Typical standards and materials

	Standards			Applications					Typical chemical requirements in % according to ASTM									Tubing Typical Tensile requirements (min)			Typical Yield strength 0,2 at high temperature (min) - MPa-ksi				Thermal conductivity W/(m °C) - BTU/(h.ft °F)					Density	Coefficient of expansion 10⁻⁶ /°C(20 °C→) - 10⁻⁶/°F (68 °F→)					Young modulus (tensile) 10³ MPa - 10³ ksi				
	ASTM / grade (UNS N°)	Closest EN /*DIN / registered trademark grade	VALTIMET	Feedwater Heaters	Condensers	Desalination	Chemical and Petrochemical	Automotive	C	Mn	Si	Cr	Mo	Ni	Cu	Others	TS MPa ksi	YS 0,2 MPa ksi	El%	100 °C 212 °F	200 °C 392 °F	300 °C 572 °F	400 °C 752 °F	20 °C 68 °F	100 °C 212 °F	200 °C 392 °F	300 °C 572 °F	400 °C 752 °F	kg / dm³ lb / in³	100 °C 212 °F	200 °C 392 °F	300 °C 572 °F	400 °C 752 °F	20 °C 68 °F	100 °C 212 °F	200 °C 392 °F	300 °C 572 °F	400 °C 752 °F
	VALINOX STAINLESS STEELS																																					
Ferritic	A 240 (S43940/S43932)	1.4509	441					X	≤0.03	≤1	≤1	17.5 18.5	–	–	–	Ti : 0.1/0.6 0.3+3xC≤Cb	430 62	250 36	18	–	–	–	–	25 14.5	–	–	–	–	7.7 0.28	–	11 6.1	–	11.5 6.3	220 31.9	–	–	–	–
	A 240 TP 444 (S44400)	1.4521	444					X	≤0.025	≤1	≤1	17.5 19.5	1.75 2.5	≤1	–	N ≤ 0.035 0.2+4(C+N)≤Ti+Cb≤0.80	415 60	275 40	20	–	–	–	–	23 13.2	–	–	–	–	7.7 0.28	–	10.8 6	–	11.6 6.3	220 31.9	–	–	–	–
	A 268 - A 803 TP 439 (S43035)	1.4510	439	X	X	X	X	X	≤0.07	≤1	≤1	17 19	–	≤0.5	–	Al<0.15 N≤0.04 0.2+4(C+N)≤Ti≤1.10	415 60	205 30	20	260 38	235 34.5	210 31	185 24.7	24 14	24.2 14.1	24.8 14.3	25 14.5	25.3 14.6	7.73 0.28	10.2 5.7	10.4 5.8	10.8 6	11.4 6.3	201 29.2	196 28.5	189 27.3	181 26.2	174 25.1
	A 268 - A 803 (S44735)	1.4592 AL 29-4C®		X	X	X	X		≤0.03	≤1	≤1	28 30	3.6 4.2	≤1	–	N<0.045 Cb+Ti : 0.2/1 6(C+N)≤Ti+Cb	515 75	415 60	18	420 60.9	345 50.1	310 45.0	300 43.5	17 9.9	17.7 10.2	18.5 10.7	19.3 11.2	–	7.67 0.27	9.4 5.2	9.7 5.4	–	10.4 5.8	207 30	–	–	–	–
Duplex	A 789 - A 790 (S32101)	1.4162 LDX 2101®		X	X				≤0.04	4 6	≤1	21 22	0.10 0.80	1.35 1.70	0.10 0.80	0.20 ≤ N ≤ 0.25	700 101	530 77	30	380 55.1	330 47.9	300 43.5	–	15 8.8	16 9.4	17 10	18 10.6	–	7.7 0.28	3.5 7.5	14 7.7	14.5 8									
	A 789 - A 790 (S32304)	1.4362	2304	X	X				≤0.03	≤2.5	≤1	21.5 24.5	0.05 0.6	3 5.5	0.05 0.6	0.05 ≤ N ≤ 0.20	600 (4) 87 (4)	400 (5) 58 (5)	25	330 47.9	280 40.6	–	–	15 8.8	16 9.4	17 10	18 10.6	–	7.7 0.28										
	A 789 - A 790 (S32003)	AL 2003®		X	X				≤0.03	≤2	≤1	19.5 22.5	1.5 2	3 4	–	0.14 ≤ N ≤ 0.20	690 100	485 70	25	450 65	386 56	386 56	–	16 9.4	17 10	18 10.6	19 11	–	7.7 0.28	13 7.2	13.5 7.5	14 7.7	–	200 29	194 28.1	186 27	180 26.1	–
	A 789 - A 790 (S31803)	(SEW 400) 1.4462	22-05	X	X		X		≤0.03	≤2	≤1	21 23	2.5 3.5	4.5 6.5	–	0.08 ≤ N ≤ 0.20	620 90	450 65	25	360 52.1	320 46.3	–	–	16 9.4	17 10	18 10.6	19 11	20 11.8	7.8 0.28									
	A 789 - A 790 (S32750)	1.4410	25-07		X				≤0.03	≤1.2	≤0.8	24 26	3.0 5.0	6.0 8.0	≤0.5	0.24 ≤ N ≤ 0.32	800 116	550 80	15	480 69.6	420 60.9	–	–	14 8.2	15 8.8	16 9.4	18 10.5	20 11.8	7.8 0.28									
Austenitic	A 240 TP 301LN (S30153)	1.4318	301 LN					X	≤0.03	≤2	≤1	16 18	–	6 8	–	0.07 ≤ N ≤ 0.20	550 80	240 35	45	265 38.4	185 26.8	170 25	–	15 8.8	16.2 9.4	17.4 10	19.3 11.3	20 11.8	7.97 0.29	16 8.9	16.5 9.2	17 9.4	17.5 9.7					
	A 249 - A 688 TP 304 (S30400)	1.4301	304	X	X			X	≤0.08	≤2	≤1	18 20	–	8 11	–	–	515 75	205 30	35	157 22.8	127 18.4	110 15.9	98 14.2	15 8.8	16.2 9.4	17.9 10.5	19.3 11.3	20 11.8										
	A 249 - A 688 TP 304L (S30403)	1.4306 1.4307	304 L	X	X		X	X	≤0.03	≤2	≤1	18 20	–	8 12	–	–	485 70	170 25	35	150 21.5	120 17.5	100 14.5	90 13	14.9 8.6	16.2 9.4	17.9 10.5	19.3 11.3	20 11.8		16.8 9.3	17.3 9.6	17.6 9.8	17.9 9.9					
	A 249 - A 688 TP 304LN (S30453)	1.4311	304 LN	X					≤0.03	≤2	≤1	18 20	–	8 11	–	0.10 ≤ N ≤ 0.16	515 75	205 30	35	210 29.4	160 23.2	140 20.3	130 18.8	15 8.8	16.2 9.4	17.4 10	19.3 11.3	20 11.8										
	A 249 - A 688 TP 316L (S31603)	1.4404 (1.4435)	316 L	X	X		X	X	≤0.03	≤2	≤1	16 18	2 3	10 14	–	–	485 70	170 25	35	170 24.5	140 20	120 17.5	110 16	13.6 7.7	14.6 8.4	16.3 9.4	18 10.4	19.4 11.2		16.5 9.2	16.8 9.3	17 9.4	17.2 9.6	200 29	190 27.5	183 26.5	175 25.4	169 24.5
	A 312 TP 316 Ti (S31635)	1.4571	316 Ti	X				X	≤0.08	≤2	≤0.75	16 18	2 3	10 14	–	5(C+N)≤Ti≤0.7 N≤0.10	515 75	205 30	35	185 26.8	167 24.2	145 21	135 19.6	13.4 7.7	14.6 8.4	16.3 9.4	18 10.4	19.4 11.2		16.8 9.3	17.3 9.6	17.6 9.8	17.9 9.9					
	A 249 TP 317L (S31703)	1.4438	317 L		X				≤0.03	≤2	≤1	18 20	3 4	11 15	–	–	515 75	205 30	35	170 24.5	146 21.1	127 18.4	118 17.1	73.5 7.9	–	–	–	–		16.8 9.3	17.3 9.6	17.6 9.8	17.9 9.9					
	A 249 TP 321 (S32100)	1.4541	321	X				X	≤0.08	≤2	≤1	17 19	–	9 12	–	5(C+N)≤Ti≤0.7 N≤0.10	515 75	205 30	35	180 26	160 23	140 20.5	125 18	14 8.1	15.2 8.8	17.1 9.9	18.2 10.5	20 11.6										
	A 249 TP 317LMN (S31726)	1.4439	4439		X				≤0.03	≤2	≤1	17 20	4 5	14.5 17.5	–	0.10 ≤ N ≤ 0.20	550 80	240 35	35	255 37	210 30.4	190 27.5	175 25.4	15 8.8	–	–	–	–		16.5 9.1	17.5 9.7	17.5 9.7	18.5 10.2					
	A 249 (N08904)	1.4539	904 L		X		X	X	≤0.02	≤2	≤1	19 23	4 5	23 28	1 2	–	490 71	215 31	35	210 29.4	175 25.5	140 21	135 19.5	13 7.5	15 8.5	16 9.2	–	–	8.05 0.29	15.2 8.4	16.1 8.9	16.8 9.3	17.2 9.5	195 28.3	190 27.5	180 26.1	–	–
	A 249 (S31254)	1.4547 254 SMO®			X				≤0.02	≤1	≤0.8	19.5 20.5	6 6.5	17.5 18.5	0.5 1	0.18 ≤ N ≤ 0.25	675 98	310 45	35	230 33.4	190 27.6	230 33.4	230 33.4	13.5 7.9	–	–	–	–	7.97 0.29	16.8 9.3	17.3 9.6	17.6 9.8	17.9 9.9	200 29	190 27.5	183 26.5	175 25.4	169 24.5
Heat resistant austenitic	A240 (S30415)	1.4818 153MA®						X	0.04 0.06	≤0.8	1 2	18 19	–	9 10	–	0.12 ≤ N ≤ 0.18 0.03 ≤ Ce ≤ 0.08	600 87	290 42	40	200 29	165 23.9	150 21.8	140 20.3	15 8.8	–	–	–	–	7.8 0.28	16.8 9.3	17.3 9.6	17.6 9.8	17.9 9.9	200 29	190 27.5	183 26.5	175 25.4	169 24.5
		1.4828	4828					X	≤0.20	≤2	1.5 2.5	19 21	–	11 13	–	N ≤ 0.11	550 80	230 33	30	140 20.3	116 16.8	100 14.5	91 13.2	15 8.8	–	–	–	–	7.8 0.28	–	16.5 9.1	–	17.5 9.7	196 28.4	–	–	–	–
	A240 (S30815)	1.4835 253MA®						X	0.05 0.10	≤0.8	1.4 2	20 22	–	10 12	–	0.14 ≤ N ≤ 0.20 0.03 ≤ Ce ≤ 0.08	650 94	270 39	40	230 33.4	185 26.8	230 33.4	230 33.4	15 8.8	–	–	–	–	7.8 0.28	16.8 9.3	17.3 9.6	17.6 9.8	17.9 9.9	200 29	190 27.5	183 26.5	175 25.4	169 24.5
	TITANIUM ALLOYS								C	N	H	Fe	O	Other elements	Titanium																							
	B 338 GR.1	3.7025*	Ti gr.1		X	X			≤0.08	≤0.03	≤0.015	≤0.20	≤0.18	EACH < 0.10 TOTAL < 0.40	rem.	240 35	138 20	24	158.7 23	96.6 14	55.2 8	41.4 6	22 12.7	20.7 12	19.9 11.5	19.4 11.2	19.4 11.2	4.5 0.163										
	B 338 GR.2	3.7035*	Ti gr.2		X	X	X		≤0.08	≤0.03	≤0.015	≤0.30	≤0.25		rem.	345 50	275 40	20	262.2 38	172.5 25	124.2 18	96.6 14	22 12.7	20.7 12	19.9 11.5	19.4 11.2	19.4 11.2		8.5 4.75	8.8 4.9	9.1 5.05	9.4 5.2	107 15.5	103 15	97 14	88 12.8	–
	B 338 GR.3	3.7055*	Ti gr.3				X		≤0.08	≤0.05	≤0.015	≤0.30	≤0.35		rem.	450 65	380 55	18	345 50	213.9 31	144.9 21	124.2 18	20.8 12	19.1 11	–	–	–										
	B 338 GR.7	3.7225*	Ti gr.7				X		≤0.08	≤0.03	≤0.015	≤0.30	≤0.25	0.12≤Pd≤0.25	rem.	345 50	275 40	20	262.2 38	172.5 25	124.2 18	96.6 14	22 12.7	20.7 12	19.9 11.5	19.4 11.2	19.4 11.2										
	B 338 GR.9	_	Ti gr.9						≤0.08	≤0.03	≤0.015	≤0.25	≤0.15	2.5≤Al≤3.5 2≤V≤3	rem.	620 (3) 90	483 70	15	531.3 77	434.7 63	379.5 55	345 50	7.6 4.4	8.3 4.8	–	–	–		9.3 4.9	9.5 5.0	9.7 5.1	9.9 5.2	103 15.0	–	–	–	–
	B 338 GR.12	3.7105*	Ti gr.12				X		≤0.08	≤0.03	≤0.015	≤0.30	≤0.25	0.2≤Mo≤0.4 0.6≤Ni≤0.9	rem.	483 70	345 50	18	414 60	324.3 47	269.1 39	234.6 34	22.8 13.2	21.2 12.3	–	–	–		9.5 5.3	–	–	9.9 5.5	103 15.0	–	–	–	–
	B 338 GR.16	_	Ti gr.16				X		≤0.08	≤0.03	≤0.015	≤0.30	≤0.25	0.04≤Pd≤0.08	rem.	345 50	275 40	20	262.2 38	172.5 25	124.2 18	96.6 14	22 12.7	20.7 12	19.9 11.5	19.4 11.2	19.4 11.2		8.5 4.75	8.8 4.9	9.1 5.05	9.4 5.2	107 15.5	103 15	97 14	88 12.8	–
	COPPER ALLOYS								Cu	Ni	Zn	Pb	Fe	Mn	As	Sn																						
	B 543 - B552 C 70600	2.0872.19*	90/10		X	X			rem.	9.0 11.0	≤1.0	≤0.05	1.0 1.8	≤1.0	–	–	275 40	105 15	30	–	–	–	–	45 26	–	–	–	–	8.94 0.31	–	–	17 9.4	–	130 18.8	–	–	–	–
	B 543 - B552 C 71500	2.0882.19*	70/30		X	X			rem.	29.0 33.0	≤1.0	≤0.05	0.40 1.0	≤1.0	–	–	360 52	125 8	30	–	–	–	–	30 17.3	–	–	–	–	8.94 0.31	–	–	16 8.9	–	149 21.6	–	–	–	–
	B 543 - B552 C 71640	2.0883*	66/30/2/2		X	X			rem.	29.0 32.0	≤1.0	≤0.05	1.7 2.3	1.5 2.5	–	–	440 63	175 25	30	–	–	–	–	30 17.3	–	–	–	–	8.94 0.31	–	–	16 8.9	–	149 21.6	–	–	–	–
	B 543 C 44300		B70/30AS		X				70 73	–	rem.	≤0.07	≤0.06	–	0.02 0.06	0.8 1.2	315 45	105 15	40	–	–	–	–	121 70	–	–	–	–	8.67 0.30	19.9 11.12	–	–	–	115 16.67	–	–	–	–

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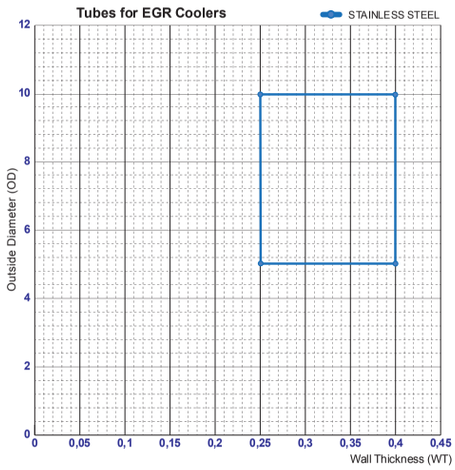
(4) Annealed, (5) 690 MPa (100 ksi) if OD ≤ 25 mm (1 in.), (3) 450 MPa (65 ksi) if OD ≤ 25 mm (1 in.)

Most usual dimensions : thermal conductivity and metric weight

Material (ASTM / EN)		Thermal conductivity K	Wall thinkness	Outside diameter	Metric weight
			(WT) mm	(OD) mm	kg / m
Titanium grade 2 (B338 GR.2)		22 W/(m.°C)	0.5	30	0.21
				25.4	0.18
				19	0.13
Stainless Steels (ASTM / EN)	Austenitic (ex: 304, 316, 321) (1.4301) (1.4404 / 1.454)	15 W/(m.°C)	0.5	15	0.18
				20	0.24
				25	0.31
			1.0	15	0.35
				20	0.48
				25	0.60
	Duplex (ex: 25-07) (1.4462, 1.4410)	15 W/(m.°C)	0.5	19.5	0.23
				25.4	0.31
			0.7	19.4	0.31
				25.4	0.42
	Ferritic (TP439)	24 W/(m.°C)	1.2	15	0.40
				19	0.52
			1.7	15	0.55
				19	0.71
	Super Ferritic S44735 (1.4592)	17 W/(m.°C)	0.5	25.4	0.30
Cu / Ni (ex: 70 / 30)		30 W/(m.°C)	1	20	0.53
				25.4	0.69
Brass (ex: CuZn30As)		121 W/(m.°C)	1	20	0.52

Diameter and wall thickness capabilities



Titanium Alloys

12.7 mm ≤ OD ≤ 73 mm
(0.5") (2.875")

0.4 mm ≤ WT ≤ 2.77 mm
(0.015") (0.11")

Stainless Steels

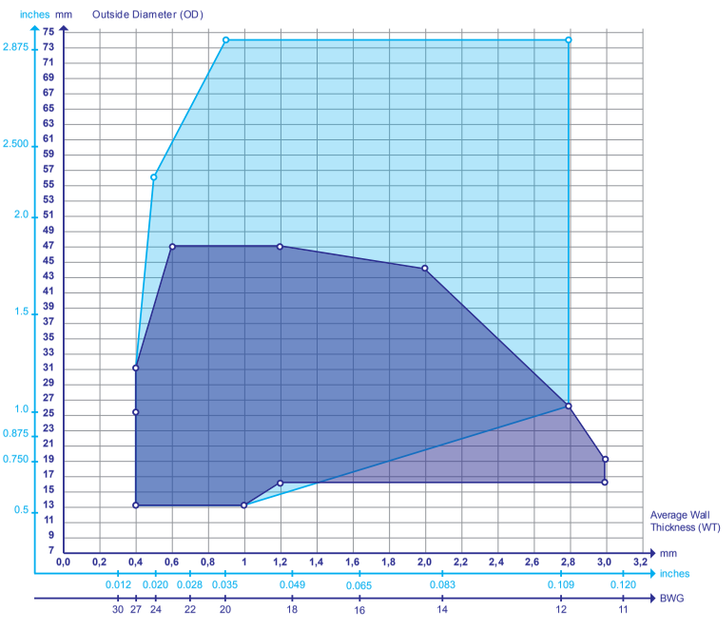
12.7mm ≤ OD ≤ 46.2 mm
(0.5") (1.82")

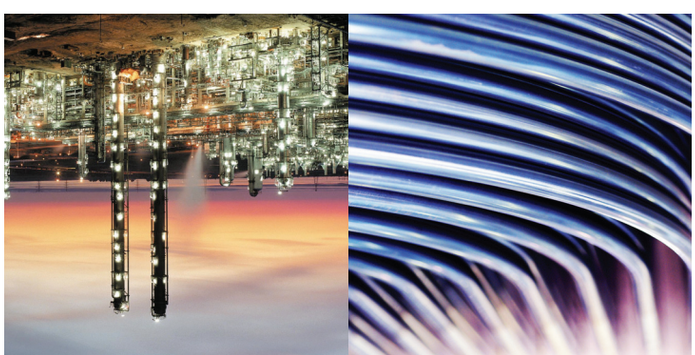
0.4 mm ≤ WT ≤ 3.05 mm
(0.015") (0.12")

Other dimensions can be considered upon request

Titalium Alloys

Stainless Steels





VALTIMET pocket

Quality & safety
The fruit
of experience

TITANIUM AND STAINLESS STEEL
WELDED TUBES FOR HEAT
EXCHANGERS

vallourec

Conversion tables

Metric mass

WT - mm, OD - mm, mass - kg

(OD-WT) x WT x
0.01414 (titanium)
0.02504 (Austenitic)
0.02420 (Ferritic)
0.02809 (Cu/Ni)
0.02450 (Duplex)

Centigrade / fahrenheit

C°	F°
0	32
5	41
10	50
20	68
30	86
40	104
50	122
75	167
100	212
200	392
300	572
500	932
700	1292
900	1652
1000	1832

Formula

[°C] = ([°F] - 32) x 5/9
[°F] = [°C] x 5/9 + 32

Pressure

1 bar = 0.1 MPa (Megapascal) = 0,99 atm (Atmosphere) = 14,5 psi (Pound Square Inch)

Kilograms / pounds

Pounds = kg x 2.2
Kilograms = lbs / 2.2

Meters / feet

feet = meters x 3.281
meters = feet x 0.3048

mm / inches / BWG

mm	inches	BWG
0.4	0.016	27
0.5	0.020	25
0.7	0.028	22
0.89	0.035	20
1.24	0.050	18
1.47	0.059	17
1.65	0.063	16
1.83	0.072	15
2	0.079	
2.11	0.083	14
2.41	0.095	13
2.77	0.109	12
3.05	0.120	11
3.40	0.134	10
5	0.20	
6.35	0.25	
7.62	0.3	1
10	0.39	
12.7	0.5	
15	0.59	
16.5	0.65	
19.05	0.75	
25.4	1	

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WT = wall thickness / OD = outside diameter / BWG = Birmingham Wire Gauge