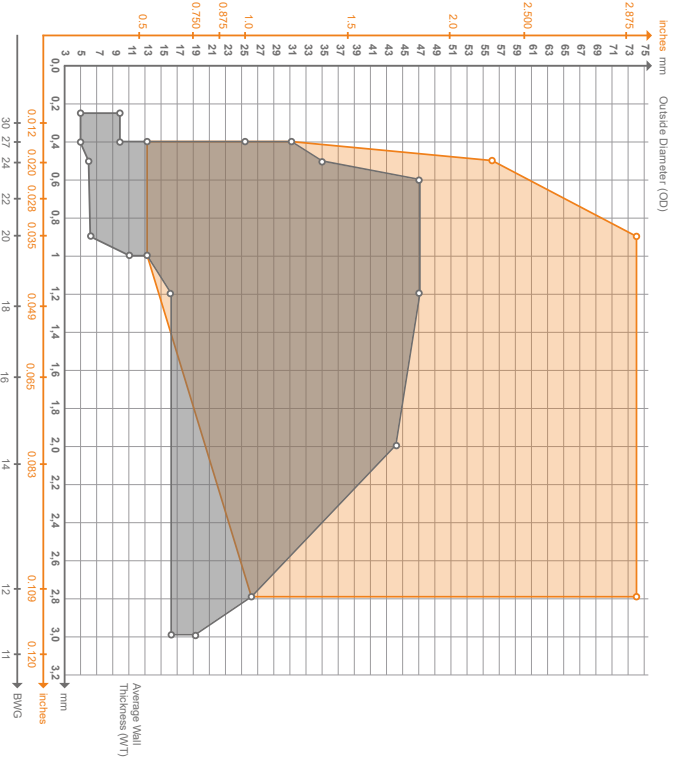


Standards			Applications				Typical chemical requirements in % according to ASTM							Tubing Typical Tensile requirements (min)			Typical Yield strength 0.2 at high temperature (min) - MPa-ksi				Thermal conductivity W/(m °C) - BTU/(h.ft °F)				Density	Coefficient of expansion 10 <sup>-6</sup> /°C (20 °C→) - 10 <sup>-6</sup> /°F (68 °F→)				Young modulus (tensile) 10 <sup>3</sup> MPa - 10 <sup>3</sup> ksi									
ASTM / grade (UNS N <sup>o</sup> )	Closest EN /DIN / registered trademark grade	Neotiss	FreeWater Heaters	Condensers	Desalination	Process	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 / dm <sup>3</sup> lb / in <sup>3</sup>	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		
STAINLESS STEELS																																							
Ferritic	A 240 (S43940/S43932)	1.4509	441				X	≤0.03	≤1	≤1	17.5 18.5	-	-	-	Ti: 0.10/0.6 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	-	-	-	-	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	≤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 <sup>®</sup>		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 2 101 <sup>®</sup>		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	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 <sup>(4)</sup> 87 <sup>(4)</sup>	400 <sup>(6)</sup> 58 <sup>(6)</sup>	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 <sup>®</sup>		X	X			≤0.03	≤2	≤1	19.5 22.5	1.5 3	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	↑	↑	↑	-	-	-	-	-			
	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	7.2	13.5 7.5	14 7.7	-	200 29	194 28.1	186 27	180 26.1	-		
	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 304 L (S30403)	1.4306 1.4307	304 L	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	↑	16.5 9.2	16.8 9.3	17 9.4	17.2 9.6	↓	↓	↓	↓	↓		
	A 249 - A 688 TP 316 L (S31603)	1.4404 (1.4435)	316 L	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 317 L (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	4 14.5	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	↑	16.5 9.1	17.5 9.7	17.5 9.7	18.5 10.2	↓	↓	↓	↓	↓		
	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	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 <sup>®</sup>			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 <sup>®</sup>				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			
	A240 (S30815)	1.4835 253MA <sup>®</sup>	4828			X	0.05 0.10	≤0.8	1.4 2	19 22	-	11 12	-	0.14 ≤ N ≤ 0.20 0.03 ≤ Ce ≤ 0.08	550 80	230 33	30	240 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	-	-	-	-			
TITANIUM ALLOYS																																							
Titanium	B 338 GR.1	3.7025*	Ti gr.1		X	X		≤0.08	≤0.03	≤0.015	≤0.20	≤0.18	-	-	-	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	8.94 0.31	↑	↑	↑	↑	↑	↑	↑	↑	↑		
	B 338 GR.2	3.7035*	Ti gr.2		X	X	X	≤0.08	≤0.03	≤0.015	≤0.30	≤0.25	-	EACH < 0.10 TOTAL < 0.40	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	8.94 0.31	↑	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	-	-	8.94 0.31	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
	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	8.94 0.31	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
	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 <sup>(8)</sup> 90	483 70	15	531.3 77	434.7 63	379.5 55	345 50	7.6 4.4	8.3 4.8	-	-	-	-	8.94 0.31	↑	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	7.6 4.4	8.3 4.8	-	-	-	-	8.94 0.31	↑	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	8.94 0.31	↑	8.5 4.75</										

## Most usual dimensions : thermal conductivity and metric weight

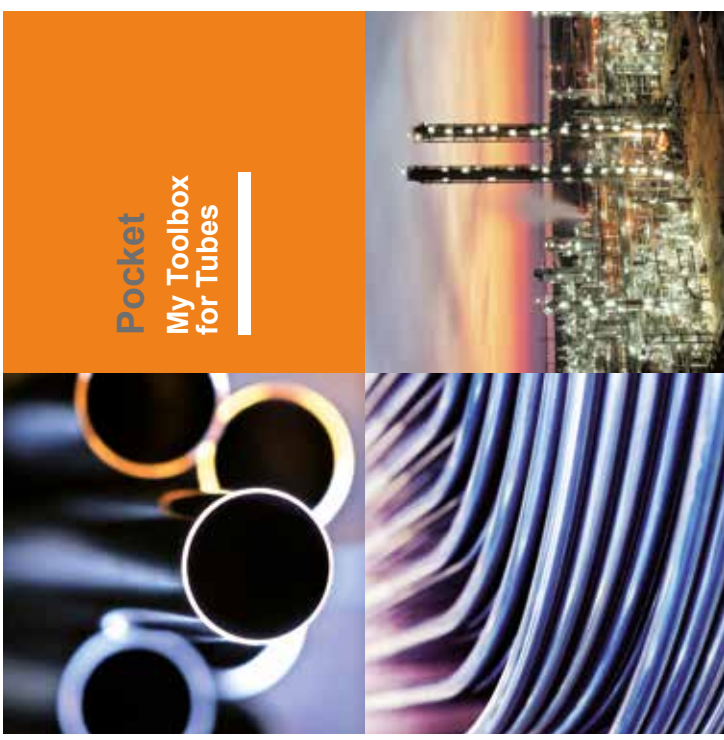
Material (ASTM / EN)	Thermal conductivity K	Wall thickness (WT) mm	Outside diameter		Metric weight kg / m
			(OD) mm	mm	
<b>Titanium grade 2</b> (B338 GR.2)	<b>22 W/(m.°C)</b>	<b>0.5</b>	<b>30</b>	<b>0.21</b>	
			<b>25.4</b>	<b>0.18</b>	
Autenstenic (ex: 304, 316, 321) (1.4301 / 1.4404 / 1.454)	<b>15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

## Titanium and Stainless Steel Welded Tubes 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



Pocket My Toolbox for Tubes



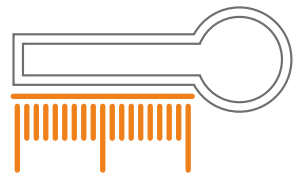
[www.neotiss.com](http://www.neotiss.com)  
WT = Wall thickness / BWG = Birmingham Wire Gauge

**Kilograms / pounds**  
Pounds = kg x 2.2  
Kilograms = lbs / 2.2

**Meters / feet**  
feet = meters x 3.281  
meters = feet x 0.3048

**Pressure**  
1 bar = 0.1 MPa (Megapascal) = 0.99 atm (Atmosphere) = 14,5 psi (Pound Square Inch)

**Formula**  
 $32 + \frac{5}{9} \times [C] = [F]$   
 $\frac{5}{9} \times (F - 32) = [C]$



**Centigrade / fahrenheit**

**Metric mass**  
WT - mm, OD - mm, mass - kg  
(OD-WT) x LT x WT x 0.01414 (Titanium)  
0.02504 (Austenitic)  
0.02420 (Ferritic)  
0.02809 (Cu/Ni)  
0.02450 (Duplex)

**BWG**  
inches / mm  
inches / mm

## Conversion tables