

Supplier's LOGO	Supplier's Name and Address	Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00					
		Item : U Tubes & Straight Tubes		Sub-system: Steam Generator			QP No.: To be filled by Supplier		Rev.No.: To be filled by Supplier		Date: To be filled by Supplier	

Project: GHAVP 1& 2
W.O : D157 to D160-001-1-93-171
P.O No : To be filled by Supplier

Sl. No	Component & Operations	Characteristics	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Agency			Remarks
							8.	D*	M	B	N	
1.	2.	3.	4.	5.	6.	7.	8.	D*	9. **			10.
1.0	Raw Material :											
1.1	Steel Melting; : Melting in electric furnace	Temperature	Record Verification	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	--		---
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Melt	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R		---
1.3	Electro slag Remelting (ESR)	Temperature	Record Verification	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	--		---
1.4	Forge to Round Billet	Forging Ratio	Dimensions	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	--		Forging Ratio: For information only
1.5	Ultrasonic Examination for Billet	Internal soundness	By Ultrasonic Test	100%	PC-M-962 Rev 01 UT Procedure for Billet: To be submitted	TC	√	P	R	R		Ensure freedom from cavities and slag Inclusions.
1.6	Mechanical/ Metallurgical tests on Billets	Mechanical & Metallurgical properties, Chemistry	Tensile at RT Tensile at 350° Hardness Grain Size, Macro Product analysis	1 per melt	PC-M-962 Rev 01	TC	√	P	R	R		---

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
 ** M: SUPPLIER B: BHEL, N: NPCIL/TPI
 P: PERFORM R: REVIEW W: WITNESS AND H: HOLD
 TC: TEST CERTIFICATE RD: RECORD

Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved
SUPPLIER'S NAME: To be filled	BHEL	NPCIL	

BHEL
 - Prepared -
[Signature]
 [S. Lakshmi] [S. Lakshmi]

BHEL
 - Approved -
[Signature]
 [S. Lakshmi] [S. Lakshmi]

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			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:2 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier							
2.0 In process Controls :												
2.1	Heating of Billet	Temp , Soaking Time	HT Chart/ Server Recording	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	--	P	R	R	---	
2.2	Hot Extrusion to Intermediate Size	OD , Wall thickness	Visual & Dimension	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	--	P	R	R	Size to be filled by Supplier	
2.3	Cold Pilgering to intermediate Size	OD , WT , Dimensions , Size	Visual & Dimension	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	--	P	R	R	Reduction in WT=To be filled. Reduction in OD= To be filled.	
2.4	Cleaning	Surface Condition	Visual & Cleaning	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	--	P	W	R	--	
2.5	Final Annealing	Temp , Time , ROH ,ROC	HT Chart/ Server Recording	100%	PC-M-962 Rev 01 HT Plan: To be submitted MPP: To be submitted	RD	--	P	H	W	HT Chart to be signed by Purchaser.	
2.6	Straightening	Straightness	Visual & Measurement	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	---	P	R	R	Ensure sufficient straightness to get the final straightness of 0.5mm/metre.	
2.7	Blasting	OD& ID Surface condition	Visual & cleanliness check	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R	---	
2.8	Polishing	OD& ID Surface condition	Visual & cleanliness check	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R	---	

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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

M.P.K.
14/10/2024

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:3 of 14				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
2.9	Pickling	OD& ID Surface condition	Visual & cleanliness check	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R	---	
2.10	Cold Drawing to Final Size (OD19 x1.1 mm)	OD , WT , Dimensions , Size	Visual & Dimension	100%	PC-M-962 Rev 01 Drg No: To be filled MPP: To be submitted	TC	√	P	W	W	--	
2.11	Cleaning & Degreasing	Surface Condition	Visual & Boroscopic for ID & Visual for OD	100%	PC-M-962 Rev 01 Procedure for Cleaning process: To be submitted MPP: To be submitted	TC	√	P	W	W	--	
2.12	Straightening	Straightness	Visual & Measurement	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R	straightness: 0.5mm/metre.	
2.13	Eddy Current Examination	Defect Inspection	By ECT	100%	PC-M-962 Rev 01 Procedure for Eddy Current Test: To be submitted	TC	√	P	H	H	---	
2.14	Ultrasonic Inspection	Defect Inspection & Dimensional Check (OD &WT)	By Ultrasonic Test	100%	PC-M-962 Rev 01 Procedure for Ultrasonic Examination: To be submitted	TC	√	P	H	H	Two opposite axial & Two opposite circumferential directions	
2.15	Eccentricity of Tube at straight condition* (For both U tube and straight Tube supply)	Eccentricity	By Ultrasonic	100%	PC-M-962 Rev 01 Procedure for Ultrasonic Examination(showing OD, Wall thickness measurement) : To be submitted	TC	√	P	H	W	* shall be reported from the data obtained during OPN: 2.14	
2.16	Straight Tube's Visual Examination	Visual	Visual	100%	PC-M-962 Rev 01	TC	√	P	R	R	---	

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SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

M.P.K.
17/09/2021

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:4 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier							
2.17	Repair of Tubes at straight condition (if necessary)	Superficial external surface defects removal	Visual/NDE	100%	PC-M-962 Rev 01 Procedure for Repair : To be submitted.	TC	√	P	W	R	---	
		OD Polishing on the repaired area	Visual & Cleanliness check	100%	PC-M-962 Rev 01 Procedure for OD polishing : To be submitted	TC	√	P	H	H	---	
		UT for repaired Area(Note-1)	Ultrasonic Test	100%	PC-M-962 Rev 01 Procedure for UT: To be submitted.	TC	√	P	H	H	---	
		ECT for repaired Area(Note-1)	Eddy Current Test	100%	PC-M-962 Rev 01 Procedure for ECT: To be submitted	TC	√	P	H	H	---	
		Wall thickness , Visual , Ovality , out of roundness at repaired area	Visual , Dimensions	100%	PC-M-962 Rev 01	TC	√	P	H	H	---	
2.18	Boroscopic Examination (For straight Tube supply)	Visual	By Boroscope	3% per lot #	PC-M-962 Rev 01 Procedure for Boroscopic Examination: To be filed	TC	√	P	R	R	100% shall be ensured by Supplier.	
2.19	End Trimming and Cutting to Final Length(For straight Tube supply)#	End Cut & Deburring	Visual	3% per lot #	PC-M-962 Rev 01 Drg No: To be filled	TC	√	P	R	R	#Identify the samples from both ends of each tube for Flare Test(For Straight Tube supply). 100% shall be ensured by Supplier.	

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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

M. K. S.
19/07/2004

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:5 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier							
2.20	Hydrostatic Test (For straight Tube supply)	Integrity	Defect Inspection by Hydro test	100%	PC-M-962 Rev 01 Procedure for Hydrostatic Test: To be submitted	TC	√	P	W	R	---	
2.21	Material Sampling and Testing Plan	Test samples	Traceability	Sample/Lot	PC-M-962 Rev 01 Procedure for Extraction of Samples: To be submitted	TC	√	P	H	H	Identification of samples with traceability to the tube/bend , before they are parted off.	
2.22	Tube Bending Qualification	Wall Thickness-WT (Before bending)	Dimensions	2 Samples/ 100 No. for smallest Bend Radius/ Machine	PC-M-962 Rev 01 Procedure for Bending Qualification , Liquid Penetrant Examination ,Hydro Test , Ball Test , Surface Roughness : To be submitted	TC	√	P	H	H	Wall thickness: For Bend Region- Measure by ultrasonically (90° apart circumferentially) and at End portions of tube shall be measured by physical means for calculation purpose.	
		Bending Radius Control	Dimensions/Lay out check			TC	√	P	H	H		
		Hydrostatic Test (Integrity)	Hydro pressure test			TC	√	P	H	H		
		ID obstructions	Ball passage Test			TC	√	P	H	H		
		Surface NDE	LPE Test			TC	√	P	H	H		
		External Visual control , Surface Finish	Visual , Roughness Gauge			TC	√	P	H	H		
		Visual Defects	Visual			TC	√	P	H	H		
		Non circularity , Ovality	Vernier calipers and micrometer			TC	√	P	H	H		
<p>-One of the above identified two bends shall be cut transversely into eleven equally spaced sections starting at the start of the bend and finishing at the end of the bend. : ie 10 Transverse ring(11 transverse section cuts)</p> <p>-The other bend shall be sectioned in longitudinal plane (Plane of Flexure) into two halves: ie 2 Longitudinal sections.</p>												
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Prepared		Reviewed & Approved		Reviewed & Approved		Reviewed & Approved						
SUPPLIER'S NAME: To be filled		BHEL		NPCIL								

Handwritten signature and date:
17/09/2024

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		Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:6 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier							
		Visual(Internal defects)	Visual	10 Transverse rings & 2 longitudinal sections	PC-M-962 Rev 01 Procedure for Bending Qualification , Surface Roughness , Hardness Test : To be submitted	TC	√	P	H	H	Bright Finish at ID & OD.
		Surface finish(Internal & External)	Surface Roughness			TC	√	P	H	H	
		HV hardness at 3 places (At neutral, tension& compression cross sectional zone)	Hardness Tester	TC		√	P	H	H		
		Optical illustration of the cross section	Optical illustration	TC		√	P	H	H		
		Wall thickness at Internal & External apex as well as at neutral bending axis	Dimensions	10 Transverse rings		TC	√	P	H	H	
		Non circularity , ovality , thinning	Dimensions	TC		√	P	H	H		
2.23	Tube Bending (Production Bending)	Ovality , out of roundness	Dimensions	100% for smallest radius	PC-M-962 Rev 01 Procedure for Tube Bending(Production) ,	TC	√	P	H	H	---

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M. K. ...
17/07/2024

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			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:7 of 14			Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
		Ovality , Noncircularity , Bend radius at 5 locations , wall thickness , Visual & Bright Finish	Dimensions Visual	a) First two productio n bend for each radius b) Every 10 th productio n bend for each radius	Roughness control : To be submitted	TC	√	P	H	H		
		Visual control (Surface Defects)	Visual	100%		TC	√	P	H	H		
		Surface Finish (Internal & External)	Surface Roughness	1% per shift		TC	√	P	H	H		
2.24	Repair for U Bends (If necessary)	Superficial External surface Defects removal	Visual /NDE	100%	PC-M-962 Rev 01 Procedure for Repair: To be submitted.	TC	√	P	H	H	The local repair shall be carried out with the approval from purchaser only. Repaired Tubes shall be clearly identified and easily distinguishable from other tubes.	
		LPE for repaired area	LPE Test	100%	PC-M-962 Rev 01 Procedure for Liquid Penetrant Examination: To be submitted	TC	√	P	H	H		
		Wall thickness , Visual , Ovality , Out of roundness for repaired area	Visual , Dimensions	100%	PC-M-962 Rev 01	TC	√	P	H	H		

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SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Handwritten signature and date: 17/07/2011

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			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:8 of 14				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
2.25	Cut to the final length (For U Tube supply)	Leg length deviation , leg difference , end squareness deviation , straight portion of the bend	Visual & Dimension	3 % per lot	PC-M-962 Rev 01 Drg: No to be filled	TC	√	P	H	H	Identify the samples from both ends of each tube for Flare Test (For U tube supply)	
2.26	Hydrostatic test for U Tube supply)	Integrity	Hydro Test	100%	PC-M-962 Rev 01 Procedure for Hydro Test: To be submitted	TC	√	P	H	H	---	
2.27	Trial assembly of U Tubes	Trial assembly	Dimensions	100%	Drg No: 2-HE-171-01076/Latest	TC	√	P	H	H	Note-4	
2.28	Liquid Penetrant Examination for Both straight and U Tube supply	Surface NDE	LPE	100%. As per Clause No:8.9 of PC-M-962 Rev 01	PC-M-962 Rev 01 Procedure for Liquid Penetrant Examination: To be submitted	TC	√	P	W	W	---	
2.29	Vickers Hardness Measurement for both Straight Tube and U Tube supply.	Hardness (For bend portion: at neutral, tension & compression cross sectional zone & For straight portion: 3 locations 120° apart)	Vickers Hardness Test	3 % per lot	PC-M-962 Rev 01 Procedure for Hardness Test: To be submitted	TC	√	P	H	W	HV:170 Hv:270 Max(On smallest Bend)	

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SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Handwritten signature and date: 17/07/2024

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			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.:	Rev.No.:	Date:	Page No:	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
2.30	Residual stress Test/ Stress Measurement (Before Peening)	Residual stress (at the apex portion on the outside surface of smallest bent radius)	XRD	1 Sample/ Lot	PC-M-962 Rev 01 Procedure for Stress measurement: To be submitted	TC	√	P	H	W	Stress shall be measured at 6 locations(ie at a depth of 30μm , 60μm , 90μm ,120μm , 150μm & 180μm from OD in axial and longitudinal direction – [At neutral , tension and compression zone of Bend].	
2.31	Stress Corrosion cracking Test (Before Glass Bead peening)	Stress corrosion cracking test , Test 100hrs , 500Hrs	LPE Test at 400	1 Sample /Lot	PC-M-962 Rev 01 Procedure for Stress Corrosion Cracking Test : To be submitted	TC	√	P	H	W	---	
2.32	Glass Bead peening Qualification	a)Max acceptance Level b) Normal acceptance level c) Minimum acceptance Level	Almen Gauge	3 Sample tubes for Bend and 3 Sample tubes for straight	PC-M-962 Rev 01 Procedure for Glass bead Peening Qualification , Procedure for stress measurement : To be submitted for approval	TC	√	P	H	H	Stress shall be measured at 6 locations(ie at a depth of 30μm , 60μm , 90μm ,120μm , 150μm & 180μm from OD in axial and longitudinal direction for bend and straight. For bend: at neutral	
		Compressive Stress Depth upto 0.15 mm(Min) from OD.	Stress Measurement by XRD			TC	√	P	H	H		
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M.P.D.
27/07/2021

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
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		OD Dimension	Dimension			TC	√	P	H	H	, tension and compression zone of Bend	
2.33	Glass Bead Peening (Production-For both straight and U Tubes supply)	Arc Height & Coverage	Almen Test	1 Sample/Lot	PC-M-962 Rev 01 Procedure for Stress measurement, Procedure for Glass bead peening(production) : To be submitted for approval	TC	√	P	R	R	OD Dimensions shall be reported at both the ends and at regular interval along the length. Stress shall be measured at 6 locations(ie at a depth of 30µm , 60µm , 90µm ,120µm , 150µm & 180µm from OD in axial and longitudinal direction for bend and straight. For bend: at neutral , tension and compression zone of Bend.	
		OD Dimension	Micrometer			TC	√	P	R	R		
		Compressive stress at 0.12 mm(Min) depth from OD	Stress measurement by XRD			TC	√	P	R	R		
		OD Check at both the ends and at random intervals along the length	Limit Gauge	100%		TC	√	P	R	R		
		Visual for adequacy of uniformity of glass bead peening and comparison with already established reference specimen.	Visual	100%		TC	√	P	W	R		
2.34	Stress Corrosion cracking Test (After Glass Bead Peening)	Stress Corrosion cracking Test , Test 100 Hrs , 500Hrs	LPE Test . 400x magnification	1 sample/Lot	PC-M-962 Rev 01 Procedure for Stress Corrosion Cracking Test : To be submitted	TC	√	P	H	W	---	
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SUPPLIER'S NAME: To be filled				BHEL		NPCIL						

MPCIL
17/07/2021

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2.35	Identification	Electro etching/ Permanent Method	Visual	100%	PC-M-962 Rev 01 Procedure for Permanent Marking Method : To be submitted	TC	√	P	H	W	---	
2.36	Ball go through Test (After Glass bead peening)	ID obstruction	Ball passage Test	100%	PC-M-962 Rev 01 Procedure for Ball passage Test : To be submitted	TC	√	P	H	W	---	
2.37	Cleanliness/Quantitative Measurement of Contaminants	Surface Contamination	Swipe Test/Swab Test	1 Sample/ 500 Tubes	PC-M-962 Rev 01 Procedure for Quantitative measurements of contaminants : To be submitted	TC	√	P	W	R	Chloride, Silica , Halogen , Sulphur , Lead , Fluorides & Sulphate	
2.38	Product Analysis	Chemical analysis	XRF	1 Sample/ Lot	PC-M-962 Rev 01 Procedure for Product Analysis : To be submitted	TC	√	P	H	H	---	
2.39	Intergranular Corrosion Test	IGC	Corrosion rate (Weight)	1 Sample/m elt/Heat Treatment Batch	PC-M-962 Rev 01 Procedure for IGCT : To be submitted	TC	√	P	H	H	≤ 0.6 mm/year	
2.40	Roughness Control	Surface Finish	Surface roughness	1% per shift	PC-M-962 Rev 01 Procedure for Surface Roughness check: To be submitted	TC	√	P	H	H	Ra<1.6µm on ID Ra<3.3 µm on OD	

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SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

NPCIL
17/09/2019

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:12 of 14			Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
2.41	Tensile Test Room Temperature	Mechanical property	Destructive Test	1 Sample/Lot	PC-M-962 Rev 01 Procedure for Tensile Test : To be submitted	TC	√	P	H	H	Tensile strength: 569-697 MPa 0.2%Yield strength: 334-471 MPa Elongation on 5d ≥30% on Full Size specimen	
2.42	Tensile Test at 350°C	Mechanical property	Destructive Test	1 Sample/Lot	PC-M-962 Rev 01 Procedure for Hot Tensile : To be submitted	TC	√	P	H	H	Tensile strength ≥495 MPa 0.2%Yield strength: ≥295 MPa Elongation to be reported on full size specimen.	
2.43	Flare Test	No Crack(Flare sample)	Flare Up	100%(At both sides of each Tube)	PC-M-962 Rev 01 Procedure for Flare Test: To be submitted	TC	√	P	H	H	OD Increase ≥30%	
2.44	Micro , Macro and Grain Size	Grain Size	Metallographic	1 sample/Lot	ASTM E 112 PC-M-962 Rev 01 Procedure for Micro, Macro etch and Grain size: To be submitted	TC	√	P	H	H	Grain size Number shall be STM Micro Grain Size Number 8 or finer. Attempts shall be made to achieve a grain size of 10 or finer.	

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC:TEST CERTIFICATE RD:RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

N.P.K.
17/02/2024

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes								Generic QP: GQP/U Tube/01 Rev 00	
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:13 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier							
3.0 Final Inspection												
3.1	Final cleaning Control	ID& OD Surface cleanliness	Visual & Boroscopic for ID & Visual for OD	100%	PC-M-962 Rev 01 Cleaning procedure: To be submitted. Boroscopic Inspection Procedure:To be submitted.	TC	√	P	H	H	Bright Finish at ID&OD for both straight and U Tube supply.	
3.2	Material Mix up Test	Material Inspection	PMI	100%	PC-M-962 Rev 01	TC	√	P	W	R	---	
3.3	Final Compilation of all test reports/ Dimensional reports	All Test & Inspection Review	Visual & Review	100%	---	--	---	P	H	H	---	
3.4	Documents (Test Certificates) shall be sent to BHEL/Trichy prior to dispatch. Dispatch clearance will be given after Acceptance of Test Certificates by BHEL&NPCIL)											
3.5	Packing and Shipment	Cleaning & Packing	Visual & Packing	100%	Packing procedure :To be submitted	--	---	P	H	H	--	
3.6	Final Documentation	Six copies	Set of Test reports	100%	---	--	√	H	H	H	---	

Note:

1. The repaired area shall be inspected by both UT & ECT (after completion of repair work) , irrespective of the method by which the defects got revealed.
2. A "lot" shall consist of 100 Tubes Max/Each Melt/Each Heat Treatment Batch.
3. All the test/dimensional reports and certificates shall indicate the relevant QAP stage Number also.
4. Trial assembly of U Tubes shall be carried out as per drawing No: 2-HE-171-01076/Latest
5. Defect catalogue to be submitted as per clause 6.4 of PC-M-962.

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC:TEST CERTIFICATE RD:RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

M.P.M.
17/07/2024

Supplier's LOGO	Supplier's Name and Address	Quality Plan for U Tubes & Straight Tubes		Generic QP: GQP/U Tube/01 Rev 00
		Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No: 14 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier

6. Following Procedures/Documents shall be submitted for approval:

Sl No		Sl No	
1	UT Procedure for Billet	17	Stress Measurement
2	Cleaning procedure adopted during various stages	18	Stress Corrosion Crack Test
3	Eddy Current Test	19	Glass Bead Peening Qualification
4	Ultrasonic Examination (OD, Wall thickness measurement) –Final Cold drawn Tubes	20	Glass Bead Peening- Production
5	Repair Procedure	21	Permanent Marking
6	ID Blasting	22	Quantitative Measurement of contaminants
7	OD Polishing	23	Product Analysis-Chemistry
8	Boroscopic Examination	24	IGC Test
9	Hydrostatic Test	25	Tensile Test- Room Temperature
10	Extraction of Samples(Material Sampling and Testing Plan)	26	Tensile Test at 350°C
11	Bending Qualification	27	Flare Test
12	Liquid Penetrant Examination	28	Micro structure, Macro etch & Grain Size determination
13	Ball Passage Test	29	Packing procedure
14	Surface Roughness Checking	30	Heat Treatment plan
15	Hardness Test	31	MPP(Manufacturing Process Plan)
16	Tube Bending- Production		

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled	BHEL	NPCIL		