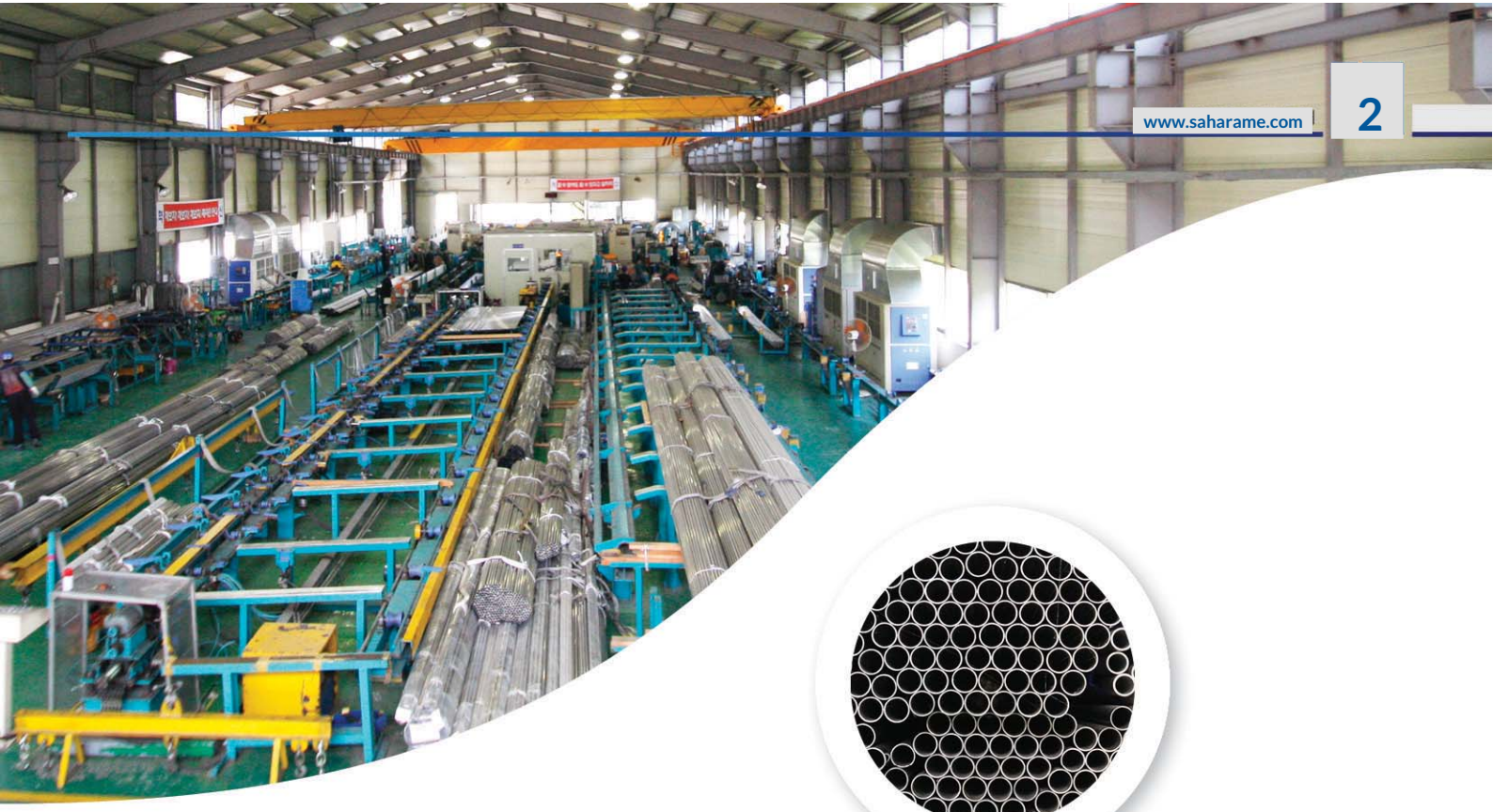
STAINLESS STEEL

Duplex / Super Duplex Tubes

sahara emirates



COMPANY

Market
- Oil & Gas Plant, Petrochemical Plant, Chemical Plant, Offshore Plant, Power Plant, Building, Food/Beverage Industry.

Usage
- Boiler, Heat Exchanger, Superheater, Air Cooler, Condenser, Structure, Machinery, Ordinary Tubing, Ice Machine & Equipment, Freezer & IQF, Sanitary Flow Equipment, Dairy & Beverage Machine, Sugar Mill, Coffee Mill, Juice Extractor, Food/Beverage Processing Equipment, Powder Mixing Tank, etc.

Major materials (ASME/ASTM)
- SS : TP304(L/H), TP321, TP316(L/Ti), TP317(L), TP347, TP405, TP409, TP429, TP430, TP439
- Duplex & Super Duplex : S31803/S32205, S32304, S32750, S32760

Available size
- OD : 13.8 ~ 51.0mm
- Thickness : 0.5 ~ 3.0mm
- Length : Max. 21m

Capacity
- 7,500tons per year

Certificates
- ISO9001, CE PED, KS D3577, KS D3595

BOILER & HEAT EXCHANGER TUBES

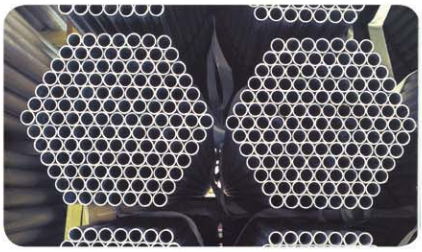
Welded Tube

Process

1 Coil → 2 Forming → 3 Welding → 4 Bead Removing → 5 Sizing → 6 Solution Heat Treatment → 7 Straightening → 8 Eddy Current Test → 9 Marking → 10 Cutting & End Facing → 11 Hydro Test → 12 Other Inspections → 13 Packing

Standards

- ASME SA249/ASTM A249 Welded Austenitic Steel Boiler, Superheater, Heat Exchanger, and Condenser Tubes
- ASME SA688/ASTM A688 Welded Austenitic Stainless Steel Feedwater Heater Tubes
- ASME SA269/ASTM A269 Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- ASME SA789/ASTM A789 Seamless and Welded Ferritic/Austenitic Stainelss Steel Tubing for General Service
- KS D3577 Stainless Steel for Boiler and Heat Exchanger Tubes


Seamless Tube

Process

1 Mother Tube → 2 Pointing → 3 Cold Drawing → 4 Degreasing → 5 Heat Treatment (Repeat) → 6 Straightening → 7 Pickling → 8 Eddy Current Test → 9 Cutting & End Facing → 10 Marking → 11 Hydro Test (if necessary) → 12 Other Inspections → 13 Packing

Standards

- ASME SA213/ASTM A213 Seamlesse Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat Exchanger Tubes
- ASME SA269/ASTM A269 Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- ASME SA789/ASTM A789 Seamless and Welded Ferritic/Austenitic Stainelss Steel Tubing for General Service
- EN ISO 1127 Seamless Stainless Steel Tubes (Dimensions and Weights)
- KS D3577 Stainless Steel for Boiler and Heat Exchanger Tubes

Available Size

O.D(mm) \ W.T(mm)	0.56	0.71	0.80	0.89	0.90	1.00	1.25	1.50	1.65	1.80	2.00	2.20	2.30	2.50	2.80	3.00	Heat Treatment
13.80	●	●	●	●	●	●	●	●	●	●	●						BA[1],AP[2]
15.88	●	●	●	●	●	●	●	●	●	●	●						BA,AP
17.30	●	●	●	●	●	●	●	●	●	●	●	●	●				AP
19.05	●	●	●	●	●	●	●	●	●	●	●	●	●				BA,AP
20.00	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		BA,AP
21.00	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		BA,AP
21.34	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
21.70	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
22.22	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
25.00	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
25.40	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
26.67	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	AP
27.20		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	AP
28.58		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
31.80			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
32.10			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
33.40			●	●	●	●	●	●	●	●	●	●	●	●	●	●	AP
34.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
35.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	AP
38.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
38.10			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
41.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
42.40			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
44.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
44.50			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
50.80			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
51.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP

*Remarks
1) BA : On-Line Bright Annealing
2) AP : Off-Line Annealing + Pickling

Seamless tube : Custom size available within OD12.5~61.0mm.

Dimensional Tolerance

(Unit :mm)

Division \ Specification		Outer Diameter		ASME SA249 ASTM A249	ASME SA249 ASTM A213
Tolerance	Outer Diameter	D < 25		+0.10,-0.11	
		25 ≤ D ≤ 40		±0.15	
		40 < D < 50		±0.20	
		50 ≤ D < 65		±0.25	
	Wall Thickness	Ave. wall tubes	All size	±10%	±10%
		Min. wall tubes	D ≤ 38.1	-0/+18%	-0/+20%
			38.1 < D		-0/+22%
	Length	D < 50.8	L ≤ 7,300	-0/+3	
			7,300 < L ≤ 10,300	-0/+6	
			10,300 < L ≤ 13,300	-0/+9	
			13,300 < L ≤ 16,300	-0/+12	
			16,300 < L	-0/+13	
		D ≥ 50.8	L ≤ 7,300	-0/+5	
			7,300 < L ≤ 10,300	-0/+10	
			10,300 < L	-0/+13	
Straightness		127mm ≤ D & Total Length 914m		Max. Curvature 0.8mm	

(Unit :mm)

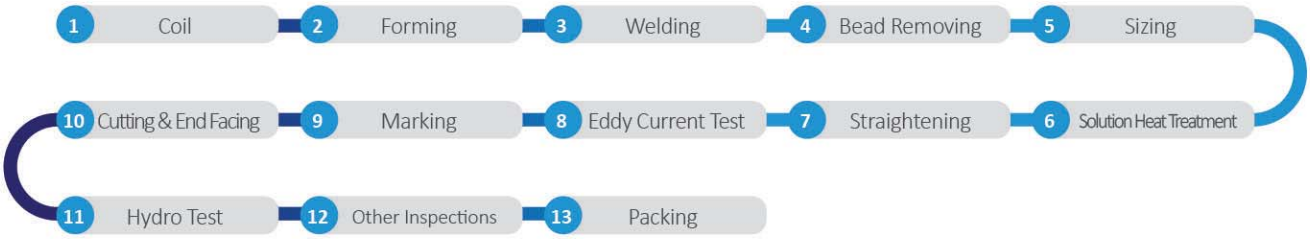
ASTM A269					ASME SA789 / ASTM A789				
Outer Diameter (mm)		Wall Thickness (mm)		Length	Outer Diameter (mm)		Wall Thickness (mm)		Length
Size	Tolerance	Tolerance	Thin Walled Tubes	Tolerance	Size	Tolerance	Tolerance	Thin Walled Tubes	Tolerance
12.7 ≤ D < 38.1	±0.13	±10%	less than 1.65mm nominal	-0/+3.2	12.7 ≤ D < 38.1	±0.13	±10%	less than 1.60mm nominal	-0/+3.0
38.1 ≤ D < 88.9	±0.25	±10%	less than 2.41mm nominal	-0/+4.8	38.1 ≤ D < 88.9	±0.25	±10%	less than 2.40mm nominal	-0/+4.8

400 GRADE TUBE - SA268 / A268

Standards

ASME SA268/ASTM A268 Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service

Process



Available Size

O.D(mm) \ W.T(mm)	0.56	0.71	0.80	0.89	0.90	1.00	1.25	1.50	1.65	1.80	2.00	2.20	2.30	2.50	2.80	3.00	Heat Treatment
13.80	●	●	●	●	●	●	●	●	●	●	●						BA[1],AP[2]
15.88	●	●	●	●	●	●	●	●	●	●	●	●					BA,AP
17.30	●	●	●	●	●	●	●	●	●	●	●	●	●				AP
19.05	●	●	●	●	●	●	●	●	●	●	●	●	●				BA,AP
20.00	●	●	●	●	●	●	●	●	●	●	●	●	●	●			BA,AP
21.00	●	●	●	●	●	●	●	●	●	●	●	●	●	●			BA,AP
21.34	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
21.70	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
22.22	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
25.00	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
25.40	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
26.67	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	AP
27.20		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	AP
28.58		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
31.80			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
32.10			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
33.40			●	●	●	●	●	●	●	●	●	●	●	●	●	●	AP
34.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
35.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	AP
38.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
38.10			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
41.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
42.40			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
44.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
44.50			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
50.80			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP
51.00			●	●	●	●	●	●	●	●	●	●	●	●	●	●	BA,AP

*Remarks
1) BA : On-Line Bright Annealing
2) AP : Off-Line Annealing + Pickling

COMPARATIVE TABLE OF STAINLESS STEEL

Grade	UNS	DIN		Composition											Mechanical Requirements			
		Material No.	Code No.	C^{Max}	Mn^{Max}	P^{Max}	S^{Max}	Si^{Max}	Cr	Ni	Mo	N^{Max}	Ti	Other	T.S.	Y.S.	El.	Hardness
															Mpa^{Max}	Mpa^{Max}	%	HRB^{Min}
304	S30400			0.080	2.00	0.045	0.030	1.00	18.0-20.0	8.0-11.0	-	-	-	-	515	205	35	90
		1.4301	x5CrNi 18-10	0.070	2.00	0.045	0.030	1.00	17.0-19.5	8.0-10.5	-	0.11	-	-	500-700	195	40	-
304L	S30403			0.030	2.00		0.030	1.00	18.0-20.0	8.0-12.0	-	-	-	-	485	170	35	90
		1.4307	x2CrNi 18-9	0.030	2.00	0.040	0.015	1.00	17.5-19.5	8.0-10.0	-	0.11	-	-	460-680	180	40	-
		1.4306	x2CrNi 19-11	0.030	2.00	0.040	0.015	1.00	18.0-20.0	10.0-12.0	-	0.11	-	-	460-680	180	40	-
304N	S30451			0.080	2.00	0.045	0.030	1.00	18.0-20.0	8.0-11.0	-	0.10-0.16	-	-	550	240	35	90
304H	S30409			0.04-0.10	2.00	0.045	0.030	1.00	18.0-20.0	8.0-11.0	-	-	-	-	515	205	35	90
321	S32100			0.080	2.00	0.045	0.030	1.00	17.0-19.0	9.0-12.0	-	0.10	-	-	515	205	35	90
		1.4541	x6CrNiTi 18-10	0.080	2.00	0.040	0.015	1.00	17.0-19.0	9.0-12.0			5xC to 0.70	-	500-730	200	35	-
316	S31600			0.080	2.00	0.045	0.030	1.00	16.0-18.0	10.0-14.0	2.0-3.0	-	-	-	515	205	35	90
		1.4401	x5CrNiMo 17-12-2	0.070	2.00	0.040	0.015	1.00	16.5-18.5	10.0-13.0	2.0-2.5	0.11	-	-	510-710	205	40	-
316L	S31603			0.030	2.00	0.045	0.030	1.00	16.0-18.0	10.0-14.0	2.0-3.0	-	-	-	485	170	35	90
		1.4404	x2CrNiMo 17-12-2	0.030	2.00	0.040	0.015	1.00	16.5-18.5	10.0-13.0	2.0-2.5	0.11	-	-	490-690	190	40	-
		1.4435	x2CrNiMo 18-14-3	0.030	2.00	0.040	0.015	1.00	17.0-19.0	12.5-15.0	2.5-3.0	0.11	-	-	490-690	190	40	-
316Ti	S31635			0.080	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.0-3.0	0.10	5X(C+N) -0.70		515	205	35	90
		1.4571		0.080	2.00	0.040	0.015	1.00	16.5-18.5	10.5-13.5	2.0-2.5		5xC to 0.70	-	490-690	190	35	-
317L	S31703			0.030	2.00	0.045	0.030	1.00	18.0-20.0	11.0-15.0	3.0-4.0	-	-	-	485	170	35	90
		1.4438	x2CrNiMo 18-15-4	0.030	2.00	0.045	0.030	1.00	18.0-20.0	11.0-15.0	3.0-4.0	0.11	-	-	490-690	220	35	-
347	S34700			0.080	2.00	0.045	0.030	1.00	17.0-19.0	9.0-12.0	4.0-5.0	0.40-0.60	-	Cb 10xC-1.10	515	205	35	90
		1.4550	x6CrNiNb 18-10	0.080	2.00	0.045	0.03	1.00	17.0-19.0	9.5-12.0	-	-	-	Nb 1.0	510-740	205	35	-
	S31803			0.030	2.00	0.030	0.020	1.00	21.0-23.0	4.5-6.5	2.5-3.5	0.08-0.20	-	-	620	450	25	HRC 30
		1.4462	x2CrNi-MoN 22-5-3	0.030	2.00	-	-	1.00	21.0-23.0	4.5-6.5	2.5-3.5	0.08-0.20	-	-	700-920	450	25	-
	S32205			0.030	2.00	0.030	0.020	1.00	22.0-23.0	4.5-6.5	3.0-3.5	0.14-0.20	-	-	655	485	25	HRC 30
	S32304			0.030	2.50	0.040	0.040	1.00	21.5-24.5	3.0-5.5	0.05-0.60	0.05-0.20	-	Cu 0.05-0.60	690 600	450 400	25 25	- HRC 30
	S32750			0.030	1.20	0.035	0.020	0.80	24.0-26.0	6.0-8.0	3.0-5.0	0.24-0.32	-	Cu 0.5	800	550	15	HRC 32
	S32760			0.050	1.00	0.030	0.010	1.00	24.0-26.0	6.0-8.0	3.0-4.0	0.20-0.30	-	Cu 0.50-1.00 W 2.10-2.50	750	550	25	-
409	S40900			0.080	1.00	0.045	0.030	1.00	10.5-11.7	0.5 Max			6 x C min		380	170	20	95
410	S41000			0.150	1.00	0.040	0.030	1.00	11.5-13.5			0.03 max			415	205	20	95
439	S43035			0.070	1.00	0.040	0.030	1.00	17.0-19.0	0.5 Max		0.04 max		Al 0.15 max	145	205	20	90

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