

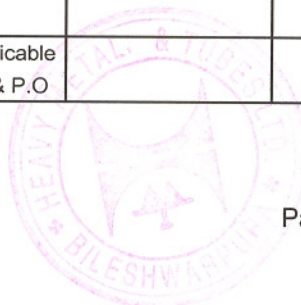
# Heavy Metal & Tubes Ltd

## Quality Assurance Plan for Stainless Steel Welded 'U' Tubes

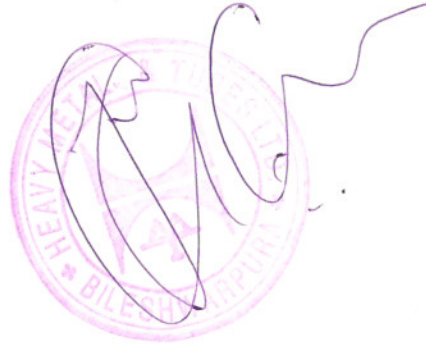
Sr.No	Operation	Quality Characteristics Checked	Reference Standard	Instrument used	Testing Carried Out	Type of record keeping	Remark	Responsibility
1	2	3	4	5	6	7	8	9
1	Coil	[A] Dimensions	As per Applicable Standard	With & Thickness Checking	HMTL	Format	Random Checking of Dimensions	Q.C.Dept.
1.1		[B] Surface		Visual	HMTL		Random Checking of surface inspection	Q.C.Dept.
1.2		[C] Chemical Analysis	As per Applicable Standard & P.O.Requirments	Spectro metre	HMTL	Format	Chemical analysis results compared with ladle analysis as per applicable standard(One Sample / Heat)	Q.C.Dept.
2	Tube Forming & Welding	Welding Parameters	As per internal Procedure		HMTL		Random checking of Physicl testing .	Q.C.Dept.
3	Intermediate drawing ( If Applicable)	Visual & Dimension	As per Applicable Standard & P.O.Requirments	OD & Thickness				
4	Digressing		As per internal Procedure	Lab	HMTL		Random Checking once in a day	Chemist
5	Heat treatment	(A) Temperature	As per Applicable Standard & P.O.Requirments	Automatic Temp. controller	HMTL	Format	As per Applicable Specification & P.O.Requirments.	Production & Q.C. Department
5.1		(B) Speed & Feed	Depends on tubes thk & size of tube		HMTL	Format	Speed & Feed checking for maintaining soaking time (Depends on OD & Thk of the tubes)	Production & Q.C. Department

5.2		© Hardness	As per Applicable Standard & P.O.Requirments	Rckwell Superfical Hardness Tester & Rockwell Hardness Tester	HMTL	Format	Random Checking	Production & Q.C. Department
6	Straightening	A) Dimensions	As per Applicable Standerd & P.O.Requirement	Micrometer .	HMTL	Format	Random Checking as per applicable standard	Production & Q.C. Department
6.1		B) Surface		Visual			Random checking for straightening marks,dents & any other mechanical damages which are visible in straightening condition	Production & Q.C. Department
7	End Cutting	Length checking	P.O.Requirment	Mesuringtap	HMTL	Format	Random checking	Production dept
8	Air Under Water test [If Applicable]	NDT	10Kg/sq.cm	Air Under Testing	HMTL	±	100%	Q.C.Dept
9	Eddy Current [ If Applicable]	Non Destructive testing	ASTM-A-450/ E-426 & P.O	Eddy current testing machine	HMTL	Format	100%	Q.C.Dept
10	Ultrasonic test [if applicable]	Non Destructive testing	ASTM E-213 & P.O	Ultrasonic testing machine	HMTL	Format	100%	Q.C.Dept
11	Mechanical testing	A) Tensile test	As per Applicable standard & P.O	Tensile testing Machine	HMTL	Format	Tensile test carried out random as per standard	Q.C.Dept
11.1		B)Hardness	As per Applicable Standard & P.O	Rckwell Superfical Hardness Tester & Rockwell Hardness Tester	HMTL	Format	Random Checking as per applicable standard	Q.C.Dept.
11.2		C) Flaring & Flattening	As per applicable Standard & P.O	Tensile testing Machine	HMTL	Format	Testing conducted as per standard	Q.C.Dept
11.3		D) IGC & Micro [If Applicable]	As per Applicable Standerd & P.O.Requirement		HMTL & At out side approved lab as demand		As per Applicable Specification & P.O.Requirments.	Q.C.Dept

11.4		Residual Stress	As Per Procedure		HMTL	Format	As per Applicable Specification & P.O.Requirements.	Q.C.Dept
12	Chemical	Product Analysis	As per Applicable Standard & P.O.Requirement	Spectro metre	HMTL	Format	As per Applicable Specification & P.O.Requirements.	Q.C.Dept
13	Mock Up Test	Thinning & Ovality	As per Applicable Standard & P.O.Requirements	Micro Metre & Thickness Ultrasomic metre	HMTL	Format	As per Applicable Specification & P.O.Requirements.	Q.C.Dept
14	U-Bending	Surface		Visual	HMTL		Random Checking of surface inspection	Production Dept
14.1		B) Dimension & Radius	As per Applicable Standard & P.O.Requirements	Micrometer[for OD & Thickness Checking] & Measuringtap	HMTL		Random Checking As per applicable standard	Production Dept
15	End Cutting	Length checking	P.O.Requirement	Mesuringtap	HMTL	Format	Random checking	Production dept
16	Solution Annealing On 'U' Bendportation + 300 mm Leg Length	Temperature	As per Applicable Standard & P.O.Requirements	Automatic Temp. controller	HMTL	Format	As per Applicable Specification & P.O.Requirements.	Production & Q.C. Department
17	Hydrotesting	Test Pressure	As per Applicable Standard & P.O.Requirement	Hydrotesting	HMTL	Format/Register	100% Checking by keeping of pressure for minimum of 5 seconds	Production & Q.C. Department
18	Final Cutting	A) Dimensions	As per Applicable Standard & P.O.Requirements	Micrometre & Mesuringtap	HMTL	Format	Random Checking as per applicable standard	Production & Q.C. Department
19	Final Inspection	A) Dimensions	As per applicable Standard & P.O	Micrometre, Vernier , Measuringtap.	HMTL	Format/Register	100 % Checking	Q.C Dept
19.1		B) Surface			HMTL	Format/Register	100% Visual Inspection	Q.C.Dept
19.2		C) D.P.Test	As per applicable Standard & P.O		HMTL	Format	100 % Checking	Q.C Dept



20	Marking	For Identification			HMTL		Manufacturer trade mark,OD,Thk,Length,Spec.,Grade,Heat No and as Specified by	Q.C.Dept
21	Packing	Soundnes of packing	As per P.O		HMTL	Formet	As Per P.O	Despatch



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