

Supplier's LOGO	Supplier's Name and Address	Quality Plan for Spacer Tubes						QP NO: SPACER TUBE:01 Rev 02 Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171				
		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 3							
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.
2.4	Pickling and Passivation	Completeness	Visual and Passivity Check	100%	PC-M-961, ASTM A380		TC	√	P	W	W	10% random witness by BHEL & NPCIL
							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								

-Prepared -
N. Lakshmi
09/04/2021
[NITHAN.O.R.]

-Reviewed & Approved -
S. Lakshmi
09/04/21
[S. LAKSHMI / SDGM/QA]

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2.5	Identification of Test coupon	Identification	Visual	100%	PC-M-961 DIN EN 10216-5	RD	√	P	W	W	---
2.6	Mechanical and Metallurgical Tests :										
2.7	Product analysis	Chemistry	Chemical analysis	1 /melt/ HT Batch	PC-M-961 DIN EN10216-5	TC	√	P	W	W	---
2.8	Tensile at RT	Tensile Strength, Yield Strength (0.2% offset), % Elongation	Destructive Test	2 / melt/ HT Batch	PC-M-961 DIN EN 10216-5	TC	√	P	H	H	---
2.9	Tensile at 350° C	0.2% & 1.0% proof strength	Destructive Test	1 /melt/ HT Batch	PC-M-961 DIN EN 10216-5	TC	√	P	H	H	---
2.10	Corrosion Test (after sensitization)	Inter Granular Corrosion	IGC Test	1 /melt / HT Batch	PC-M-961 ASTM A 262 Practice-E	TC	√	P	W	W	Sensitization-650° x 30 Minutes
2.11	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 8495:2004 or EN ISO 8493:2004	TC	√	P	H	H	---
2.12	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	---
2.13	Hardness	Hardness	Brinell / Rockwell /Vickers Hardness	1/ melt / HT Batch	PC-M-961 Hardness value to be reported	TC	√	P	W	W	---
2.14	Hydro Test	Leak Tightness Check	Hydro Test	100%	PC-M-961 DIN EN 10216-5 Procedure: To be submitted.	TC	√	P	W	W	Randomly 10% will be witnessed by BHEL & NPCIL
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Prepared		Reviewed & Approved		Reviewed & Approved		Reviewed & Approved					
SUPPLIER'S NAME: To be filled		BHEL		NPCIL							

Signature
09/04/2021

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2.15	Final Dimensional check of Tubes	Dimensions	Measurement	100%	Drg No/P.O No: To be filled	TC	√	P	H	H	
3.0 Final Inspection											
3.1	Visual Inspection of Tubes	Free from visual defects	Verification and Visual	100%	PC- M-961	TC	√	P	H	W	---
3.2	Marking	SI 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	---
3.3	Mix up Test	Positive Material Identification	PMI Test	100%	PC- M-961	TC	√	P	H	W	10% random witness by NPCIL
3.4	Certification and Documentation Control	Order compliance	Certificate compilation	100%	PC- M-961	TC	√	P	R	R	---
3.5	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	---
3.6	Packing & Shipment	Packing	Visual	100%	PC- M-961	---	--	P	--		---

Note:

1. MPP(Manufacturing Process plan), Heat Treatment Plan, Hydro Test procedure shall be submitted by Supplier and the same will be subjected to both BHEL&NPCIL approval.
2. Surface finish of CFG tubes: 3.2 microns(CLA) for both internal and external surfaces.
3. Spacer tubes are in Secondary Side of steam Generator. (Not in Primary Side of Steam Generator).

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

N. P. R.
09/07/2021