

		MANUFACTURER'S NAME & ADDRESS: BHEL PIPING CENTRE CHENNAI / NPCIL APPROVED SUB CONTRACTORS		MANUFACTURING QUALITY PLAN					PROJECT: KUDANKULAM UNIT 3 & 4 (2x1000Mwe) CUSTOMER : NPCIL MAIN-SUPPLIER: BHEL-PIPING CENTRE BHEL CUSTOMER Nos: 7430, 7431					
				ITEM : PIPING FABRICATION (Carbon Steel) SYSTEM : PEB (SCHEDULE NO : G.1)			QP No: 7430:QPC:05 Rev No: 00 Date : 12.03.2020							
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	6	7	8	9	D*	P	R	W		H
1	2	3	4	5	6	7	8	9	D*	10				11
1.0	RAW MATERIAL: All Raw materials shall be from approved vendors of NPCIL													
1.1	Seamless Steel Pipes: SA106 Gr.B / Spec as per drawing	Material Conformance	Critical	TC review	100%	Specification as per BHEL drawing	TC & Records	✓	3	2,1	-	1		
1.2	Plates* for Plate Formed Pipes: SA516 Gr.70/ Spec as per drawing	Material Conformance	Critical	TC review	100%	Specification as per BHEL drawing	TC & Records	✓	3	2,1	-	1	*100% UT on plates of all thickness as per as per SA 578. Acceptance Standard: Level - B	
1.3	Forgings, Bars & Rounds: SA105/ Spec as per drawing	Material Conformance	Critical	TC review	100%	Specification as per BHEL drawing	TC & Records	✓	3	2,1	-	1		
1.4	Fittings: SA234WPB/ Spec as per drawing	Material Conformance	Critical	TC review	100%	Specification as per BHEL drawing	TC & Records	✓	3	2,1	-	1		
1.5	Fasteners : ASTM A193 Gr.B7M, ASTM A 194 Gr.2HM / Spec as per drawing	Material Conformance	Critical	TC review	100%	Specification as per BHEL drawing	TC & Records	✓	3	2,1	-	-		
1.6	Gaskets : BSI BS-7531 Grade X/ Spec as per drawing	Material Conformance	Critical	TC review	100%	Specification as per BHEL drawing	TC & Records	✓	3	2,1	-	-		
1.7	Welding Consumable	Chemical & Mechanical property as per ASME Sec II C	Critical	TC review	100%	Specification as per Approved WPS/PQR	TC & Records	✓	3	2,1	-	-		
J.NANTHINI, Dy.MGR/QA MANUFACTURER		D.SANDRA PRIYA, Dy.MGR/QA MANUFACTURER	K V RAMANI, AGM/E&Q MANUFACTURER	LEGEND: * Records identified with mark "✓" shall be essentially included by supplier in QA RT-RADIOGRAPHIC TEST, UT-ULTRASONIC TEST, MT-3: MANUFACTURER; 2:BHEL/BHEL AIA ; 1: NPCIL. P: PERFORM; W: WITNESS; R: REVIEW; H:HOLD .				FOR NPCIL USE:						
								REVIEWED BY		APPROVED BY		APPROVAL SEAL		

		MANUFACTURER'S NAME & ADDRESS: BHEL PIPING CENTRE CHENNAI / NPCIL APPROVED SUB CONTRACTORS		MANUFACTURING QUALITY PLAN					PROJECT: KUDANKULAM UNIT 3 & 4 (2x1000Mwe) CUSTOMER : NPCIL MAIN-SUPPLIER: BHEL-PIPING CENTRE BHEL CUSTOMER Nos: 7430, 7431								
				ITEM : PIPING FABRICATION (Carbon Steel) SYSTEM : PEB (SCHEDULE NO : G.1)			QP No: 7430:QPC:05 Rev No: 00 Date : 12.03.2020										
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	6	7	8	9	D*	P	R	W		H			
1	2	3	4	5	6	7	8	9	D*	10				11			
2.0	INPROCESS:																
2.1	Plate formed Pipes/Mitre bends/Tees/Reducers & Flanges																
2.1.1	Welding Procedure Qualification	Procedure Qualification	Major	Review of Record	100%	ASME Sec IX	WPS, PQR	✓	3	-	2,1	-	Refer Note 3				
2.1.2	Welder Performance Qualification	Personnel Qualification	Major	Review of Record	100%	ASME Sec IX	WPQR	✓	3	-	2,1	-	Refer Note 3				
2.1.3	Plate cutting layout for Pipe rolling	Rolling direction	Major	Dimension & Orientation	100%	Approved drawings	Approved drawings	HC	-	3	2,1	-	-				
2.1.4	Edge Preparation	Surface defects	Major	PT	100%	ASME Sec V Article 6 / ASME Sec III Div.1 NC5130	NDT Report	✓	3	2,1	-	-					
2.1.5	Fitup	Dimension & fitup	Minor	Visual & Measurement	100%	Approved drawings	Approved drawings	HC	-	3	2	-	-				
2.2	NDE on welds																
2.2.1	Weld Inspection	Weld size, profile & finish*	Major	Visual & Measurement	100%	BHEL Drawing	HC	✓	3	1	2	2	* NOTE 6				
2.2.2	Butt Joints (LS & CS) inclusive of Mitre Bends, Plate formed pipes/ tees/ reducers	Weld quality (LS & CS)	Major	RT	100%	ASME Sec V Article 2 / ASME Sec III Div.1 NC5320	NDT Report	✓	3	2,1	-	2	Including all T-Joints				
2.2.3	5% of Butt Joints	Weld quality	Major	UT	100%	ASME Sec V Article 4 / ASME Sec III Div.1 NC5330	NDT Report	✓	3	1	2	2					
J.NANTHINI, Dy.MGR/QA		D.SANDRA PRIYA, Dy.MGR/QA	K V RAMANI, AGM/E&Q	LEGEND: * Records identified with mark "X" shall be essentially included by supplier in QA RT-RADIOGRAPHIC TEST, UT-ULTRASONIC TEST, MT-MAGNETIC TEST, PT-PENETRANT TEST 3: MANUFACTURER; 2:BHEL/BHEL AIA ; 1: NPCIL. P: PERFORM; W: WITNESS; R: REVIEW; H:HOLD .				FOR NPCIL USE:									
MANUFACTURER				MANUFACTURER				MANUFACTURER				REVIEWED BY		APPROVED BY		APPROVAL SEAL	
SIGNATURE																	
Page 2 of 4																	
2.2.4	All butt and pressure boundary welds	Root pass and final pass Weld quality	Major	PT	100%	ASME Sec V Article 6 / ASME Sec III Div.1 NC5350	NDT Report	✓	3	1	2	2					

		MANUFACTURER'S NAME & ADDRESS: BHEL PIPING CENTRE CHENNAI / NPCIL APPROVED SUB CONTRACTORS		MANUFACTURING QUALITY PLAN					PROJECT: KUDANKULAM UNIT 3 & 4 (2x1000Mwe) CUSTOMER : NPCIL MAIN-SUPPLIER: BHEL-PIPING CENTRE BHEL CUSTOMER Nos: 7430, 7431					
				ITEM : PIPING FABRICATION (Carbon Steel) SYSTEM : PEB (SCHEDULE NO : G.1)			QP No:7430:QPC:05 Rev No: 00 Date : 12.03.2020							
S. No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY				REMARKS	
									P	R	W	H		
1	2	3	4	5	6	7	8	9	D*	10				11
2.2.5	Other welds : Branch/ Attachment Welds	Weld quality	Major	MT	100%	ASME Sec V Article 7/ ASME Sec III Div.1 NC5340		NDT Report	✓	3	1	2	2	
2.3	Post Weld Heat Treatment	Time/Temp control	Major	Visual & Measurement	100%	WPS / ASME Sec.III Div.1 NC		HT Chart	✓	3	2,1	-	-	Refer note 5
2.4	Hydro test	Pressure resistance	Major	Visual	100%	ASME Sec.III Div.1 NC		Hydro test Report	✓	3	-	2,1 *	1	*10% Witness
2.5	Product Testing for Plate formed Pipes (Sample shall be identified from attached coupon plate to pipe per heat/lot)													
	a) Product Analysis (Parent&Weld test coupon)	Chemical Properties	Major	Chemical test	Plate : 1 sample per heat ; Weld : 1 sample per heat per 60 meter.	As per S4 of ASME SA-671		TC	✓	3	-	2,1	1	
	Transverse Tensile test of weld	Tensile strength of weld	Major	Mechanical test	1 sample per heat per 60 meter.	As per ASME SA-671 & ASTM A 370		TC	✓	3	-	2,1	1	
	Transverse Guided Weld Bend test	Weld ductility	Major	Mechanical test	2 sample per heat per 60 meter.	As per ASME SA-671 & ASTM A 370		TC	✓	3	-	2,1	1	
	Charpy V Notch Impact test	Toughness	Major	Mechanical test	1 sample per heat per 60 meter.	As per ASME SA-671, ASTM A 370& SA-20	Test Temp: -50°C Min Avg value=15J. Min Individual value=12J.	TC	✓	3	-	2,1	1	Refer Note 6
3.0	FINAL INSPECTION													
3.1	Dimensional Inspection, Surface Condition	Visual, Surface condition, Straightness, End finish, Bevel angle, Root face, Outer diameter,Thickness, Length, Diagonal, Ep, Orientation, Location, Height of attachments etc	Major	Measurement	100%	BHEL Drawing		Report/ HC	✓	3	-	2,1*	1	*10% Witness

		MANUFACTURER'S NAME & ADDRESS: BHEL PIPING CENTRE CHENNAI / NPCIL APPROVED SUB CONTRACTORS		MANUFACTURING QUALITY PLAN				PROJECT: KUDANKULAM UNIT 3 & 4 (2x1000Mwe) CUSTOMER : NPCIL MAIN-SUPPLIER: BHEL-PIPING CENTRE BHEL CUSTOMER Nos: 7430, 7431						
				ITEM : PIPING FABRICATION (Carbon Steel)		QP No:7430:QPC:05 Rev No: 00 Date : 12.03.2020								
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	6	7	8	9	D*	P	R	W	H	11
3.2	Cleaning and Grit blasting,Painting & Color code	Surface Preparation, Paint specification, Appearance & DFT	Minor	Visual & Measurement	100%	If Direct to Site (DTS) : External : Primer of Inorganic Zinc Silicate DFT=70 microns min. If Despatch to BHEL Stores : External : Resin type Rust		HC	✓	3	2,1	-	-	DFT at random location across job
J.NANTHINI, Dy.MGR/QA		D.SANDRA PRIYA, Dy.MGR/QA	K V RAMANI, AGM/E&Q		LEGEND: * Records identified with mark "X" shall be essentially included by supplier in QA RT-RADIOGRAPHIC TEST, UT-ULTRASONIC TEST, MT-MAGNETIC TEST, PT-PENETRANT TEST 3: MANUFACTURER; 2:BHEL/BHEL AIA ; 1: NPCIL. P: PERFORM; W: WITNESS; R: REVIEW; H:HOLD .				FOR NPCIL USE:					
MANUFACTURER		MANUFACTURER	MANUFACTURER						REVIEWED BY		APPROVED BY		APPROVAL SEAL	

Page 3 of 4

3.3	Identification, Marking and Protection	Vendor code, WO, Du no, Qty etc*	Minor	Visual & Measurement	100%	PO, GMS & BHEL Drawing	HC	✓	3	2,1	-	-	* Refer Note 7&8
4.0	INSPECTION CLEARANCE												
4.1	Inspection data compilation	History card, Reports, TC	Major	Verification	100%	All documents as per QP	IR		3	2,1	-	1	Despatch Clearance

Note:

- 1) Heat number transfer to cut piece (raw material) shall be ensured by Sub Contractor.
- 2) Incase of Welded pipes, in one random length one welded circumferential seam of same quality as longitudinal weld is permitted. Circumferential weld seam shall be atleast 2.5 m from either end. Longitudinal seams of two portions shall be staggered by 90°. Welded pipes of diameter less than 900NB shall not have more than one longitudinal joint.
- 3) WPS/PQR/WPQR shall be reviewed by BHEL&NPCIL.Only NPCIL approved brand of Welding Consumables shall be used(Annexure 1).Impact test qualified WPS/PQR shall be used.
- 4) Non destructive examinations shall be carried out by personnel qualified to Level II of ISNT or ASNT.
- 5) PWHT is applicable for thickness 38mm and above and CS: Carbon content : max 0.30%..
- 6) Impact test shall be done as per any one of the below option : Option 1 : Raw material SA 516 Gr 70 plates used for fabrication of pipes shall be subjected to Charpy V-Notch Impact test as per S5 - Supplementary requirement of SA 516. Fabricated pipe SA671 Gr CC70 Cl32 shall be subjected to Charpy V-Notch Impact test as per S2 - Supplementary requirement of SA 671.
Option 2 : Raw material SA 516 Gr 70 plates used for fabrication of pipes is exempted from Impact test according to ASME Sec III NC 2019, Clause NC 2311(a)-8. Impact test shall be done on the weld metal and welding procedure qualification.
for the SA 516 Gr 70 Plates and Pipe made from SA 516 Gr 70 plates shall meet the requirements of SA 20.
- 7) Marking :- Hard Punching & Paint stencilling at one end: Project name, PO no, W/O DU details, Block number (as per Engg drg).
Stencilling & Punching shall be done in such a manner that any pipe may be easily identified without turning or lifting it.
Paint or ink for marking shall not contain any harmful metal or metallic salts such as zinc, lead or copper which cause corrosive attack on heating.
- 8) Packing : End of pipes shall be secured with end caps to avoid storage & transit damages. Bevelled pipe ends shall be closed with a leak tight Steel bevel protector combined with plastic plug. Dessicant material suitable for use in combination with steel (moisture absorbent) shall be placed inside closed pipe to enable corrosion prevention for atleast 2 years.
- 9) All Gauges and measuring Instruments, used shall be with valid calibration.

		MANUFACTURER'S NAME & ADDRESS: BHEL PIPING CENTRE CHENNAI / NPCIL APPROVED SUB CONTRACTORS		MANUFACTURING QUALITY PLAN				PROJECT: KUDANKULAM UNIT 3 & 4 (2x1000Mwe) CUSTOMER : NPCIL MAIN-SUPPLIER: BHEL-PIPING CENTRE BHEL CUSTOMER Nos: 7430, 7431						
				ITEM : PIPING FABRICATION (Carbon Steel)		QP No: 7430:QPC:05 Rev No: 00 Date : 12.03.2020								
S. No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS		AGENCY				REMARKS
										P	R	W	H	
1	2	3	4	5	6	7	8	9	D*	10				11
J.NANTHINI, Dy.MGR/QA MANUFACTURER		D.SANDRA PRIYA, Dy.MGR/QA MANUFACTURER		K V RAMANI, AGM/E&Q MANUFACTURER		LEGEND: * Records identified with mark "X" shall be essentially included by supplier in QA RT-RADIOGRAPHIC TEST, UT-ULTRASONIC TEST, MT-MAGNETIC TEST, PT-PENETRANT TEST 3: MANUFACTURER; 2:BHEL/BHEL AIA ; 1: NPCIL. P: PERFORM; W: WITNESS; R: REVIEW; H:HOLD .		FOR NPCIL USE:						
								REVIEWED BY						
SIGNATURE														