


<div>  <div> <b>BHEL</b>  <b>HYDERABAD-32</b> </div> <div> <b>STANDARD QUALITY PLAN</b>  <b>Item : WELDED SS STRAIGHT TUBES FOR DRAIN COOLER</b> </div> <div> BHEL Spec. No. : HE 51103 Rev. 18 BHEL Drg. No. : As per P.O. </div> <div> QP No. : <b>HY/HE/005/ST-TUBE</b>  Revision : <b>03</b>  Date : 30.09.2010 </div> </div>													
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SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										S	M	C	
1.0	<b>RAW MATERIAL INSPECTION</b>												
1.1	Coil	a) Identification of coil markings w.r.t. TC	Major	Visual	100%	Test Certificate	HE 51103 Rev.18 & PO	TC & Inspn. Record		P	V	V	Note 1
		b) Visual & Dimn. Exam	Major	Visual & Measurt.	100%	Test Certificate	HE 51103 Rev.18 & PO	TC & Inspn. Record		P	V	V	
1.2	Verification of Coil Test Certificate	a) Chemical comp.	Major	Visual & Measurt.	100%	Test Certificate	HE 51103 Rev.18 & PO	TC & Inspn. Record	✓		P	V	C 0.05% max. CHP
		b) Mech. Properties	Major	Visual & Measurt.	100%	Test Certificate	HE 51103 Rev.18 & PO	TC & Inspn. Record	✓		P	V	
2.0	<b>IN PROCESS INSPECTION</b>												
2.1	Tube Forming & Welding	Welding parameters	Major	Visual	Periodic checking	Mfr. Std.	Mfr. Std.	Inspn. Record			P		
2.2	ID Bead Rolling	ID Bead Height	Major	Measurt.	Random	Mfr. Std.	Mfr. Std.	-do-	✓		P	V	
2.3	OD Bead Grinding	Surface Condition	Major	Visual	100%	Mfr. Std.	Mfr. Std.	-do-			P		
2.4	Intermediate / final drawing	Solution annealing after drawing operation	Major	Heat treatment	100%	Mfr. Std.	Mfr. Std.	-do-			P		Note 2
2.5	Tube washing	Surface condition	Major	Visual	100%	Mfr. Std.	Mfr. Std.	-do-			P		
2.6	Bright Annealing	Solution Annealing in inert atmosphere	Major	Heat treatment	100%	Mfr. Std. & SA688	Mfr. Std. & SA688	HT Chart	✓		P	V	Note 3
2.7	Final sizing	OD & surface condition	Major	Measurt.	100%	HE 51103 Rev.18 & PO	HE 51103 Rev.18 & PO	Inspn. Record			P		
2.8	Straightening	Straightness	Major	Visual	100%	HE 51103 Rev.18 & PO	HE 51103 Rev.18 & PO	Inspn. Record			P		
2.9	Eddy Current test	Internal flaws	Major	NDE	100%	ASTM E426 & SA688 S1	ASME SA450	Supplier TC	✓		P	W *	*10% for online & 100% for offline
2.10	Ultrasonic test	Internal flaws	Major	NDE	100%	ASTM E213	ASME SA450	Supplier TC	✓		P	W #	#10%

**Legend:** \*D- Documents marked (✓) to be included by Supplier in Documentation Package.

**S** - Sub Vendor

**P** - Perform

**C of C** : Certificate of Compliance

**M** - Vendor / Manufacturer

**W** - Witness

**Mfr.** : Manufacturer

**C** - BHEL/ Third Party Inspection Agency

**V** - Verify

**Measurt.:** Measurement

**PREPARED BY:**


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		<b>BHEL HYDERABAD-32</b>	<b>STANDARD QUALITY PLAN</b>						QP No. : <b>HY/HE/005/ST-TUBE</b> Revision : <b>03</b> Date : 30.09.2010				
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2.11	Cut to length with allowance	Length	Major	Measurt	100%	HE 51103 Rev.18 & PO	HE 51103 Rev.18 & PO	Inspn. Record			P		
2.15	Residual circumferential stress	Stresses	Major	Measurt	One specimen per lot	HE 51103 Rev.18	Max. 4Kg/mm2	Inspn. Record				W	Procedure for residual stress measurement as approved by BHEL to be followed
3.0	<b>FINAL INSPECTION</b>												
3.1	Hydrostatic testing	Pressure, Time, Leakage	Major	Visual	100%	ASTM A450	ASTM A450	Supplier TC	✓		P	W	Note 4
3.2	Cut to length, deburr	Length, edge condition	Major	Measurt	100%	HE 51103 Rev.18 & PO	HE 51103 Rev.18 & PO	Insp. Record			P		
3.3	Dimn. conformity & visual exam.	OD, Thickness, Length, Straightness, Edge burrs., surface condition	Major	Visual & Measurt.	100%	Drg. / PO	Drg. / PO	Insp. Record	✓		P	W *	* Verify & Random witness
3.4	Test on Tubes	a. Chemical composition	Major	Chemical	As per Spec.	SA688 TP304, SA450 & PO	SA688 TP304, SA450 & PO	Suppliers TC	✓		P	V	C 0.05% max.
		b. Tensile testing	Major	Mech.	-do-	SA688 TP304 & PO	SA688 TP304 & PO	Suppliers TC	✓		P	W	
		c. Hardness testing	Major	Mech.	-do-	SA688 TP304, SA450 & PO	SA688 TP304, SA450 & PO	Suppliers TC	✓		P	W	
		d. Reverse Bend test	Major	Mech.	-do-	SA688 TP304 & PO	SA688 TP304 & PO	Suppliers TC	✓		P	W	
		e. Flattening test	Major	Mech.	-do-	SA688 TP304, SA450 & PO	SA688 TP304, SA450 & PO	Suppliers TC	✓		P	W	
		f. Flaring test (2 samples)	Major	Mech.	-do-	SA688 TP304, SA450 & PO	SA688 TP304, SA450 & PO	Suppliers TC	✓		P	W	
		g. Flanging test	Major	Mech.	-do-	SA688 TP304, SA450 & PO	SA688 TP304, SA450 & PO	Suppliers TC	✓		P	W	

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**C** - BHEL/ Third Party Inspection Agency                      **V** - Verify                      Measurt.: Measurement

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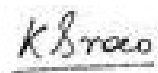


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AGM / QA

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		h. Inter granular corrosion testing	Major	Met.	-do-	SA688 TP304 & PO	SA688 TP304 & PO	Suppliers TC	✓		P	V	
		i. Residual Chloride	Major	Chem.	-do-	SA688 TP304 & PO	SA688 TP304 & PO	Insp. Record	✓		P	V	
4.0	Packing & despatch	Verification of all TCs for completion.	Major	Visual	100%	PO, Spec, Drg. & QP	PO, Spec, Drg. & QP	Insp. Record			P	V	
		Identification, preservation & packing	Major	-do-	-do-	PO / Drg & AA0490002	PO / Drg & AA0490002	Insp. Record			P	V	Note 5

**Notes :**

- 1) In case of indigenous vendors, the raw strip used for manufacturing the tubes shall be procured from BHEL approved Vendors.
- 2) Intermediate solution annealing shall also be done in Bright Annealing furnace only.
- 3) Straight tubes shall be cleaned and bright annealed at a temperature of 1040°C min. followed by quenching to below 370° C.
- 4) 'Hydrostatic testing' of tubes shall be carried out with demineralised water. Chloride content of DM water shall not be more than 10 ppm max.
- 5) Tubes shall be packed in sea worthy packing & shall be capable of with standing mechanical damages during transit.
- 6) Project specific requirements, if any, as per P.O. shall also be complied with.
- 7) Lubricants used in tube drawing operation shall be non-chlorinated (50 ppm chlorides or less). All cleaning compounds shall be chloride and caustic free. Each cleaning operation shall be followed by a rinse or rinses with water, the final rinse shall be with demineralised water containing not more than 10 ppm chlorides.

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