MW catalogue

MW Metal , Makes it Wonderful !

Company Profile

MW Metal Industry Limited / MW Stainless Steel industry limited, is a leading manufacturer of high-quality welded stainless steel tubes. We own three production plants and one sales center. The whole scale of ornamental tube/industrial pipe/sanitary pipe plants reach 35000 square meters, and total annual output of different tubes and pipes reaches 30000 tons.

With 20+ years of experience, MW have established ourselves as a trusted source for a variety of markets. We offer a broad range of welded stainless steel pipes and tubes, providing customized sizes and shapes to meet our customers' specific needs, including material of grade 304/304L/316L/409L/430/439/441/200 serious and duplex stainless steel, covering different standard of ASTM A554/A249/A269/A270/A789 and EN 10296-2/EN 10217-7/EN 10312/EN 10357.

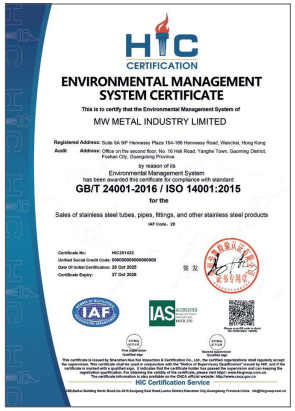
MW has a team of experienced professionals who are dedicated to developing innovative solutions and providing excellent customer service. Our state-of-the-art facilities and advanced technology allow us to produce high-quality products efficiently and effectively, ensuring timely delivery and competitive pricing.

At our factory, we prioritize environmental sustainability and responsibility, and we take steps to minimize our impact on the environment. We aim to be a leading example of eco-friendly manufacturing practices in the industry. Contact us today to learn more about how we can meet your tubing needs.

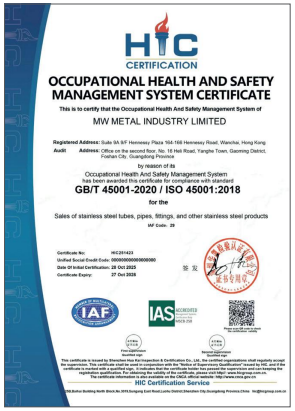
Certificate

Years of dedication have earned MW Metal key credentials, including management systems and pressure equipment certifications.

ISO 9001



ISO 14001



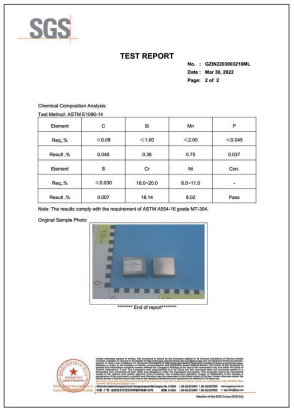
ISO 45001

ISO 9001

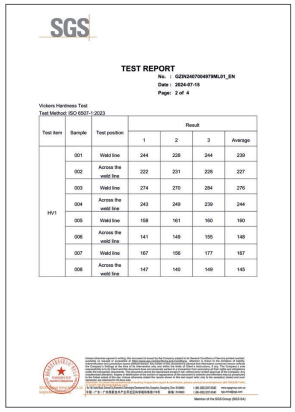
AD2000

PED 2014/68/EU

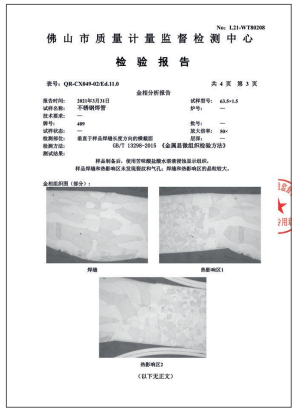
Certificate



SGS Chemical composition report



SGS Harness test report



Metallographic Analysis Report

MW METAL INDUSTRY LIMITED

No.16, He Li Road, Yang He Town, Gaoming District, Foshan, Guangdong, China
TEL/FAX: 0086-757-8560-3840, Mobile：0086-1379-409-8677 Contact： Catherine Zhu

CERTIFICATE OF QUALITY ACC. TO EN 10204- 3.1.

Product Name: Stainless Steel Welded Tube	**Product Standard: EN 10357**		**Date: 23rd, April, 2025**
Delivery Condition: CC, ID & OD pickled + internal bead removed		**Tolerance: D3/T3**	**PO#:**
Raw Material Specification: ASTM A240/ EN 10028-7 Cold Rolled SS. Coil		**The country of melt and pour: China**	**Invoice No.:**
Route: 03	**Welding Factor: 1.0**	**Longitudinal Welding**	**LC No.:**
Material: 1.4404/ AISI 316L	**HS Code of Raw Material: 721933**		

Customer:									**Standard: EN 10357**					**Certificate No.: MW-HSS2025042301**							
									Mechanical Test					**Chemical Composition(%)**							
No.	**Steel Grade**	**Lot No.**	**Heat No.**	**OD (mm)**	**THK (mm)**	**Length (mm)**	**Finish**	**QTY (pcs)**	**(YS) Rp0.2% MPa**	**(YS) Rp1.0% MPa**	**Elongation EL % A**	**(TS) Tensile Strength Mpa Rm**	**Hardness HRB**	**C**	**Si ≤1.0**	**Mn ≤2.0**	**P ≤ 0.045**	**S ≤ 0.015**	**Cr**	**Ni**	**Mo**
1	316L	MW24112406	112424-316150	38.1	1.50	300	ID & OD pickled + internal bead removed	100	248	286	58	681	84	0.023	0.525	1.321	0.040	0.002	16.738	10.096	2.040
2	316L	MW24112406	112424-316150	50.8	1.50	255	ID & OD pickled + internal bead removed	150	248	286	58	681	84	0.023	0.525	1.321	0.040	0.002	16.738	10.096	2.040
3	316L	MW24112406	112424-316150	63.5	1.50	300	ID & OD pickled + internal bead removed	100	248	286	58	681	84	0.023	0.525	1.321	0.040	0.002	16.738	10.096	2.040

Certification:
ISO 9001: 2015
TN/AD2000-W0/2660/23
Directive 2014/68/EU (Pressure Equipment Directive)

Qualification:
WPQR No.: WPQRJSX2301, WPS No.: PWPSJSX2301, DIN EN ISO 15613,
Weld operator's certificate: DIN EN ISO 14732
Supervisor for Non-destructive testing: AD 2000, DIN ISO 9712

No tubes are in repaired welded condition. Tubes are NOT heat-treated. The belowed inspection and tests are carried out and approved by MW Metal according to EN 10217-7 TC1.

Cast Anakysis	**Visual Examination**	**Dimention Inspection**	**EN ISO 8493 Drift Expanding Test**	**EN ISO 8492 Flattening Test**	**EN ISO 5173 Weld Bend Test**	**EN ISO 10893-2 Non-destructive (Eddy Current Test)**	**EN ISO 3651-2 Intergranular Corrossion**
OK	OK	OK	OK	OK	OK	OK	-

We hereby certify that the products described herein have been manufactured and tested with satifactory results in accordance with the requirement of the above specification and order .
Material on this cerificate does not contain steel products originating in Russia mentioned in Annex XVII to the (EU) Regulation No 833/2014 and further amendment.
Quality Manager:

ASTM A554 EN 10296-2

Stainless steel welded tube with ASTM A554 (EN 10296-2) standard is the initial product of MW. After development of nearly 20 years, we are getting mature on workmanship, finish and appearance of tube. The plant to produce ornamental tube is 15000 square meters, with 26 welding lines and 10 polishing lines. Differing with other ornamental factories with single product, MW product range is much richer and complete, OD from 8mm to 323.9mm, WT from 0.6mm to 6.0mm, shape varies from round / square /rectangular to oval /slotted /embossed / triangle, process includes bright annealed and non-heat treatment. MW ASTM A554 (EN 10296-2) tube is widely used in every corner of your life: construction, decoration, automotive, and household supplies, making the world more wonderful.

Surface We can offer:

Round tubes: Mill Finish, Pickle Finish, 600G Polish, Satin Finish by 180G,240G,320G, 400G, 8K Mirror

Square & Rectangular Tubes: Mill Finish, Pickle Finish, Hairline finish by 180G,240G,320G, 600G Polish, 8K Mirror

Slot tubes: 6K Mirror, 8K Mirror, Hairline and Satin finish

Customized finish: Rose Golden, Titanium Golden, Copper, Wooden, Powder…

Available Grades and Chemical Requirements

Grade	Composition, %							
	C	Mn	P	S	Si	Ni	Cr	Mo
	max		max	max	max			
Austenitic								
201	0.150	8.0-12.0	0.06	0.030	1.00	1.0-2.5	13.0-15.0	
304	0.080	2.0 max	0.045	0.030	1.00	8.0-11.0	18.0-20.0	
304L	0.035	2.0 max	0.045	0.030	1.00	8.0-13.0	18.0-20.0	
316L	0.035	2.0 max	0.045	0.030	1.00	10.0-15.0	16.0-18.0	2.0-3.0
Ferritic								
409L	0.030	1.0 max	0.040	0.020	1.00	0.5 max	10.5-11.7	
430	0.120	1.00	0.040	0.030	1.00	0.5 max	16.0-18.0	
439	0.030	1.00	0.040	0.030	1.00	0.5 max	17.0-19.0	
441	0.030	1.00	0.040	0.030	1.00	1.0 max	17.5-19.5	

Mechanical Properties

Grade	Tensile Requirements					Hardness Requirements	
	Tensile Strength, min		Yield Strength, min		Elongation in 2 in. or (50mm), min	Brinell, max	Rockwell, max
	ksi	Mpa	ksi	Mpa	%		
304L & 316L	70	483	25	172	35	192	90
All other austenitic	75	517	30	207	35	192	90
409L	55	379	30	207	20	190	90
430	60	414	35	241	20	190	90
All other ferritic	60	414	35	241	20	190	90

Tolerances

ASTM A554 Wall Thickness/Outside Dimention Tolerances		
Wall Thickness Tolerances		
± 10% of specified wall thickness		
Round Tubing Outside Dimention Tolerances		
OD Size	Wall Thickness	OD,±
mm	mm	mm
Under 12.7	0.51 - 1.24	0.10
12.7-25.4	0.51 - 1.65	0.13
12.7-25.4	over 1.65 - 3.40	0.25
Over 25.4-38.1, incl	0.64 - 1.65	0.20
Over 25.4-38.1, incl	over 1.65 - 3.40	0.25
Over 38.1-50.8, incl	0.64 - 1.24	0.25
Over 38.1-50.8, incl	over 1.24 - 2.11	0.28
Over 38.1-50.8, incl	over 2.11 - 3.78	0.30
Over 50.8-63.5, incl	0.81 - 1.65	0.30
Over 50.8-63.5, incl	over 1.65 -2.77	0.33
Over 50.8-63.5, incl	over 2.77 - 4.19	0.36
Over 63.5-88.9, incl	0.81 - 4.19	0.36
Over 63.5-88.9, incl	over 4.19	0.51
Over 88.9-127.0, incl	0.89 - 4.19	0.51
Over 88.9-127.0, incl	over 4.19	0.64
Over 127.0-190.5, incl	1.24 - 6.35	0.64
Over 127.0-190.5, incl	over 6.35	0.76
Over 190.5-406.4, incl	all	0.00125 in./in.or mm/mm of cicumference
Square & Rectangular Outside Dimention Tolerances		
Largest Specified OD Across Flats	Wall Thickness	across flats, Convexity or Concavity, ±
mm	mm	mm
To 31.8, incl		0.38
Over 31.8-63.5, incl		0.51
Over 63.5-139.7, incl		0.76
Over 139.7-203.2, incl		1.52
Square & Rectangular Maximum Radii of Corners Tolerances		
Wall Thickness		Radii of Corners, max
mm		mm
Over 0.51-1.24, incl		2.4
Over 1.24-1.65, incl		3.2
Over 1.65-2.11, incl		3.6
Over 2.11-2.42, incl		4.8
Over 2.42-2.77, incl		5.2
Over 2.77-3.40, incl		5.6
Over 3.40-3.96, incl		6.4
Over 3.96-5.08, incl		9.5
Over 5.08-6.35, incl		12.7
Over 6.35-9.53, incl		19.1

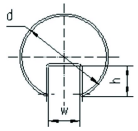
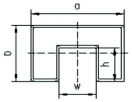
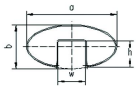
Round Tube Size List

OD(mm) \ WT(mm)	0.60	0.70	0.80	0.90	1.00	1.20	1.50	2.00	2.50	3.00	4.00	5.00	6.00
6	■	■	■	■	■								
7	■	■	■	■	■								
8	■	■	■	■	■								
9	■	■	■	■	■	■							
9.5	■	■	■	■	■	■							
10	■	■	■	■	■	■							
12 (12.7)	■	■	■	■	■	■	■	■					
13	■	■	■	■	■	■	■	■					
14	■	■	■	■	■	■	■	■					
15	■	■	■	■	■	■	■	■					
16 (15.9)	■	■	■	■	■	■	■	■					
18	■	■	■	■	■	■	■	■					
19	■	■	■	■	■	■	■	■					
20				■	■	■	■	■					
21.3				■	■	■	■	■	■				
22.22				■	■	■	■	■	■				
23				■	■	■	■	■	■				
25 (25.4)				■	■	■	■	■	■	■			
26.9				■	■	■	■	■	■	■			
28.6				■	■	■	■	■	■	■			
30					■	■	■	■	■	■			
32 (31.8)					■	■	■	■	■	■			
33.7					■	■	■	■	■	■			
35					■	■	■	■	■	■			
38.1					■	■	■	■	■	■			
40					■	■	■	■	■	■			
41.3					■	■	■	■	■	■			
42.4					■	■	■	■	■	■			
44.5					■	■	■	■	■	■			
45					■	■	■	■	■	■			
48.3					■	■	■	■	■	■			
50.8					■	■	■	■	■	■	■		
52					■	■	■	■	■	■	■		
53					■	■	■	■	■	■	■		
54					■	■	■	■	■	■	■		
57					■	■	■	■	■	■	■		
60.3					■	■	■	■	■	■	■		
63.5					■	■	■	■	■	■	■		
65					■	■	■	■	■	■	■		
70					■	■	■	■	■	■	■		
72					■	■	■	■	■	■	■		
73					■	■	■	■	■	■	■		
76.2					■	■	■	■	■	■	■		
80					■	■	■	■	■	■	■	■	
84					■	■	■	■	■	■	■	■	
85					■	■	■	■	■	■	■	■	
88.9					■	■	■	■	■	■	■	■	
100						■	■	■	■	■	■	■	■
101.6						■	■	■	■	■	■	■	■
108						■	■	■	■	■	■	■	■
114.3						■	■	■	■	■	■	■	■
127						■	■	■	■	■	■	■	■
129						■	■	■	■	■	■	■	■
133						■	■	■	■	■	■	■	■
139.7								■	■	■	■	■	■
152.4								■	■	■	■	■	■
154								■	■	■	■	■	■
159								■	■	■	■	■	■
168.3								■	■	■	■	■	■
180								■	■	■	■	■	■
203.2								■	■	■	■	■	■
204								■	■	■	■	■	■
219								■	■	■	■	■	■
273								■	■	■	■	■	■
323.9								■	■	■	■	■	■
325								■	■	■	■	■	■

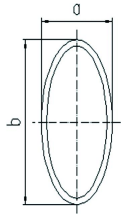
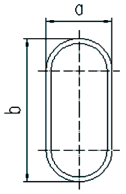
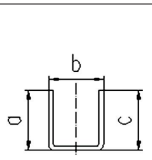
Square/Rectangular Tube Size List

OD(mm) \ WT(mm)	0.60	0.70	0.80	0.90	1.00	1.20	1.50	2.00	2.50	3.00	4.00	5.00	6.00
10*10	■	■	■	■	■	■	■						
12*12 (12.7*12.7)	■	■	■	■	■	■	■						
15*15	■	■	■	■	■	■	■						
16*16(15.9*15.9)	■	■	■	■	■	■	■						
19*19 (19.05*19.05)	■	■	■	■	■	■	■	■					
20*10				■	■	■	■	■					
20*20				■	■	■	■	■					
23*11				■	■	■	■	■					
25*13 (25.4*12.7)				■	■	■	■	■					
25*25 (25.4*25.4)				■	■	■	■	■	■				
25.4*19.05				■	■	■	■	■					
30*10					■	■	■	■					
30*15					■	■	■	■					
30*20					■	■	■	■					
30*30					■	■	■	■	■	■			
32*32(31.75*31.75)					■	■	■	■	■	■			
35*35					■	■	■	■	■	■			
38*20 (38.1*19.05)					■	■	■	■					
38*25					■	■	■	■	■				
38*38 (38.1*38.1)					■	■	■	■	■	■			
40*10					■	■	■	■					
40*15					■	■	■	■					
40*20					■	■	■	■					
40*40					■	■	■	■	■	■			
45*45					■	■	■	■	■	■			
50*10					■	■	■	■					
50*15					■	■	■	■					
50*20(50.8*19.05)					■	■	■	■	■				
50*25(50.8*25.4)					■	■	■	■	■				
50*30					■	■	■	■	■	■			
50*50(50.8*50.8)						■	■	■	■	■	■		
60*10						■	■	■					
60*15						■	■	■					
60*20						■	■	■					
60*30						■	■	■	■	■			
60*40						■	■	■	■	■			
60*60						■	■	■	■	■	■		
63.5*63.5						■	■	■	■	■	■		
65*65						■	■	■	■	■	■		
70*20						■	■	■					
70*30						■	■	■	■	■			
70*40						■	■	■	■	■			
70*50						■	■	■	■	■	■		
75*45						■	■	■	■	■			
75*50						■	■	■	■	■	■		
76.2*50.8						■	■	■	■	■	■		
80*20						■	■	■					
80*40						■	■	■	■	■			
80*60						■	■	■	■	■	■		
80*80						■	■	■	■	■	■	■	
90*40						■	■	■	■	■			
90*90						■	■	■	■	■	■	■	■
100*20						■	■	■					
100*30						■	■	■	■	■			
100*40						■	■	■	■	■			
100*50(101.6*50.8)						■	■	■	■	■	■	■	
100*100(101.6*101.6)						■	■	■	■	■	■	■	■
120*60							■	■	■	■	■	■	
120*80							■	■	■	■	■	■	
120*120							■	■	■	■	■	■	■
150*50								■	■	■	■	■	
150*100								■	■	■	■	■	■
200*100								■	■	■	■	■	■
200*150								■	■	■	■	■	■
200*200								■	■	■	■	■	■

Slot Tube Size List

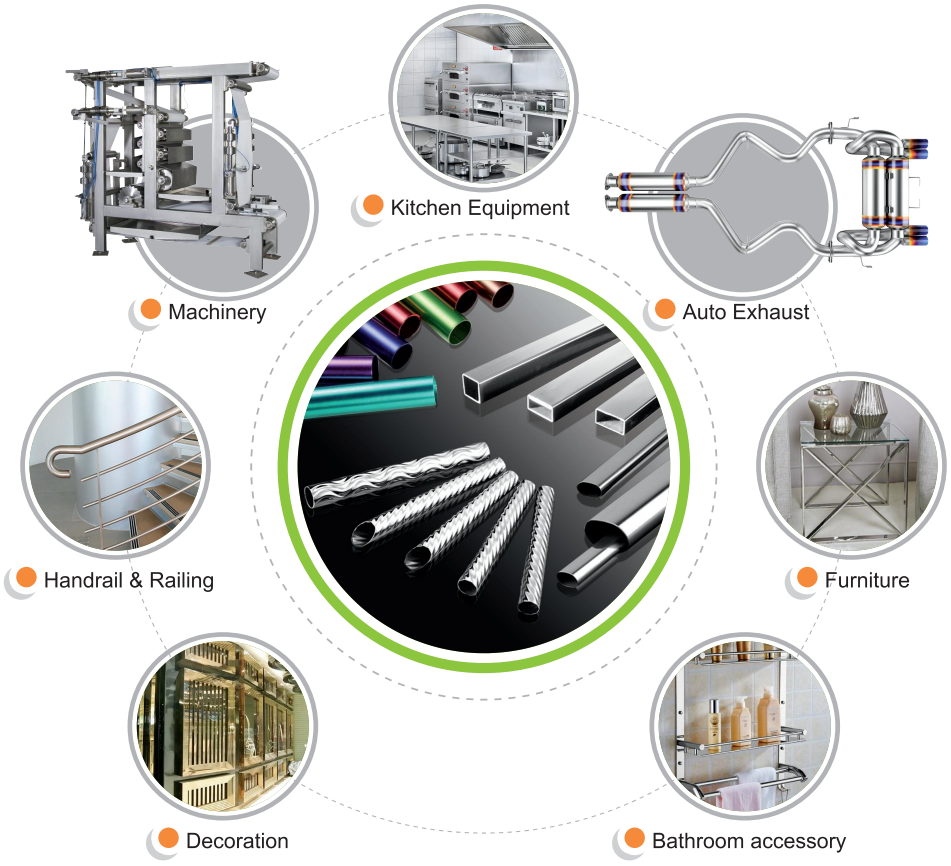
Drawing	OD d/a*b*c	Slot w*h	Drawing	OD d/a*b*c	Slot w*h
	φ25.4	14*14		25*13	19*8
	φ28	6*6		25*25	14*14
	φ31.8	15*15		25*21	14*14
	φ38.1	15*15		25.4*21	14*14
	φ38.1	18*16		28.6*25.4	14*14
	φ38.1	20*20		30*30	12*12
	φ38.1	23*17		30*30	15*15
	φ38.1	19*22.5		32*32	15*15
	φ42.4	15*15		38*25	15*15
	φ42.4	24*24		38*38	15*15
	φ42.4	28*23.6		38*38	20*20
	φ42.4	30*21		40*30	24*24
	φ45	20*20		40*30	30*21
	φ48.3	24*24		40*40	15*15
	φ48.3	27*30		40*40	20*20
	φ48.3	29*29		40*40	24*24
	φ50.8	15*15		50*25	15*15
	φ50.8	15*20		50*50	15*15
	φ50.8	20*20		50*50	20*20
	φ50.8	20*25		50*50	25*25
	φ50.8	25*25		50.8*50.8	27*30
	φ50.8	30*30		60*30	28*15
	φ60	15*15		60*40	15*15
	φ60	20*20		60*40	24*24
	φ60	24*24		60*60	25*25
	φ60.3	34*34		75*45	25*25
	φ63.5	15*15		60*30	24*24
	φ63.5	15*20		60*40	20*20
	φ63.5	20*20		80*40	15*15
	φ63.5	25*25		80*40	24*24
	φ63.5	30*30		80*40	33*26
	φ63.5	34*34		100*46	25*25
	φ76.2	20*20		110*40	33*26
	φ76.2	25*25		110*60	35*35
	φ101.6	23*26.7			

Special-shape Tube Size List

Drawing	OD a*b*c	Drawing	OD a*b*c
	20*30		15*30
	20*40		15*35
	25*40		19.5*38.5
	30*60		20*40
	30*70		20*60
	35*55		20*90
	35*80		30*60
	40*60		40*80
	40*80		42*75
	40*100		50*100
	42*75		60*100
	46*100		50*120
	50*100		60*120
	50*120		
	50*150		20*24*20
	60*120		20*28*20
			25*22*25
			26*28*26
			27*30*27
			32.5*32.5*32.5
			33.4*25*33.4
			36*37*36

Application

ASTM A554/EN 10296-2 tubes are widely used in every corner of our life, such as ornamental, structural, exhaust, and other applications where appearance, mechanical properties, or corosion resistance is needed, due to its hygienic properties, durability, and resistance to corrosion.



ASTM / A249 / A269 / A789

ASTM A249/ASME SA249 is a standard specially for welded Austenitic steel boiler, superheater, heat-exchanger, and condenser tubes, covers nominal-wall-thickness welded tubes and heavily cold worked welded tubes.

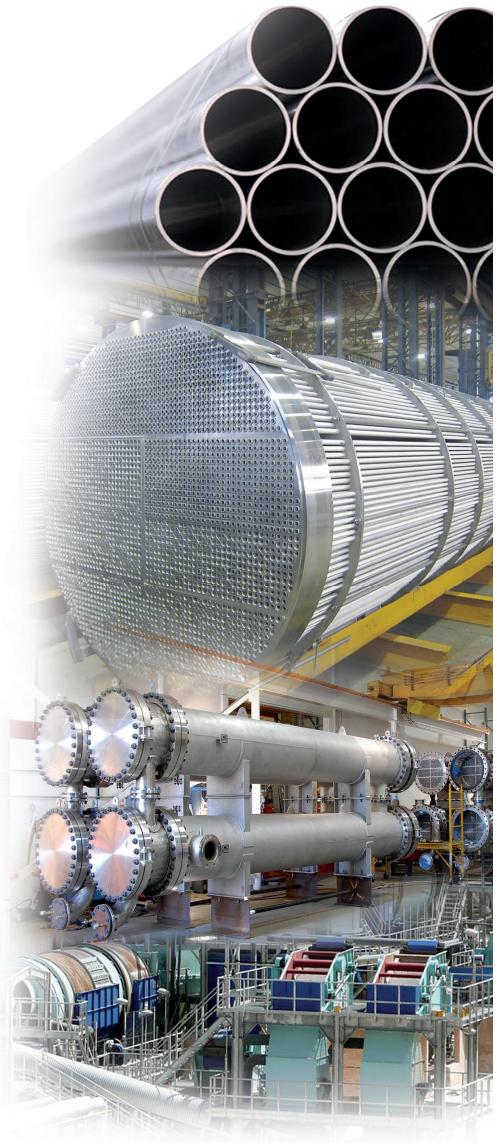
ASTM A269/ASME SA269 is a standard for seamless and welded Austenitic stainless steel tubing for general corrosion-resisting and low-or high-temperature service.

ASTM A789 is a standard for seamless and welded Ferritic/Austenitic stainless steel tubing for services requiring general corrosion resistance, with particular emphasis on resistance to stress corrosion cracking. These steel are susceptible to embitterment if used for prolonged periods at elevated temperatures.

As a welded tube factory, MW supplies above standards in welded condition.
Above standards are widely used for industrial pressure tubing and piping. And MW is certified with PED 2014/68/EU and AD2000, which are specialized certifications for pressure tubing and piping.

Bright Annealing:
Hydrogen bright annealed in line to 1900 °F(1040°C) minimum and rapidly water quenched is processed for all grades.

Surface Condition:
The tubes, after final heat treatment(Bright annealing), shall be chemically descaled or pickled free of scale. When bright annealing is used, pickling or chemical descaling is not necessary.



Available Grades and Chemical Requirements

Grade	Composition, %								
	C	Mn	P	S	Si	Ni	Cr	Mo	N
	max		max	max	max				
Austenitic									
304	0.08	2.0 max	0.045	0.03	1.00	8.0-11.0	18.0-20.0		
304L	0.03	2.0 max	0.045	0.03	1.00	8.0-13.0	18.0-20.0		
316L	0.03	2.0 max	0.045	0.03	1.00	10.0-14.0	16.0-18.0	2.0-3.0	
310S	0.08	2.0 max	0.045	0.03	1.00	19.0-22.0	24.0-26.0		
321	0.08	2.0 max	0.045	0.03	1.00	9.0-12.0	17.0-19.0		
Austenitic-Ferritic									
S31803	0.03	2.0 max	0.03	0.02	1.00	4.5-6.5	21.0-23.0	2.5-3.5	0.08-0.2
2205	0.03	2.0 max	0.03	0.02	1.00	4.5-6.5	22.0-23.0	3.0-3.5	0.14-2.0
2507	0.03	1.2 max	0.035	0.02	0.80	6.0-8.0	24.0-26.0	3.0-5.0	0.24-0.32

Mechanical Properties

Grade	UNS Designation	Tensile Requirements					Hardness Requirements	
		Tensile Strength, min		Yield Strength, min		Elongation in 2 in. or (50mm), min	Rockwell, max	Vickers max
		ksi	Mpa	ksi	Mpa	%		
304	S30400	75	515	30	205	35	B90	200
304L	S30403	70	485	25	170	35	B90	200
316L	S31603	70	485	25	170	35	B90	200
310S	S31008	75	515	30	205	35	B90	200
321	S32100	75	515	30	205	35	B90	200
	S31803	90	620	65	450	25	30	290
2205	S32205	95	655	70	485	25	30	290
2507	S32750	116	800	80	550	15	32	300

Mechanical Test

Test	ASTM	MW
Flare	Not Required	Required
Flattening	Required	Required
Flange	Required	Required
Reverse Bend	Required	Required
Reverse Flatening	Required	Required
Tesion Test	Required	Required
Hardness	Required	Required
Eddy Current	Required	Required [a]
Hydrostatic	Required	Not Required
Air Underwater Test	Not Required	Required [b]

Note:
a: Hydrostatic or Nondestructive Electric Test: MW each tube is subjected to 100% online eddy Current Test.
b: Air Underwater Pressure Test: MW all Tubing is examined by the air underwater pressure test. Inspection is made of the entire external surface of the tube after holding the pressure for not less than 10 s after the surface of the water has become calm. If any tube shows leakage during the air underwater test, MW reject it.

Tolerances for ASTM A249 tubes

Outer Diameter in. [mm] Tolerance			Thickness Tolerance	Length Tolerance
Under 1"	<25.4mm	±0.10mm	±10%	Under 2 [50.8] +3.0mm/-0mm
1" to 1 1⁄2"	≥25.4-38.1mm	±0.15mm		2 [50.8] or over +5.0mm/-0mm
Over 1 1⁄2" to 2"	≥38.1-50.8mm	±0.20mm		For lengths greater than 24 ft [7.3m], the above over-tolerances shall be increased by 1⁄8 in. [3 mm] for each 10 ft [3m] or fraction thereof over 24 ft or 1⁄2 in. [13 mm], whichever is the lesser.
2"to 2 1⁄2"	≥50.8-63.5mm	±0.25mm		
2 1⁄2 "to 3"	≥63.5-76.2mm	±0.30mm		
3" to 4"	≥76.2-101.6mm	±0.38mm		
Over 4"to 7 1⁄2"	≥101.6-190.5mm	+0.38/-0.64mm		
Over 7 1⁄2" to 9"	≥190.5mm-228.6mm	+0.38/-1.14mm		
*In accordance with Standard ASTM A1016/A1016M.				

Tolerances for ASTM A269 tubes

Outer Diameter in. [mm] Tolerance			Thickness Tolerance	Length Tolerance
Up to 1/2"	≤12.7mm	±0.13mm	±10%	+3.2mm/0mm
1/2"to 1 1/2"	≥12.7-38.1mm	±0.13mm		+3.2mm/0mm
1 1/2" to 3 1/2"	≥38.1-88.9mm	±0.25mm		+4.8mm/0mm, these tolerance apply to cut lengths up to and including 24ft(7.3m). For lengths greater than 24ft(7.3m), the above tolerance shall be increased by 1/8 in.(3mm) for each 10ft(3m) or fraction thereof over 24ft. Or 1/2 in (13mm), whichever is lesser.
3 1/2" to 5 1/2"	≥88.9-139.7mm	±0.38mm		
5 1/2"to 8"	≥139.7-203.2mm	±0.76mm		
8" to 12"	≥203.2-304.8mm	±1.01mm		
12" to 14"	≥304.8-355.6mm	±1.26mm		
*In accordance with Standard ASTM A269				

Tolerances for ASTM A789 tubes

Outer Diameter in. [mm] Tolerance			Thickness Tolerance	Length Tolerance
Up to 1/2"	≤12.7mm	±0.13mm	±15%	+3.2mm/0mm
1/2" to 1 1/2"	≥12.7-38.1mm	±0.13mm	±10%	+3.2mm/0mm
1 1/2" to 3 1/2"	≥38.1-88.9mm	±0.25mm	±10%	+4.8mm/0mm, these tolerance apply to cut lengths up to and including 24ft(7.3m). For lengths greater than 24ft(7.3m), the above tolerance shall be increased by 1/8 in.(3mm) for each 10ft(3m) or fraction thereof over 24ft. Or 1/2 in (13mm), whichever is lesser.
3 1/2" to 5 1/2"	≥88.9-139.7mm	±0.38mm	±10%	
5 1/2" to 8"	≥139.7-203.2mm	±0.76mm	±10%	
*In accordance with Standard ASTM A789				

ASTM A249/ASTM A269/ ASTM A789 Product Specification

Outer Diameter(mm) \ Thickness (mm)/GA		0.7	0.8	0.9	1.00	1.20	1.25	1.50	1.65	2.00	2.11	2.77	3.05
inch	mm			20GA			18GA		16GA		14GA	12GA	11GA
5/8	15.88 (16)	■	■	■	■	■	■	■	■				
	18	■	■	■	■	■	■	■	■				
3/4	19.05	■	■	■	■	■	■	■	■	■	■		
	20				■	■	■	■	■	■	■		
	21.3				■	■	■	■	■	■	■		
7/8	22 (22.22)				■	■	■	■	■	■	■		
1	25 (25.4)				■	■	■	■	■	■	■		
	26				■	■	■	■	■	■	■		
	28 (28.6)				■	■	■	■	■	■	■		
1 1/4	31.8 (32)				■	■	■	■	■	■	■		
	33.7 (34)				■	■	■	■	■	■	■		
	35				■	■	■	■	■	■	■		
	36				■	■	■	■	■	■	■		
1 1/2	38.1					■	■	■	■	■	■	■	
	40					■	■	■	■	■	■	■	
	42 (42.4)					■	■	■	■	■	■	■	
	45					■	■	■	■	■	■	■	
	48.3					■	■	■	■	■	■	■	
2	50 (50.8)					■	■	■	■	■	■	■	■
	52					■	■	■	■	■	■	■	■
	54					■	■	■	■	■	■	■	■
2 1/4	57					■	■	■	■	■	■	■	■
	60.3					■	■	■	■	■	■	■	■
2 1/2	63.5					■	■	■	■	■	■	■	■
	70					■	■	■	■	■	■	■	■
3	76.2					■	■	■	■	■	■	■	■
	80					■	■	■	■	■	■	■	■
3 1/2	88.9							■	■	■	■	■	■
4	101.6							■	■	■	■	■	■
	104							■	■	■	■	■	■
	108							■	■	■	■	■	■
4 1/2	114.3							■	■	■	■	■	■
5	127							■	■	■	■	■	■
	129							■	■	■	■	■	■
5 1/2	139.7 (140)									■	■	■	■
6	152.4									■	■	■	■
	154									■	■	■	■
	159									■	■	■	■
	168.3									■	■	■	■
8	203.2(204)									■	■	■	■
	219									■	■	■	■

Marking Sample

ASTM A249/A249M 304 50.8*1.5*18288mm Heat No.: xxxxxx

ASTM A269/A269M WLD 304L 31.8*1.65*6096mm Heat No.:xxxxxx

ASTM A789/A789M WLD 2205 38*1.5*6000mm Heat No.: xxxxxx

Application

ASTM A249/269/789 tubes are pressure tubing required heat treatment. They are widely used in stainless steel boiler, superheater, heat-exchanger,condenser,and other tubes for general corrosion-resisting and low-or high-temperature service.

ASTM A270 3A & S2

ASTM A270 standard specification covers grades of seamless, welded, and heavily cold worked welded austenitic and ferritic/austenitic stainless steel sanitary tubing intended for used in the dairy and food industry, bio processing equipment, and having special surface finishes. Pharmaceutical quality maybe requested, as a supplementary requirement. As a welded tube factory, MW only supplies welded condition.

In this standard, all materials should be furnished in the heat-treated condition. The heat treatment procedure, except the for duplex stainless steel materials S31803, S32003, S32205, S32750, N08926 and N08367, shall consist of heating the material to a minimum temperature of 1900°F (1040°C) and quenching in water or rapid cooling by other means. The heat treatment temperature of above duplex stainless steel materials are varied from 1850°F (1010°C) to 2060°F (1125°C)

S2. Pharmaceutical Quality Tubing

Chemistry: When S31600 and S31603 are ordered, sulfur content shall be restricted to the range of 0.005 to 0.017%.

Permissible Variations in Dimensions: The wall thickness shall not vary from the specified wall thickness by more than 10%

Other Related Standards :

ISO 2037/AS 1528.1 / BS 4825-1 / SMS 3008

Available Grades and Chemical Requirements

Grade	Composition, %								
	C	Mn	P	S	Si	Ni	Cr	Mo	N
	max		max	max	max				
Austenitic									
304	0.08	2.0 max	0.045	0.03	1.00	8.0-11.0	18.0-20.0		
304L	0.035	2.0 max	0.045	0.03	1.00	8.0-12.0	18.0-20.0		
316L	0.035	2.0 max	0.045	0.03	1.00	10.0-14.0	16.0-18.0	2.0-3.0	
316L S2	0.035	2.0 max	0.045	0.005-0.017	1.00	10.0-14.0	16.0-18.0	2.0-3.0	
Austenitic-Ferritic									
S31803	0.03	2.0 max	0.03	0.02	1.00	4.5-6.5	21.0-23.0	2.5-3.5	0.08-0.20
2205	0.03	2.0 max	0.03	0.02	1.00	4.5-6.5	22.0-23.0	3.0-3.5	0.14-0.20
2507	0.03	1.2 max	0.035	0.02	0.80	6.0-8.0	24.0-26.0	3.0-5.0	0.24-0.32

Mechanical Properties

Grade	UNS Designation	Tensile Requirements					Hardness Requirements
		Tensile Strength, min		Yield Strength, min		Elongation in 2 in. or (50mm), min	Rockwell, max
		ksi	Mpa	ksi	Mpa	%	
304	S30400	75	515	30	205	35	B90
304L	S30403	70	485	25	170	35	B90
316L	S31603	70	485	25	170	35	B90
	S31803	90	620	65	450	25	C30.5
2205	S32205	95	655	70	485	25	C30.5
2507	S32750	116	800	80	550	15	C32

Mechanical Test

Test	ASTM	MW
Flare	Not Required	Required
Flattening	Not Required	Required
Flange	Not Required	Required
Reverse Bend	Not Required	Required
Tesion Test	Not Required	Required
Reverse Flattening	Required	Required
Eddy Current	Required	Required[a]
Hydrostatic	Required	Not Required
Air Underwater Test	Not Required	Required[b]

Note:

a: Hydrostatic or Nondestructive Electric Test: MW each tube is subjected to 100% online eddy Current Test.

b: Air Underwater Pressure Test: MW all Tubing is examined by the air underwater pressure test. Inspection is made of the entire external surface of the tube after holding the pressure for not less than 10 s after the surface of the water has become calm. If any tube shows leakage during the air underwater test, MW rejects it.

Tolerances for ASTM A270 tubes

Outer Diameter in. [mm] Tolerance			Thickness Tolerance	Length Tolerance
1" and under	≤25.4mm	±0.13mm	±12.5% (316L S2 Tolerance is ±10%)	+3.2mm/0mm
over 1" to 2"	≥25.4-50.8mm	±0.20mm		+3.2mm/0mm
over 2" to 3"	≥50.8-76.2mm	±0.25mm		+3.2mm/0mm
over 3" to 4"	≥76.2-101.6m	±0.38mm		+3.2mm/0mm
over 4" to 5 1/2"	≥101.6-139.7mm	±0.38mm		+4.76mm/0mm
51/2" to 8", excl	≥139.7-203.2mm	±0.75mm		+4.76mm/0mm
8" to 12"	≥203.2-304.8mm	±1.25mm		

If customer applies standard of AS 1528.1, OD tolerance should be +/-0.13mm for OD from 12.7mm to 31.8mm, +/-0.25mm for OD from 38.1mm to 76,2mm, +/-0.38mm for OD from OD 101.6mm and 127mm, +/-0.76mm for OD 152.4mm and 203.2mm. Wall thickness tolerance should be +0/-0.1mm for all sizes.

ASTM A270 Product Specification

Outer Diameter(mm) \ Thickness (mm)/GA	1.20	1.25	1.50	1.60	1.65	2.00	2.11	2.77
inch / mm		18GA			16GA		14GA	12GA
3/4 (19.05)				AS	3A/S2			
1 (25.4)				AS	3A/S2			
1 /1/4 (31.8)				AS	3A/S2			
1 1/2 (38.1)				AS	3A/S2			
2 (50.8)				AS	3A/S2			
2/ 1/2 (63.5)				AS	3A/S2			
3 (76.2)				AS	3A/S2			
4 (101.6)				AS			3A/S2	
5 (127)				AS				
6 (152.4)				AS				3A/S2
8 (203.2)						AS		3A/S2

Note:

The marking "AS" means the specifications are from Australia standard AS 1528.1.

The marking "3A/S2" means the specifications are from US standard 3A/S2 pharmaceutical quality tubing .

Marking Sample

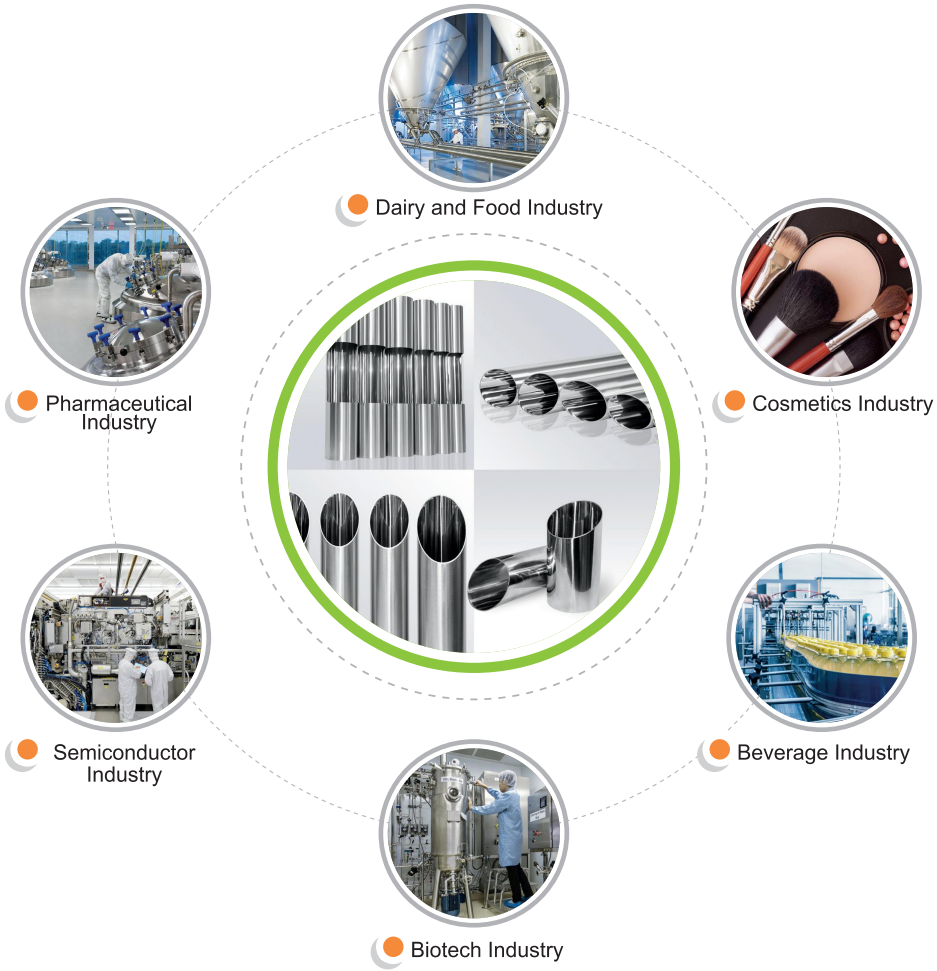
ASTM A270/A270M WLD 304L 38.1*1.65*6096mm ID 400G / OD 320G Polish Heat No.:xxxxxx

Surface Finish Cross Reference Chart

Grit No.	USA Finish #	Common Name	[UK] Ra Micron (μm)	ISO Number
150	#4	3A Sanitary Finish	1.06	N6
180	#4	Satin Finish	0.76	
200-220	#4S	Biotech Finish	0.48	
240	#6		0.38	N5
320	#7		0.30	
400	#8	Mirror Finish	0.23	N4

Application

ASTM A270 stainless steel welded sanitary tubes are heat treated and also polished inside and outside, contributing to it's superior capacity on many uses, including dairy and food industry, cosmetics industry, beverage industry, pharmaceutical industry, semiconductor industry, and also biotech applications, etc.



EN 10217-7

EN 10217-7 standard specifies the technical delivery conditions in two test categories for welded tubes of circular cross-section made of Austenitic and Austenitic-Ferritic stainless steel which are intended for pressure and corrosion resisting purposes at room temperature, at low temperatures or at elevated temperatures.

This standard has been written for manufacturers, designers, engineers, quality managers and others working in areas that involves high pressure, abrasive conditions, both high and low temperatures or acidic or caustic environments.

MW is certified with PED 2014/68/EU and AD2000, which are specialized certifications for pressure tubing and piping.

Available Grades and Chemical Requirements

Steel grade		C	Si	Mn	P	S	N	Cr	Cu	Mo	Ni	Others
Steel name	Steel number	max	max	max	max	max						
X5CrNi18-10	1.4301/304	0.070	1.00	2.00	0.045[b]	0.015[b]	≤0.10	17.5-19.5	-	-	8.0-10.5	-
X2CrNi18-9	1.4307/304L	0.030	1.00	2.00	0.045[b]	0.015[b]	≤0.10	17.5-19.5	-	-	8.0-10.0	-
X2CrNiMo17-12-2	1.4404/316L	0.030	1.00	2.00	0.045[b]	0.015[b]	≤0.10	16.5-18.5	-	2.00-2.50	10.0-13.0	-
X6CrNiTi18-10	1.4541/321	0.080	1.00	2.00	0.045[b]	0.015[b]	-	17.0-19.0	-	-	9.0-12.0	Ti 5xC to 0.70
X2CrNiMoN22-5-3	1.4462/Duplex 2205	0.030	1.00	2.00	0.035	0.015	0.10-0.22	21.0-23.0	-	2.50-3.50	4.5-6.5	-
X2CrNiMoN25-7-4	1.4410/Duplex 2507	0.030	1.00	2.00	0.035	0.015	0.20-0.35	24.0-26.0		3.0-4.5	6.0-8.0	

b For tubes welded without filler material the sum of sulphur and phosphorus shall be maximum 0.040 %.

Summary of inspection and testing

Type of inspection and test		Frequency Test category 1	of testing Test category 2	Refer to	Testing standard
Mandatory tests	Cast analysis	one per cast	one per cast	11.1	
	Tensile test at room temperature	one per test unit	two per test unit	11.2.1	EN ISO 6892-1:2019
	Flattening test[a] or	one per test unit	each tube[c]	11.4.2	EN ISO 8492:2013
	Ring tensile test[a] or			11.4.3	EN ISO 8496:2013
	Drift expanding test[a] or			11.4.4	EN ISO 8493:2004
	Ring expanding test[a] or			11.4.5	EN ISO 8495:2013
	Weld bend test			11.5	EN ISO 5173:2010
	Leak tightness test a) Hydrostatic test b) Eddy current test	each tube	each tube	11.8	
				11.8.1	
				11.8.2	EN ISO 10893-1:2011[1]
	Dimensional inspection			11.9	
	Visual examination			11.10	
	NDT of the weld seam[b]			11.11	
	c) Eddy current				EN ISO 10893-2:2011[2]
	d) Ultrasonic test				EN ISO 10893-11:2011[6]
	e) Radiographic test				EN ISO 10893-6:2019
	f) Digital radiographic testing				EN ISO 10893-7:2019
	Material identification			11.12	

Tube manufacturing process, route, starting material, forming operation and weld condition

1	2	3	4	5
Route	Manufacturing process[a]	Starting material	Forming operation	Weld condition[b]
01	Arc welding	Hot or cold rolled strip	Continuous forming from strip	As welded[c e]
02				Welded, outside ground or bead worked[c e] *
03				Welded, bead worked *
05	Arc welding	Hot or cold rolled plate or sheet	Single forming from plate or sheet	As welded[d e]

* Bead worked = bead rolled or bead hammered.

[a]Tubes with outside diameter not exceeding 168,3 mm may additionally be brought to the required tube dimensions by cold working [b] (see type of condition WCA and WCR in Table 2).
[b]The terms "as-welded", "welded, outside ground", "bead worked" and "cold working" apply to the condition of the tube before heat treatment if required in accordance with Table 2.
[c]On request, the inside weld can be re-melted.
Option 3: The inside weld is re-melted.
[d]On request, the inside weld can be worked by rolling, remelting or grinding.
Option 4: The inside weld is worked by rolling, remelting or grinding.
[e]The weld seam can be welded using one or more separate layers.

Delivery conditions

Symbol	Type of delivery condition[a]	Surface condition
W0[b]	Welded from hot or cold rolled plate, sheet or strip 1D,2D,2E,2B,2R	As welded[f]
W1[b]	Welded from hot rolled plate, sheet or strip 1D, descaled and/or pickled[e]	Metallically clean
W1A[b]	Welded from hot rolled plate, sheet or strip 1D, heat treated, descaled and/or pickled[e]	
W1R[b]	Welded from hot rolled plate, sheet or strip 1D, bright annealed	Metallically bright
W2[b]	Welded from cold rolled plate, sheet or strip 2D, 2E, 2B, 2R, descaled and/or pickled[e]	Metallically clean
W2A[b]	Welded from cold rolled plate, sheet or strip 2D, 2E, 2B, 2R, heat treated, descaled and/or pickled[e]	
W2R[b]	Welded from cold rolled plate, sheet or strip 2D, 2E, 2B, 2R, bright annealed	Metallically bright
WG	Ground[c]	Metallically bright-ground, the type and degree of grinding shall be agreed at the time of enquiry and order[d]
WP	Polished[c]	Metallically bright-polished, the type and degree of polishing shall be agreed at the time of enquiry and order[d]

[a] Symbols of flat products according to EN 10028-7:2016.
[b] For tubes ordered with smoothed inside welds ("bead worked") letter "b" shall be appended to the symbol for the delivery condition (e.g. W2Ab).
[c] Conditions W2, W2A, W2R are usually used as the starting condition.
[d] It should be indicated in the enquiry or order whether grinding or polishing is to be performed internally or externally, or internally and externally.
[e] Unless specified at the time of the order the method of descaling and/or pickling is at the discretion of the manufacturer.
[f] Tubes may have residual scale, welding colours and grease residue.

Technical properties for wall thicknesses up to 60 mm of austenitic steels in the solution annealed condition (+AT) and information about intergranular corrosion

Steel grade		Tensile properties at room temperature [a]					Impact properties [a]			Reference heat treatment conditions		Resistance to intergranular corrosion	
		Proof strength		Tensile strength	Elongation		Minimum average absorbed energy KV2 J						
		Rp0,2 min	Rp1,0 min	Rm[b]	A min (%)		at RT		at -196 °C	Solution temperature[c]	Cooling in[d e]		Method in EN ISO 3651-2:19 98
Steel name	Steel number	MPa	MPa	MPa	l	t	l	t	t				
X2CrNi18-9	1.4307	200	240	500-700	40	35	100	60	60	1000-1100	w, a	yes	A
X5CrNi18-10	1.4301	210	250	520-750	40	35	100	60	60	1000-1100	w, a	yes[f]	A
X6CrNiTi18-10	1.4541	200	235	500-730	35	30	100	60	60	1020-1120	w, a	yes	A
X2CrNiMo17-12-2	1.4404	190	225	490-690	40	30	100	60	60	1020-1120	w, a	yes	A

[a] l = longitudinal; t = transverse.
[b] For the delivery conditions W 0, W 1 and W 2 which do not include solution annealing, the upper Rm limit may be exceeded by 70 MPa.
[c] The maximum temperatures are for guidance only.
[d] w = water; a = air; cooling sufficiently rapid.
[e] When tested according to EN ISO 3651-2:1998 (Appropriate method, A or B or C, as indicated) up to the limit temperatures indicated in the last column of Table 8.
[f] In delivery condition. (Normally not fulfilled in the sensitized condition).

Mechanical properties for wall thicknesses up to 30 mm of austenitic-ferritic steels in the solution annealed condition (+AT) and information about intergranular corrosion

Steel grade		Tensile properties at room temperature [a]				Impact properties [a]			Reference heat treatment conditions		Resistance to intergranular corrosion	
		Proof strength	Tensile strength	Elongation A min		Minimum average absorbed energy KV2 J						
		Rp0,2 min	Rm	(%)		at RT		At -40 °C	Solution temperature[b]	Cooling in[c]	[d]	Method in EN ISO 3651-2:1998
Steel name	Steel number	MPa	MPa	l	t	l	t	t				
Austenitic-ferritic steels												
X2CrNiMoN22-5-3	1.4462	450	700-920	25	20	120	90	40	1020-1100	w, a	yes	B or C
X2CrNiMoN25-7-4	1.4410	550	800-1 000	20	20	100	100	40	1040-1120	w	yes	B or C

[a] l = longitudinal; t = transverse.
[b] The maximum temperatures are for guidance only.
[c] w = water; a = air; cooling sufficiently rapid.
[d] When tested according to EN ISO 3651-2:1998 (Appropriate method, A or B or C, as indicated) up to 250 °C.

Tolerances on outside diameter and wall thickness

Outside diameter D mm	Tolerance on outside diameter (D)		Tolerance on wall thickness	
	Tolerance class	Permissible deviation	Tolerance class	Permissible deviation
D≤ 168,3	D3	±0,75 % or ± 0,3 mm whichever is the greater	T3	±10 % or ± 0,2 mm whichever is the greater
	D4[a]	±0,5 % or ± 0,1 mm whichever is the greater		
D>168,3	D2	±1,0%		

[a] **Option 18:** Tolerance class D4 is specified.

Maximum height of the weld seam

Dimensions in millimetres

Route (according to Table 1)	Weld condition	Maximum height of the weld seam	
		T≤ 8	T>8
01, 05, 06 and 07	As welded	0,10 T+0,5	T/6[ab]
02 and 04	Welded, outside ground for D≤ 114,3	0,06 T+0,3	—
	Welded, outside ground for D> 114,3	0,05 T+0,5	T/10
02, 03 and 04	Welded, bead worked	0,15	—

[a] **Option 28:** Different values for the Maximum height of the weld seam are to be agreed in the purchase order.
[b] **Option 29:** maximum 4 mm

Tolerances on exact lengths

Length L (mm)	Tolerance on exact length (mm)
L≤ 6 000	+ 5
6 000 < L≤ 12 000	+ 10
L > 12 000	+ by agreement

Marking Sample

168.3x4.5x6000mm EN 10217-7 X5CrNi18-10 TC1 W1 Heat No.: xxxxxx QC No.: xxx PO No.:xxxxxx

Application

EN 10217-7 Welded tubular products are frequently used in LNG plants, terminals and tankers; GTL plants, regasification and for storage. Other oil and gas applications would include in refineries and methanol, ammonia, ethylene, propylene and urea plants.

EN 10312

EN 10312 is an European Standard specifies the technical delivery conditions for light gauge welded stainless steel tubes from austenitic, austenitic-ferritic, and duplex stainless steels, primarily for water application, including water intended for human consumption, supplied in straight lengths and suitable for used with related fittings. The standard is applicable to the size range from 6mm to 267mm outside diameter made of stainless steel grades taken from EN 10088-2. It establishes clear guidelines for manufacturers on the dimensions, material properties, and testing procedures that must be met to ensure that the tubes will perform as intended and resist corrosion over their lifetime.

Available Grades and Chemical Requirements

Available Grades and Chemical Requirements		C	Si	Mn	P	S	N	Cr	Cu	Mo	Ni	Others
Steel name	Steel number	max	max	max	max	max						
X5CrNi18-10	1.4301/304	0.07	1.00	2.00	0.045[b]	0.015[b]	≤0.11	17.0-19.5	-	-	8.0-10.5	-
X2CrNi18-9	1.4307/304L	0.03	1.00	2.00	0.045[b]	0.015[b]	≤0.11	17.5-19.5	-	-	8.0-10.0	-
X2CrNi19-11	1.4306/304L	0.03	1.00	2.00	0.045[b]	0.015[b]	≤0.11	18.0-20.0	-	-	10.0-12.0	-
X2CrNiMo17-12-2	1.4404/316L	0.03	1.00	2.00	0.045[b]	0.015[b]	≤0.11	16.5-18.5	-	2.00-2.50	10.0-13.0	-

b For tubes welded without filler material the sum of sulphur and phosphorus shall be maximum 0.040 %.

Dimensions of light gauge stainless steel tubes - Series 1

Dimensions in millimetres

Specified outside diameter D	Outside diameter		Specified wall thickness T
	maximum	maximum	
15	15.04	14.94	0.60
18	18.04	17.94	0.70
22	22.05	21.95	0.70
28	28.05	27.95	0.80
35	35.07	34.97	1.00
42	42.07	41.97	1.10
54	54.07	53.84	1.20
76,1	76.3	75.54	1.50
108	108.3	107.2	1.50
133	133.5	132.2	1.50
159	159.5	157.9	2.00

The tolerance on wall thickness shall be +/-10% for series 1 tubes.

Dimensions of light gauge stainless steel tubes - Series 2

Dimensions in millimetres

Specified outside diameter D	Tolerance on D	Specified wall thickness T	Tolerance on T
15.0	±0.10	1.00	±0.10
18.0	±0.10	1.00	±0.10
22.0	±0.11	1.20	±0.10
28.0	±0.14	1.20	±0.10
35.0	±0.18	1.50	±0.10
42.0	±0.21	1.50	±0.10
54.0	±0.27	1.50	±0.10
76.1	±0.38	2.00	±0.15
88.9	±0.44	2.00	±0.15
108.0	±0.54	2.00	±0.15
133.0	±1.00	3.00	±0.30
159.0	±1.00	3.00	±0.30
219.0	±1.50	3.00	±0.30

Marking Sample

EN10312 1.4301 series 1 76.1X1.5X6000 NDT Heat No.: xxxxxx

Summary of inspection and testing

Test/Inspection		Frequency of testing	
		Non-specific inspection and testing	Specific inspection and testing
Mandatory	Cast analysis	Steel manufacturers cast analysis	Steel manufacturers cast analysis
	Hardness test [a]	By agreement	
	Tensile test [b]	Manufacturer's procedure	1/test unit
	Drift expanding test for D ≤150 mm	Manufacturer's procedure	1/test unit
	Flattening test	Manufacturer's procedure	1/test unit
	Leak tightness test	Individual	Individual
	Weld NDT	Individual	Individual
	Visual examination	The tubes shall be smooth and have a bright surface, free from all external and internal surface defects.	
	Dimensional inspection	The specified dimensions shall be verified.	
Optional	Material identification	Individual	Individual
	Intergranular corrosion test	Not applicable	By agreement

[a] Only for ferritic steel tubes supplied annealed when option 1 is specified.
[b] Only for tubes supplied in accordance with Table 2.

Application

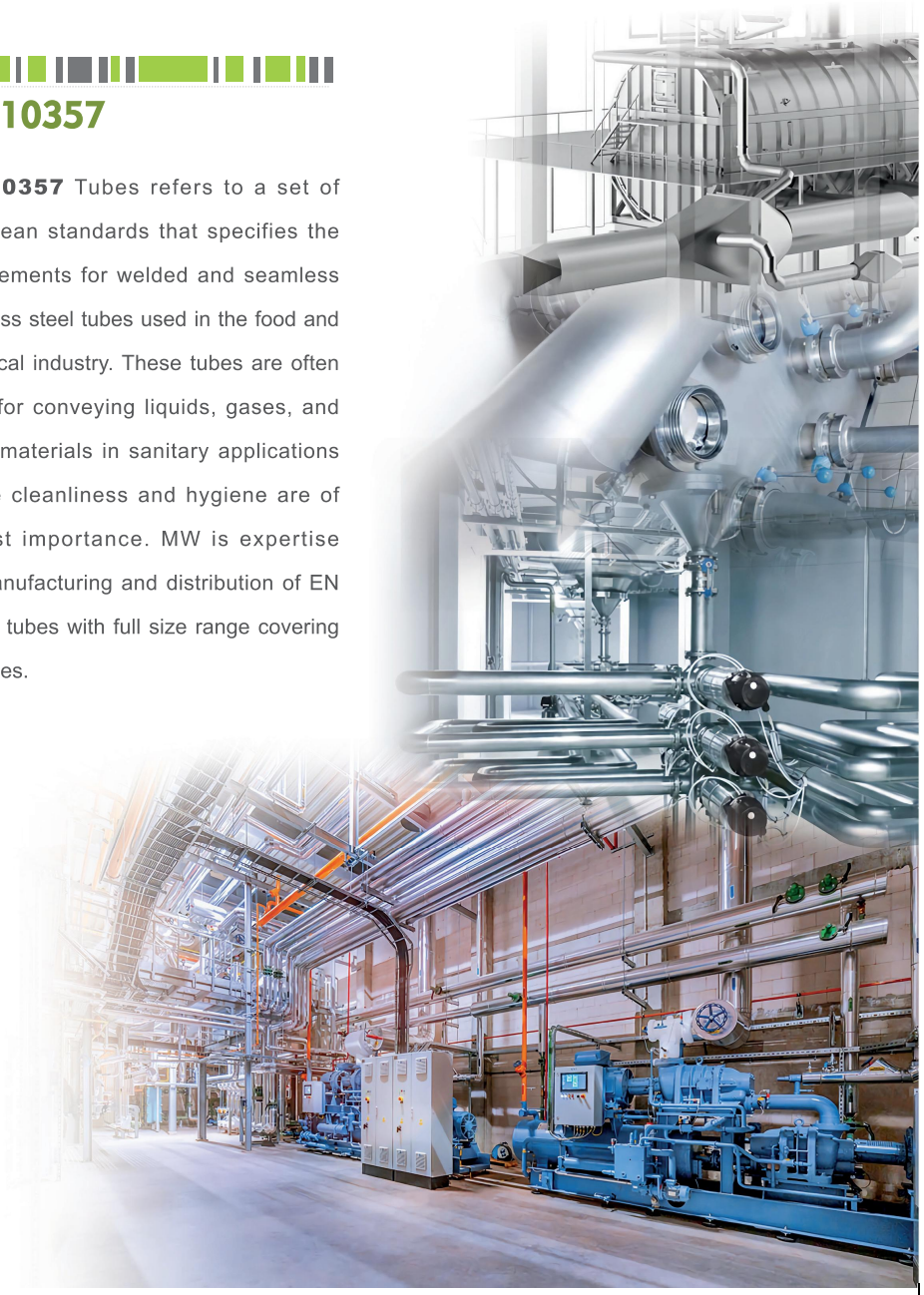
Grade 304/304L Application	Grade 316L Application
Solar thermal	Drinking & sanitary water system
Compressed air system	Heating
Air conditioning system	Air conditioning system
Heating	Refrigeration system
Chilled and hot water pipeline	Compressed air system
Vacuum and techical fluid	Fire sprinkler protection

Water Conveyance
For Human Consumption

EN 10357

EN 10357

EN 10357 Tubes refers to a set of European standards that specifies the requirements for welded and seamless stainless steel tubes used in the food and chemical industry. These tubes are often used for conveying liquids, gases, and other materials in sanitary applications where cleanliness and hygiene are of utmost importance. MW is expertise in manufacturing and distribution of EN 10357 tubes with full size range covering all series.



Available Grades and Chemical Requirements

Steel grade		C	Si	Mn	P	S	N	Cr	Cu	Mo	Ni	Others
Steel name	Steel number	max	max	max	max	max						
X5CrNi18-10	1.4301/304	0.070	1.00	2.00	0.045[b]	0.015[b]	≤0.10	17.5-19.5	-	-	8.0-10.5	-
X2CrNi18-9	1.4307/304L	0.030	1.00	2.00	0.045[b]	0.015[b]	≤0.10	17.5-19.5	-	-	8.0-10.0	-
X2CrNiMo17-12-2	1.4404/316L	0.030	1.00	2.00	0.045[b]	0.015[b]	≤0.10	16.5-18.5	-	2.00-2.50	10.0-13.0	-

Preferred dimensions and tolerances[a] (mm)

Series A	External tube diameter	19	23	29	35	41	53	70	85	104	129	154	204	254
	External diameter tolerances	±0.10	±0.12	±0.15	±0.18	±0.21	±0.27	±0.35	±0.43	±0.78	±0.97	±1.16	±1.53	±1.91
	Internal diameter (theoretical)	16	20	26	32	38	50	66	81	100	125	150	200	250
	Wall thickness	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Wall thickness tolerances	±0.15	±0.15	±0.15	±0.15	±0.15	±0.15	±0.20	±0.20	±0.20	±0.20	±0.20	±0.20	±0.20

[a]For dimensions different from the ones listed above the tolerances are:
EN ISO 1127-D4 for external diameter ≤ 85,00 mm.
EN ISO 1127-D3 for external diameter > 85,00 mm.
In external diameter tolerances ovality is included.
For wall thickness ±10%.

Alternative dimensions and tolerances[a] (mm)

Series C	External tube diameter	19.05	25.4	38.1	50.8	63.5	76.2	101.6	152.4
	External diameter tolerances	±0.13	±0.13	±0.20	±0.20	±0.25	±0.25	±0.38	±0.76
	Internal diameter (theoretical)	15.75	22.10	34.80	47.50	60.20	72.90	97.38	146.86
	Wall thickness	1.65	1.65	1.65	1.65	1.65	1.65	2.11	2.77
	Wall thickness tolerances	±0.17	±0.17	±0.17	±0.17	±0.17	±0.17	±0.21	±0.28
Series D	External tube diameter	25.0	32.0	38.0	51.0	63.5	76.1	101.6	
	External diameter tolerances	±0.13	±0.16	±0.19	±0.25	±0.32	±0.38	±0.76	
	Internal diameter (theoretical)	22.6	29.6	35.6	48.6	60.3	72.9	97.6	
	Wall thickness	1.2	1.2	1.2	1.2	1.6	1.6	2.0	
	Wall thickness tolerances	±0.12	±0.12	±0.12	±0.12	±0.16	±0.16	±0.20	

[a]For dimensions different from the ones listed above the tolerances are:
EN ISO 1127-D4 for external diameter ≤ 76,20 mm.
EN ISO 1127-D3 for external diameter > 76,20 mm.
In external diameter tolerances ovality is included.
For wall thickness ± 10%.

Manufacturing process, requirements and surface characteristics

			Surface characteristics and roughness			
Product class	**Manufacturing process**	**Heat Treatment**	**Internal surface**	**Internal weld bead**	**External surface and welding area**	**Symbol**
CL1 (0,80/1,60 µm)	From cold rolled material[a] Welded,welding bead rolled	Not heat treated	Ra ≤ 0,80 µm pickled and passivated	Ra ≤ 1,60 µm pickled and passivated	pickled and passivated	CL1 CC
					Mech. polished, Ra ≤ 1,00 µm	CL1 CD
		Heat treated	Ra ≤ 0,80 µm pickled and passivated or bright annealed	Ra ≤ 1,60 µm pickled and passivated or bright annealed	pickled and passivated or bright annealed	CL1 BC
					Mech. polished, Ra ≤ 1,00 µm	CL1 BD
CL2 (0,80/0,80 µm)	From cold rolled material[a] Welded,welding bead rolled	Not heat treated	Ra ≤ 0,80 µm pickled and passivated	Ra ≤ 0,80 µm pickled and passivated	pickled and passivated	CL2 CC
					Mech. polished, Ra ≤ 1,00 µm	CL2 CD
		Heat treated	Ra ≤ 0,80 µm pickled and passivated or bright annealed	Ra ≤ 0,80 µm pickled and passivated or bright annealed	pickled and passivated or bright annealed	CL2 BC
					Mech. polished, Ra ≤ 1,00 µm	CL2 BD

[a] From cold rolled material according to EN 10028-7:2016,Table 6, finish 2B, 2D or 2R.

Tubes that are not bright annealed and not heat treated shall be internally and externally pickled and passivated. After rinsing,residual acid or welding discolouration shall not be present. Further cleanliness requirements shall be agreed upon in the order.

The weld shall be worked down so that it is flush with the tube wall and then smoothed. There shall be no overlapping of the weld metal and parent metal. There shall also be no protrusions root gaps (lack of full penetration),overlapping or misalignment of edges,open pores (porosity) or traces of rolling.

Marking Sample

EN10357 TC1 CL1 BD 1.4301 63.5X1.65X6000 Heat No.: xxxxxx

Application

Stainless Steel Solutions — Liquid Cooling Solution

As data center workloads continue to intensify—driven by AI, HPC, and ultra-dense server architectures—traditional cooling solutions have reached their limits. That' where current liquid cooling comes in: uses phase-change dynamics to dissipate heat directly from high-powered processors. And the core of these systems is high-performance stainless steel tubing.

Features	
Material	304/304L/316L
Operating Pressure	Up to 10 bar
Temperature Range	-40°C to 150°C

Properties	
Corrosion Resistance	Low Maintenance
Smooth Inner Surface	Durability
Compatibility	Customizability

Why MW Metal
30,000+m^2. manufacturing capacity
Laser/Brazing welding available
100% air tightness test
Complete size range including round/square/rectangular, can be also customized and fabricated

Applications
AI Learning
Machine Learning
High-Frequency Trading
Edge & Cloud Data Centers
Defense & Aerospace
Next-Gen CPU & GPU

Stainless Steel Solutions — Manifold Tubes

When liquid cooling is critical and superior lifetime reliability is mandatory, MW stainless steel tubes are the best choice for your data center application. We offer different selection of round, square and rectangular shapes in a wide range of dimensions, ensuring a perfect fit for every unique application.

Our manufacturing process incorporates high-quality TIG, Plasma and laser welding, a state-of-the-art technique that creates incredibly strong, precise, and clean welds to endure leakage-free service life.

All the tubes can be in bead removed condition. The interior surface of MW tubes can be customized in smooth polished condition met with roughness 0.2-0.5μm, which ensures smooth operation and flow characteristics of the coolant.

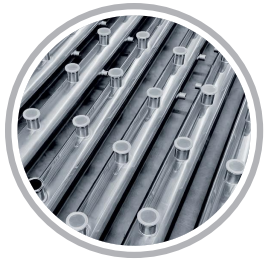
Material and Properties

Grade	Proof Strength Rp0.2 Mpa	Proof Strength Rp1.0 Mpa	Tensile Strength Rm MPa	Elongation A %
304/1.4301	210	250	520-750	40
304L/1.4307	200	240	500-700	40
316L/1.4404	190	225	490-690	40

Versatile Dimension

Shape	Dimension	Thickness	Inner Surface Roughness	Flatness	Straightness
Round	DN15-DN200	1.5-4.0mm	Bead removed, Ra≤0.8μm or Ra≤0.2-0.5μm can be met.	≤0.1mm	≤1.0mm per meter
Rectangular	15X20-100X50mm	1.5-4.0mm			
Square	20X20-100X100mm	1.5-4.0mm			

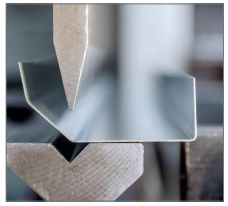
- Laser welded for secured sealing
- Maximum service life
- Guaranteed smoothness inside
- Versatile shapes tubes available
- Cut to length service
- Precut components available



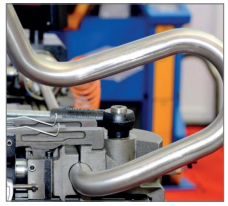
Stainless Steel Solutions — Prefabrication Solutions

MW METAL, together with our experienced brother processing partners, provide customized stainless-steel fabrications in full sizes ranges. We manufacture complete products and parts to meet specific needs in the different industries. Our production lines cover CNC machining, sheet and pipe bending, laser cutting, automatic welding, surface finishing and final assembly.

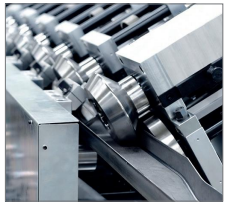
Manufacturing Processes



Sheet Bending

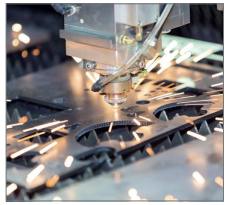


Tube/Pipe Bending



Roll Forming

CNC Machining



Laser Cutting

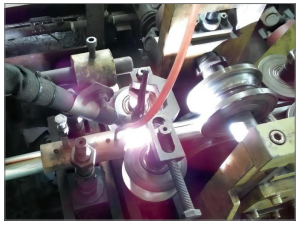
TIG/PLASMA/LASER Welding

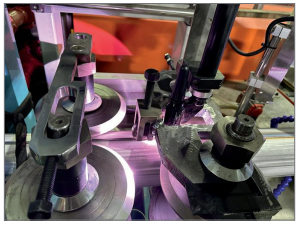
Surface Finishing (polishing/brushing/blasting/pickling)

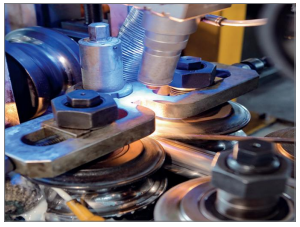
Parts Assembling

Our Projects

Manufacturing Equipments


TIG Welding


Plasma Welding


Laser Welding


Bright Annealing

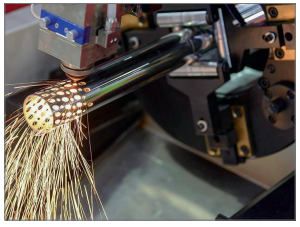

Welded Bead Removing

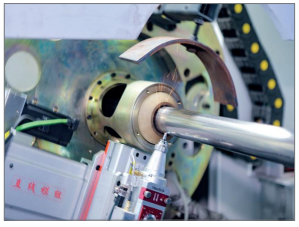

Welding Failure Detection


Outside Polishing for Round Tube


Outside Polishing for Square and Rectangular Tube


Inner Polish


Inhouse Perforated Laser Cutting


Online Laser Cutting


Automatic Packing

Inspection and Test


Spectrum Analysis


Third Party Chemical Composition Analysis

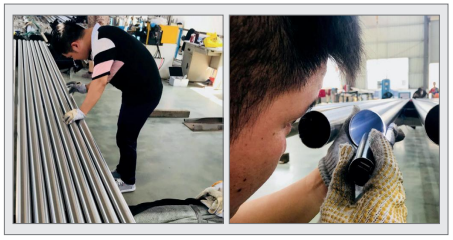

Online Eddy Current Test


Offline Eddy Current Test

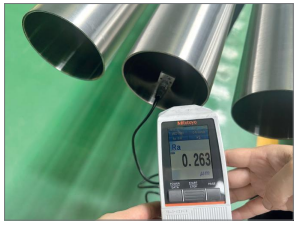

Air Underwater Test


Endoscopic Examination


Dimension Inspection


Visual Inspection

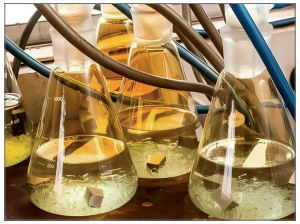
Outside Roughness Analysis



Inside Roughness Analysis


Glossiness analysis

Inspection and Test

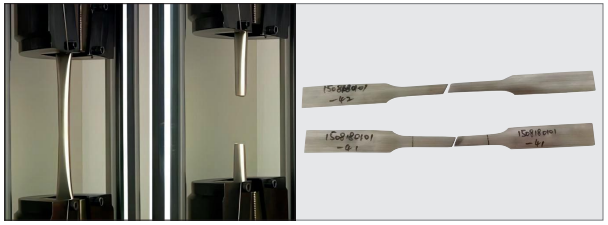


Intergranular Corrosion Test

Hardness Test

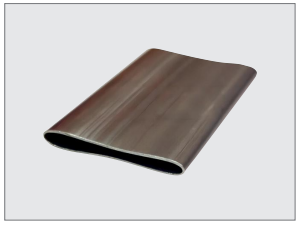
Third Party Metallographic Analysis

Universal Tensile Test



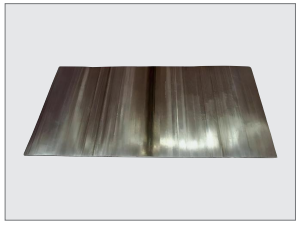
Tensile Test

Flaring Test



Flatterning Test

Flange Test



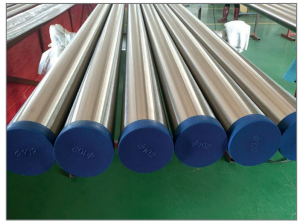
Reverse Flattening Test

Reverse Bend Test

Packing

Individual Protective Film

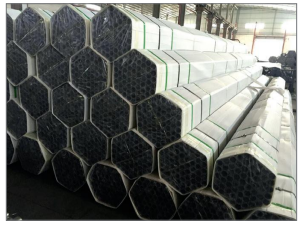
Protective Net of Each Tube



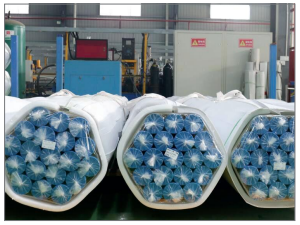
End Cap Protection

Cardboard Sleeved By End Caps

Pallet Packing



Bundle Packing



Foam Protective Bundle Packing

Big Pipe Individual Packing

Big Pipe Individual Packing By Pallet

Wooden Crate Packing

Wooden Crate Packing

Steel Crate Packing

Loading

Loading

Bundles loading

Bundles loading

Bundles loading

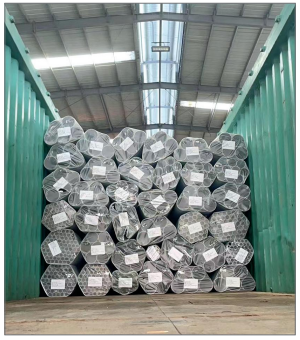
Foam Protective Bundles Loading

Pallet Loading

Steel Crate Packing

Wooden Crate Loading

Wooden Crates Loading
In Open Top Container



Bundles Loading
In Open Top Container