

Supplier's LOGO	Supplier's Name and Address	Quality Plan for Spacer Tubes						GQP NO: GQP/SG/FLEET/11 Rev 00		
		Item: Spacer Tubes (OD25x4mm thick) Material: DIN EN 10216-5: 1.4571 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.: 1 of 4			Project: Fleet 700MWe SGs		

Sl. No	Component & Operations	Characteristics	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Agency			Remarks
									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 :Vacuum Degassing	Steel melting	Record Verification	100%	PC-M-961 MPP: To be submitted	TC	√	P	--	--	--	Steel shall be fully killed
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Melt	PC-M-961 DIN EN 10216-5	TC	√	P	R	R	--	--
1.3	Billet casting	Free from defects	Visual/Record verification	100%	MPP: To be submitted	RD	--	P	--	--	--	--
2.0	In process Controls :											
2.1	Operations from Billet to Tube : To be elaborated by Supplier	Process parameters	Record Verification	100%	PC-M-961 MPP: To be submitted	TC	√	P	R	R	--	--
2.2	Visual & Identification of Tubes	Visual & Identification	Verification and Visual	100%	PC-M-961	RD	--	P	R	--	--	--
2.3	Heat Treatment (Solution Annealing)	R.O.H , Soaking Temp & Time, R.O.C,	Review of HT Chart	100%	PC-M-961 HT Plan: To be submitted	TC	√	P	R	R	HT chart to be signed & submitted along with TC.	--

				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. S. S.
08/03/2022

Supplier's LOGO	Supplier's Name and Address	Quality Plan for Spacer Tubes					GQP NO: GQP/SG/FLEET/11 Rev 00 Project: Fleet 700MWe SGs				
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2.4	Ultrasonic Examination (Longitudinal & Transverse Imperfection)	Internal Soundness	Ultrasonic Test	100%	EN ISO 10893-10 acceptance level U2, sub category C UT procedure: To be submitted.	TC	√	P	H	H	---
2.5	Pickling and Passivation	Completeness	Visual and Passivity Check	100%	PC-M-961, ASTM A380	TC	√	P	W	W	10% random witness by BHEL & NPCIL
2.6	Identification of Test coupon	Identification	Visual	100%	PC-M-961 DIN EN 10216-5	RD	√	P	W	W	---
3.0	Chemical, Mechanical and Metallurgical Tests :										
3.1	Product analysis	Chemistry	Chemical analysis	1 /melt/ HT Batch	PC-M-961 DIN EN10216-5	TC	√	P	W	W	---
3.2	Tensile at RT	Tensile Strength, Proof Strength (0.2% & 1%), % Elongation	Destructive Test	2 / melt/ HT Batch	PC-M-961 DIN EN 10216-5 EN ISO 6892-1	TC	√	P	H	H	---
3.3	Tensile at 350° C	0.2% & 1.0% proof strength	Destructive Test	1 /melt/ HT Batch	PC-M-961 DIN EN 10216-5 EN ISO 6892-2	TC	√	P	H	H	---
3.4	Corrosion Test (after sensitization)	Inter Granular Corrosion	IGC Test	1 /melt / HT Batch	PC-M-961 ASTM A 262 Practice-E	TC	√	P	H	H	Sensitization-650° x 30 Minutes
3.5	Ring Expanding Test or Drift Expanding Test	Ring Expanding Test or Drift Expanding Test	Destructive Test	10% per melt / HT Batch	DIN EN10216-5, EN ISO 8495 or EN ISO 8493	TC	√	P	H	H	---
3.6	Micrograph & grain size	Micro structure, Grain Size	Micro test , Grain size check	1/ melt / HT Batch	PC-M-961 ASTM E112 Grain Size to be reported.	TC	√	P	W	W	---

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SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

N.P.M.
08/02/2022

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3.7	Hardness	Hardness	Brinell / Rockwell /Vickers Hardness	1/ melt / HT Batch	PC-M-961 Hardness value to be reported	TC	√	P	W	W	---
3.8	Hydro Test	Leak Tightness Check	Hydro Test	100%	PC-M-961 DIN EN 10216-5 Procedure: To be submitted.	TC	√	P	H	H	Randomly 10% will be witnessed by BHEL & NPCIL
3.9	Final Dimensional check of Tubes	Dimensions	Measurement	100%	Drg No/P.O No: To be filled	TC	√	P	H	H	
4.0 Final Inspection											
4.1	Visual Inspection of Tubes	Free from visual defects	Verification and Visual	100%	PC- M-961	TC	√	P	H	W	---
4.2	Marking	Sl No, Heat Number, , Material designation, , Supply condition, Inspectors Seal, Manufactures name , P.O Number.	Verification and Visual	100%	PC- M-961	TC	√	P	W	R	---
4.3	Mix up Test	Positive Material Identification	PMI Test	100%	PC- M-961	TC	√	P	H	W	10% random witness by NPCIL
4.4	Certification and Documentation Control	Order compliance	Certificate compilation	100%	PC- M-961	TC	√	P	R	R	---
4.5	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)					RD	--	P	H	H	---

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SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

M.P.S.
08/03/2022

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4.6	Packing & Shipment	Packing	Visual	100%	PC- M-961	---	--	P	--			---

Notes:

- MPP (Manufacturing Process plan), Heat Treatment Plan, Hydro Test procedure, NDE Procedures, Report Formats, Other relevant Procedures etc shall be submitted by Supplier and the same will be subjected to both BHEL&NPCIL approval.
- Surface finish of CFG tubes: 3.2 microns(CLA) for both internal and external surfaces.
- Spacer tubes are in Secondary Side of steam Generator. (Not in Primary Side of Steam Generator).
- Residual Copper content shall not be more than 0.3% as per product analysis.
- Stage wise inspection document shall be completed/concluded with signature of all agencies including "BHEL" & "NPCIL/TPI" before taking up and presenting the next stage for inspection.
- Calibration certificate of furnace along with thermocouples, data loggers & temperature recorders, etc. shall be submitted for review and acceptance.
- For Raw material, only original co-related mill test certificate in the name of Supplier is acceptable.
- H: Hold Point: NPCIL witness/clearance is mandatory before proceeding with further activities.
- W: Witness point: Supplier is obliged to notify the BHEL/QC & NPCIL/QS sufficiently in advance the start of operations/test so that same may be witnessed
- All the test reports / certificates / Inspection reports shall be reviewed and accepted (by signing and stamping) before submitting to BHEL/QC & NPCIL/QS
- Acceptance of the Chemicals used for LPI is subjected to approval of NPCIL.
- Qualification of NDE personnel shall be submitted for approval of BHEL & NPCIL
- Repairs by Welding are prohibited.
- After completion of each stage, all concerned persons shall sign the QAP against each stage inspection. The original QAP shall be kept with Supplier till the final stage is completed and signed by all concerned. This document shall be one of the basis of issuing the Shipping Release. The final signed QAP shall be part of History Docket.

- BHEL -

- Prepared -
N. S. Lakshmi
08/03/2022
[NIPATHAN-OR]

- Reviewed & Approved -
S. Lakshmi
08/03/2022
[S. LAKSHMI]

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