless Steel	Chemical Composition	Major	Verification	100%	10%	Material Specification	Report	✓	P	RW	V	
3.3	Painting, Protection & Marking	Appearance	Major	Visual	100%	100%	Refer Note 5, 6 & 7	Report	✓	P	V	V	
		DFT	Major	Measurement	100%	10%							
		Marking & End capping	Major	Visual	100%	100%							
3.4	Data Folder	QP compliance	Critical	Compilation of records (Two copies)	100%	100%	Material TCs, NDE & hydro test reports, Heat Treatment charts	Report	✓	P	V	V	
Note: 1) CS : Carbon Content 0.25% max. Raw materials of Stainless Steel specification shall be procured with Intergranular Corrosion Test in accordance to Annexure 1 (enclosed) 2) Heat number transfer to cut piece (raw material) shall be ensured by Sub Contractor. 3) Incase of Hot Forming, Normalizing shall be as per respective material specification. 4) Selection of Welding Consumables shall be as per EIL Welding Specification Charts (Annexure 2 enclosed) for specific Piping class as mentioned in BHEL Drawing. IGC qualified WPS/PQR shall be followed for SS items. WPS/PQR shall be reviewed by BHEL. Welding Consumable shall preferably of the SAME BRAND 5) Painting :- Surface Preparation : SSPC-SP3/Power Tool Cleaning; Primer : 1 coat of 30 microns each of Red Oxide Zinc Phosphate. Total DFT : 30 microns minimum. All welds of SS Piping spools shall be pickled & passivated as per ASTM A380. 6) Marking :- Paint stencilling at one end: Project name, W/O DU details & Line number (as per Engg drg) with Spool suffix. Hard Punching at both ends : Line number (as per Engg drg) with Spool suffix. Stencilling & Punching shall be done in such a manner that any spool may be easily identified without turning or lifting it. 7) Finished Piping spools shall be suitably packed (with end caps) to avoid storage & transit damages. Flange ends shall be protected with dummy flange arrangement. 8) Gauges and measuring Instruments, with valid calibration only shall be used.													
J. Nanthini J NANTHINI, Sr.ENGR/QA MANUFACTURER		VIVEKANANDA YELIC, Dy.MGR/QA MANUFACTURER		C VAITHIANATHAN, AGM/Q MANUFACTURER		LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M: MANUFACTURER C:BHEL/ BHEL AIA; N: CUSTOMER APPROVED TPIA . P: PERFORM W: WITNESS AND V: VERIFICATION.			FOR TUV SUD USE: Yashpal Kapoor Dt. 17.05.2019 REVIEWED BY APPROVED BY APPROVAL SEAL				

ANNEXURE 1 : TO BHEL QAP No. 7419/QPC/01-001 Rev 00 Dt. 15.05.2019**1.10 I.G.C. Test for Stainless Steels**

- items,*
1.10.1 For all austenitic stainless steel ~~pipes~~ inter-granular corrosion test shall have to be conducted as per following:

ASTM A262 Practice "B" with acceptance criteria of "60 mils/year (max.)".

OR

ASTM A262 Practice E with acceptance criteria of no cracks at 20X magnification and microstructure to be observed at 250X magnification shall ensure the absence of any cracks/fissures. When testing is conducted as per practice 'E' photograph of microstructure shall be submitted for record.

- 1.10.2 When specifically asked for in MR for high temperature application of some grades of austenitic stainless steel (eg. SS 309, 310, 316, 316H etc.) ASTM A262 Practice "C" with acceptance criteria of "15 mils/year (max.)" shall have to be conducted.

- 1.10.3 For the IGC test as described in 1.10.1 & 1.10.2, two sets of samples shall be drawn from each solution annealing lot; one set corresponding to highest carbon content and the other set corresponding to the highest pipe thickness.

BHEL Q.C., Name, designation
Sign, Stamp ---
Date ---

WSC FOR PIPING CLASSES: A1A, B1A, D1A, E1A, F1A, A7A, A9A, B9A, D9A, A10A, A13A, B13A, A15A, A20A, A32A, K22A, K24A, K28A, B26

MATERIAL SPECIFICATIONS	PIPES	ASTM A106 GR.B, ASTM A 672 GR.B60 CL.12, ASTM A 672 GR.B60 CL.22, API 5L GR.B PSL1, IS-1239, IS-3589 GR.410, ASTM A 53 GR.B TYPE S		
	FITTINGS	ASTM A105, ASTM A 234 GR.WPB, ASTM A 234 GR.WPB-W, ASTM A 105 LINED WITH PTFE, API 5L GR.BPSL1		
	FLANGES	ASTM A105, ASTM A105 WITH INTERNAL LINING		
	OTHERS	-		
BASE METAL 'P' NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW/SAW (NOTE-1)	FILLER PASS: GTAW / SMAW	ROOT PASS: GTAW / SMAW	FILLER PASS: GTAW / SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-2 / E6010	FILLER PASS: ER70S-2 / E7016 / E7018	ROOT PASS: ER70S-2 / E6010	FILLER PASS: ER70S-2 / E7016 / E7018
	FILLET JOINT/SOCKET JOINT: E7016 / E7018			
BACKING RING: -		CONSUMABLE INSERT: -		
JOINT PREPARATION	ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING (NOTE-3)	PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm		INTERPASS TEMP.: ---	
POST HEATING: --				
POST WELD HEAT TREATMENT	HOLDING TEMP: ---		HOLDING TIME: ---	
	RATE OF HEATING: ---		MIN. HOLDING TIME: ---	
	METHOD OF COOLING: ---		RATE OF COOLING: ---	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY 'V' NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 200 BHN MAX (NOTE-4)			
CODE OF FABRICATION	ASME B31.3			

TECHNICAL NOTES:

- 1 THE ROOT PASS FOR SINGLE SIDE WELDING SHALL BE DONE BY GTAW PROCESS.
- 2 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- 3 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK>=12.5 mm & ≤25 mm.
- 4 PFA LINING SHALL BE RESTORED ON THE INTERNAL SURFACE OF THE WELD JOINT AFTER WELDING. EFFECTIVENESS OF THE RESTORATION PROCESS SHALL BE DEMONSTRATED DURING WELDING PROCEDURE QUALIFICATION.

Page 1/3

6/8

WSC FOR PIPING CLASSES: B1D, K34D			
MATERIAL SPECIFICATIONS	PIPES	ASTM A 335GR.P11, ASTM A 691 GR.1.25CR CL.42	
	FITTINGS	ASTM A 182GR.F11 CL.2, ASTM A 234 GR.WP11 CL.1, ASTM A 234GR.WP11-W CL.1	
	FLANGES	ASTM A 182GR.F11 CL.2.	
	OTHERS	-	
BASE METAL 'P' NO 4			
WELDING PROCESS	GROOVE JOINTS		
	BUTT		OTHER THAN BUTT
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW (NOTE-1)	ROOTPASS: GTAW FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW		
WELDING MATERIALS	GROOVE JOINTS		
	BUTT		OTHER THAN BUTT
	ROOT PASS: ER70S-B2L/ ER80S-B2	FILLER PASS: ER70S-B2L / ER80S-B2/ E7016-B2L/ E7018-B2L	ROOT PASS:ER70S-B2L/ ER80S-B2 FILLER PASS: ER70S-B2L/ ER80S-B2/ E7016-B2L/ E7018-B2L
	FILLET JOINT/SOCKET JOINT: E7016-B2L/E7018-B2L		
	BACKING RING: -		CONSUMABLE INSERT: -
JOINT PREPARATION		ASME B31.3	
GASES	PURGING: -	SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -	SHIELDING: 99.995%	
PREHEATING	PREHEAT TEMP: 150°C MIN	INTERPASS TEMP.: --	
POST HEATING: AS PER WELDING SPECIFICATION FOR PIPING			
POST WELD HEAT TREATMENT (NOTE-2)	HOLDING TEMP: 650-705°C		HOLDING TIME: 1HOUR PER INCH THK
	RATE OF HEATING: 200°C/HR MAX		MIN. HOLDING TIME: 2HRS
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C/HR MAX
MECHANICAL PROPERTY REQUIREMENTS	CHARPY 'V' NOTCH VALUE:		MIN: - AVERAGE: -
	AT TEMPERATURE:		-
	HARDNESS: 225 BHN MAX (NOTE-2)		
CODE OF FABRICATION		ASME B31.3	

TECHNICAL NOTES

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- PWHT SHALL BE DONE FOR ALL WALL THICKNESSES AND POST HEAT TREATED HARDNESS OF WELD SHALL NOT EXCEED 225 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.

Page 2/3

WSC FOR PIPING CLASSES: A1N, B1N, K42N			
MATERIAL SPECIFICATIONS	PIPES	ASTM A 312 TP316L, ASTM A 358 TP316L CL.1	
	FITTINGS	ASTM A 182 GR.F316L, ASTM A 403 GR.WP316L-S, ASTM A 403 GR.WP316L-WX	
	FLANGES	ASTM A 182 GR.F316L	
	OTHERS	-	
BASE METAL 'P' NO 8			
WELDING PROCESS	GROOVE JOINTS		
	BUTT		OTHER THAN BUTT
	ROOT PASS: GTAW	FILLERPASS: GTAW/SMAW	ROOTPASS: GTAW FILLER PASS: GTAW/SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW		
WELDING MATERIALS	GROOVE JOINTS		
	BUTT		OTHER THAN BUTT
	ROOT PASS: ER316L	FILLER PASS: ER316L / E316L-15/16	ROOT PASS: ER316L FILLER PASS: ER316L / E316L-15/16
	FILLET JOINT/SOCKET JOINT: E316L-15/16		
	BACKING RING: -		CONSUMABLE INSERT: -
JOINT PREPARATION AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %
PREHEATING	PREHEAT TEMP: 10 °C		INTER PASS TEMP.: 175°C MAX
POST HEATING: ---			
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -
	RATE OF HEATING: -		MIN. HOLDING TIME: -
	METHOD OF COOLING: -		RATE OF COOLING: -
MECHANICAL PROPERTY REQUIREMENTS	CHARPY 'V' NOTCH VALUE:		MIN: - AVERAGE: -
	AT TEMPERATURE:		-
	HARDNESS: -		
CODE OF FABRICATION AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

Page 3/3

8/8