H&H HandyTube

A STEEL PARTNERS COMPANY

ENGINEERED SOLUTIONS

www.HandyTube.com


HandyTube
A DIVISION OF Handy&Harman
WWW.HANDYTUBE.COM • DELAWARE, USA

History of HandyTube

1867 Handy & Harman founded as a precious metals company

1892 Handy & Harman sets domestic traded silver price

1905 Started diversifying metals business to include brazing alloys

1948 Handy & Harman Tube Division is founded in Norristown, Pennsylvania

1981 Camdel Metals Long Coil Division is founded in Camden, Delaware

2006 Precision Materials product line added to Camdel Metals

2006 HandyTube Corporation developed Chroma Clean I.D.®, Chromat I.D.® and LI-Chroma Clean I.D.®.

2011 Camdel Metals Corporation is renamed HandyTube Corporation

2012 HandyTube Corporation manufactures long length coils.

2017 Steel Partners acquired 100% of shares of Handy & Harman.

Seamless Coil Tubing

HandyTube has specialized in the manufacture of long length seamless coil tubing of outer diameter sizes smaller than 1" (25.4mm) for over 35 years. Our seamless coil tubing is available in a number of high performance corrosion resistant stainless steel and high nickel alloys, capable of withstanding a variety of environmental conditions. Our specific advantage is being able to make long lengths of tube which are free of welds up to and exceeding 5,000 feet long. This reduces installation efforts and the need for excess fittings as well as minimizes the risk of leaks.

Seamless Small & Ultra Small Diameter Coil Tubing

HandyTube is able to offer tubes with outer diameter sizes as small as 0.017" (0.430mm) and inner diameter sizes as small as 0.004" (0.102mm). For reference, a human hair is approximately 0.003" in size. Applying the same technology that we use to manufacture large coils, and with precision equipment specifically designed in-house, we are able to bring a more complete tubing solution to our customers.

Chroma Clean I.D.® – HandyTube's proprietary cleaning process aimed at removing oil, grease, and other contaminants from the tubing interior. This cleaning is critical for use in chromatography and other industries where any foreign particles can skew precise results.

Chromat I.D.® – HandyTube's proprietary drawing process that promotes ID support during the reduction process for a smoother ID surface.

Seamless Straight Length Tubing

HandyTube manufactures straight length tube, produced according to ASTM, MIL-T, and AMS specifications. Our straight length tube is ideal for ultra high purity, military, aircraft, semiconductor, medical, and general instrumentation applications. Through our unique processing, we manufacture straight length tube suitable for all assembly methods including flared and compression fittings, also with superior weldability.

HE KNOWS IT'S NOT JUST A TUBE.

HandyTube stainless steel seamless tube manufactured with precision.

Engineered Solutions • Superior Customer Service • Reliable Products

ISO 9001-CERTIFIED

Lloyd's Register LRQA

CUSTOMER APPROVALS

HALLIBURTON

Pratt & Whitney
A United Technologies Company

Gulfstream
A GENERAL DYNAMICS COMPANY

NORSOK M-650 EDITION 4 ACCREDITED
Statoil Approved

ارامكو السعودية
Saudi Aramco

SHIPBUILDING CERTIFICATIONS

DNV

Lloyd's Register Marine

ABS

BUREAU VERITAS

HIGH PRESSURE APPLICATIONS

TÜV SÜD
AD-2000-Merkblatt-W0

PED 97/23/EC

APPROVED VENDOR LIST

ADMA-OPCO

BAKER HUGHES

NOV NATIONAL OILWELL VARCO

ZADCO
شركة تطوير حقل زاكوم (زادكو)
Zakum Development Company (ZADCO)

Schlumberger

البترول الوطنية
KNPC
إحدى شركات مؤسسة البترول الكويتية
A Subsidiary of Kuwait Petroleum Corporation

ارامكو السعودية
Saudi Aramco

COMMITMENT TO QUALITY

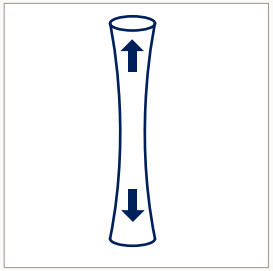
MATERIAL TESTING

HandyTube facilities are ISO 9001-Certified.

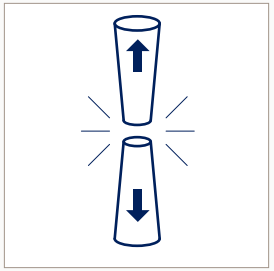
Serving with the latest testing equipment and trained personnel.

TRACEABILITY THROUGHOUT THE ENTIRE MANUFACTURING PROCESS:

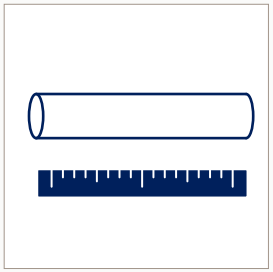
- Material Test Reports accompany every shipment
- In-house, climate controlled laboratory
- Samples retained from every lot for peace of mind
- 100% Positive Material Identification (PMI)
- 100% Pressure Testing of all coils



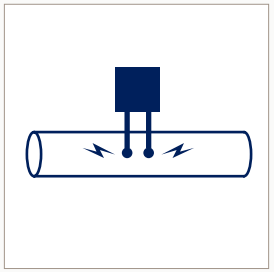
Yield Strength



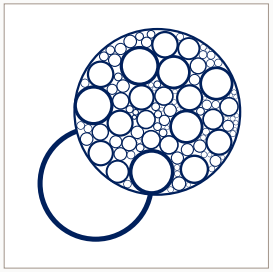
Tensile Strength



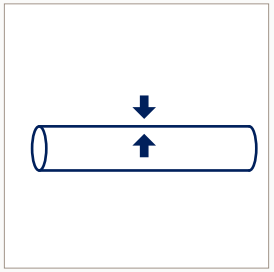
Elongation



Positive Material Identification (PMI)



Grain Size



Rockwell Hardness

Destructive and Non-destructive Tests:

- **Hydrostatic Testing:** a non-destructive test (NDT) for strength and leaks. The test involves filling the tubing with deionized water until it reaches a specified hold pressure. The tubing is then observed for leaks and pressure loss.
- **Splitflow Testing:** a non-destructive test (NDT) used on small diameter tubing to ensure that the interior is free of blockages and the surface is free of leaks. Testing involves holding a tube underwater and flowing Nitrogen through the tube.
- **Eddy Current Testing:** eddy current testing (ECT) is one of many non-destructive electromagnetic (NDE) testing methods. ECT makes use of electromagnetic induction to detect and characterize surface and sub-surface flaws in tubing.
- **Surface Roughness:** smoothness of the OD or ID surface of the tubing. Measurements are taken by a Surfometer verified against certified roughness standards.
- **Dimensional Analysis:** a measurement of the OD, ID, and/or Wall Thickness of the tube using a variety of calibrated micrometers and gauge pins.
- **Hydraulic Diameter:** measure of the cross-sectional fluid flow through the inner diameter of the tube. Hydraulic diameter is obtained through a back pressure flow test.
- **Positive Material Identification (PMI):** the analysis of a metallic sample to identify the material grade. This is accomplished by measuring the % composition of its constituent elements and matching it to a database of known alloys. Typical methods for PMI include X-ray fluorescence (XRF).
- **Yield Strength:** the stress at which a specific amount of plastic deformation is produced, usually taken as 0.2 percent of the unstressed length.
- **Tensile Strength:** a measurement of the force required to pull something to the point where it breaks. The tensile strength of a material is the maximum amount of tensile stress that it can take before failure.
- **Elongation:** a measure of the ductility; the amount of strain deformation a material can experience before failure in tensile testing.
- **Grain Size:** a measure of the density of metallic crystals with the same configuration within the microstructure of a material. Grain size serves as an indicator of temper within a sample of material.
- **Rockwell Hardness:** a hardness scale based on indentation hardness of a material. The Rockwell test determines the hardness by measuring the depth of penetration of an indenter under a large load compared to the penetration made by a preload.

AUSTENITIC STAINLESS STEELS

	ALLOY DESIGNATION				COMMON SPECIFICATIONS					
Grade	UNS	EN Name	EN Number	JIS	ASTM	ASME	AMS	MIL-T	BS/EN	Other
TP304/ 304L	S30400/ S30403	X2CrNi19-11	1.4301/1.4306	SUS304/ 304L	A213, A269, A270, A312, A450, A511, A632, A908, A1016, F899	SA213	5560, 5567, 5647, 5868, 8506	5695, 6845, 8504, 8506, 8606	10216-5, 3651-2	Nace MR0103, Nace MR0175
TP304/ 304L	S30400/ S30403	X2CrNi19-11	1.4301/1.4306	SUS304/ 304L			5564, 5566, 5569, 6845	8973		
TP304/ 304L	S30400/ S30403	X2CrNi19-11	1.4301/1.4306	SUS304/ 304L			5563			
TP304/ 304L	S30400/ S30403	X2CrNi19-11	1.4301/1.4306	SUS304/ 304L			5868			
TP316/ 316L	S31600/ S31603	X2CrNi-Mo17-12-2	1.4401/1.4404	SUS316/ 316L	A213, A269, A270, A312, A450, A511, A632, A1016, F899	SA213	5573		10216-5, 3651-2	Nace MR0103, Nace MR0175
TP316/ 316L	S31600/ S31603	X2CrNi-Mo17-12-2	1.4401/1.4404	SUS316/ 316L			5584	8973		
TP316L 2.5Mo	S31603	X3CrNi-Mo17-13-3	1.4436	SUS316L	A213, A269, A270, A312, A450, A511, A632, A1016, F899	SA213	5573		10216-5, 3651-2	Nace MR0103, Nace MR0175
TP316Ti	S31635	X6CrNiMo-Ti17-12-2	1.4571		A213, A312, A450, A1016	SA213			10216-5, 3651-2	Nace MR0103, Nace MR0175
TP317L	S31703	X2CrNi-Mo18-15-4	1.4438	SUS317L	A213, A269, A312, A450, A511, A632, A1016	SA213				Nace MR0103, Nace MR0175
TP321	S32100	X6CrNi-Ti18-10	1.4541	SUS321	A213, A269, A312, A450, A511, A632, A1016	SA213	5557, 5570, 5576, 5645	8606, 8808	10216-5, 3651-2	Nace MR0103, Nace MR0175
TP321	S32100	X6CrNi-Ti18-10	1.4541	SUS321			5896	8973		
TP347	S34700	X6CrN-iNb18-10	1.4550	SUS347	A213, A269, A312, A450, A511, A632, A1016	SA213	5556, 5571, 5646	8606, 8808	10216-5, 3651-2	Nace MR0103, Nace MR0175
TP347	S34700	X6CrN-iNb18-10	1.4550	SUS347			5897	8973		
904L	N08904	X1NiCrMo-Cu25-20-5	1.4539		A213, A269, A312, A1016	SA213			10216-5, 3651-2	Nace MR0103, Nace MR0175

HIGH-STRENGTH AUSTENITIC & NICKEL ALLOYS

	ALLOY DESIGNATION				COMMON SPECIFICATIONS					
Grade	UNS	EN Name	EN Number	JIS	ASTM	ASME	AMS	MIL-T	BS/EN	Other
XM-19	S20910				A213	SA213				Nace MR0103, Nace MR0175
6Mo	S31254	X1CrNiMo-CuN20-18-7	1.4547		A213, A269, A1016	SA213			10216-5, 3651-2	Norsok M650, Norsok M630, Nace MR0103, Nace MR0175
Alloy 600	N06600	NiCr 15 Fe	2.4816		B163, B167, B829	SB163, SB167	5580			Nace MR0103, Nace MR0175
Alloy 625	N06625		2.4856		B444, B829	SB444	5581			Nace MR0103, Nace MR0175
Alloy 22	N06022		2.4602		B622, B829	SB622				Nace MR0103, Nace MR0175
Alloy C276	N10276		2.4819		B622, B829	SB622				Nace MR0103, Nace MR0175
Alloy 230	N06230	NiCr22W-14Mo	2.4733		B622, B626	SB622, SB626				Nace MR0103, Nace MR0175
Alloy 400	N04400				B163, B165, B444	SB163, SB165, SB444	4574	1368		Nace MR0103, Nace MR0175
MP35N	R30035		2.4999		F562 Chem Only					
N200/ N201	N02200/ N02201				B161, B163	SB161, SB163				Nace MR0103, Nace MR0175
Alloy 825	N08825				B163, B423, B829	SB163, SB423				Nace MR0103, Nace MR0175

CHEMICAL COMPOSITION & MECHANICAL PROPERTIES

Austenitic Stainless Steels

CHEMICAL COMPOSITION[A]												
Grade	Temper	C	Mn	P	S	Si	Fe	Cr	Ni	Mo	N	Cb
TP304/304L	Annealed	0.035	2.00	0.045	0.030	1.00	-	18.0-20.0	8.0-12.0	-	-	-
TP304/304L	1/8 Hard	0.035	2.00	0.045	0.030	1.00	-	18.0-20.0	8.0-12.0	-	-	-
TP304/304L	1/4 Hard	0.035	2.00	0.045	0.030	1.00	-	18.0-20.0	8.0-12.0	-	-	-
TP304/304L	1/2 Hard	0.035	2.00	0.045	0.030	1.00	-	18.0-20.0	8.0-12.0	-	-	-
TP316/316L	Annealed	0.035	2.00	0.045	0.030	1.00	-	16.0-18.0	10.0-14.0	2.00-3.00	-	-
TP316/316L	1/8 Hard	0.035	2.00	0.045	0.030	1.00	-	16.0-18.0	10.0-14.0	2.00-3.00	-	-
TP316L 2.5Mo	Annealed	0.035	2.00	0.045	0.030	1.00	-	16.0-18.0	10.0-14.0	2.50-3.00	-	-
TP316Ti	Annealed	0.08	2.00	0.045	0.030	0.75	-	16.0-18.0	10.0-14.0	2.00-3.00	0.10	-
TP317L	Annealed	0.035	2.00	0.045	0.030	1.00	-	18.0-20.0	11.0-15.0	3.0-4.0	-	-
TP321	Annealed	0.08	2.00	0.045	0.030	1.00	-	17.0-19.0	9.0-12.0	-	-	-
TP321	1/8 Hard	0.08	2.00	0.045	0.030	1.00	-	17.0-19.0	9.0-12.0	-	-	-
TP347	Annealed	0.08	2.00	0.045	0.030	1.00	-	17.0-20.0	9.0-13.0	-	-	10XC-1.10
TP347	1/8 Hard	0.08	2.00	0.045	0.030	1.00	-	17.0-20.0	9.0-13.0	-	-	10XC-1.10
904L	Annealed	0.02	2.00	0.04	0.030	1.00	-	19.0-23..0	23.0-28.0	4.0-5.0	0.10	-

High-Strength Austenitic & Nickel Alloys

CHEMICAL COMPOSITION[A]												
Grade	Temper	C	Mn	P	S	Si	Fe	Cr	Ni	Mo	N	Cb
XM-19	Annealed	0.06	4.0-6.0	0.045	0.030	1.00	-	20.5-23.5	11.5-13.5	1.50-3.00	0.20-0.40	0.010-0.30
6Mo	Annealed	0.02	1.00	0.030	0.010	0.80	-	19.5-20.5	17.5-18.5	6.0-6.5	0.18-0.22	-
Alloy 600	Annealed	0.15	1.0	-	0.015	0.50	6.0-10.0	14.0-17.0	> 72.0	-	-	-
Alloy 625	Grade 1	0.10	0.50	0.015	0.015	0.50	5	20.0-23.0	> 58.0	8.0-10.0	-	-
Alloy 22	Annealed	0.015	0.50	0.02	0.02	0.08	2.0-6.0	20.0-22.5	balance	12.5-14.5	-	-
Alloy C276	Annealed	0.010	1.0	0.04	0.03	0.08	4.0-7.0	14.5-16.5	balance	15.0-17.0	-	-
Alloy 230	Annealed	0.05-.15	0.30-1.00	0.03	0.015	0.25-0.75	3.0	20.0-24.0	balance	1.0-3.0	-	-
Alloy 400	Annealed	0.30	2.0	-	0.024	0.50	2.5	-	> 63.0	-	-	-
MP35N	Annealed	0.025	0.15	0.015	0.010	0.15	1.0	19.0-21.0	33.0-37.0	9.0-10.5	-	-
N200/N201	Annealed	0.02	0.35	-	0.010	0.35	0.40	-	> 99.0	-	-	-
Alloy 825	Annealed	0.05	1.0	-	0.03	0.50	> 22.0	19.5-23.5	38.0-46.0	2.5-3.5	-	-

A. Maximum value unless noted otherwise - Compositions may or may not reflect all requirements of specifications listed
B. Minimum pitting resistance equivalent number - PREN = %Cr + 3.3(%Mo) + 16(%N), C. Minimum properties except hardness is maximum

CHEMICAL COMPOSITION & MECHANICAL PROPERTIES

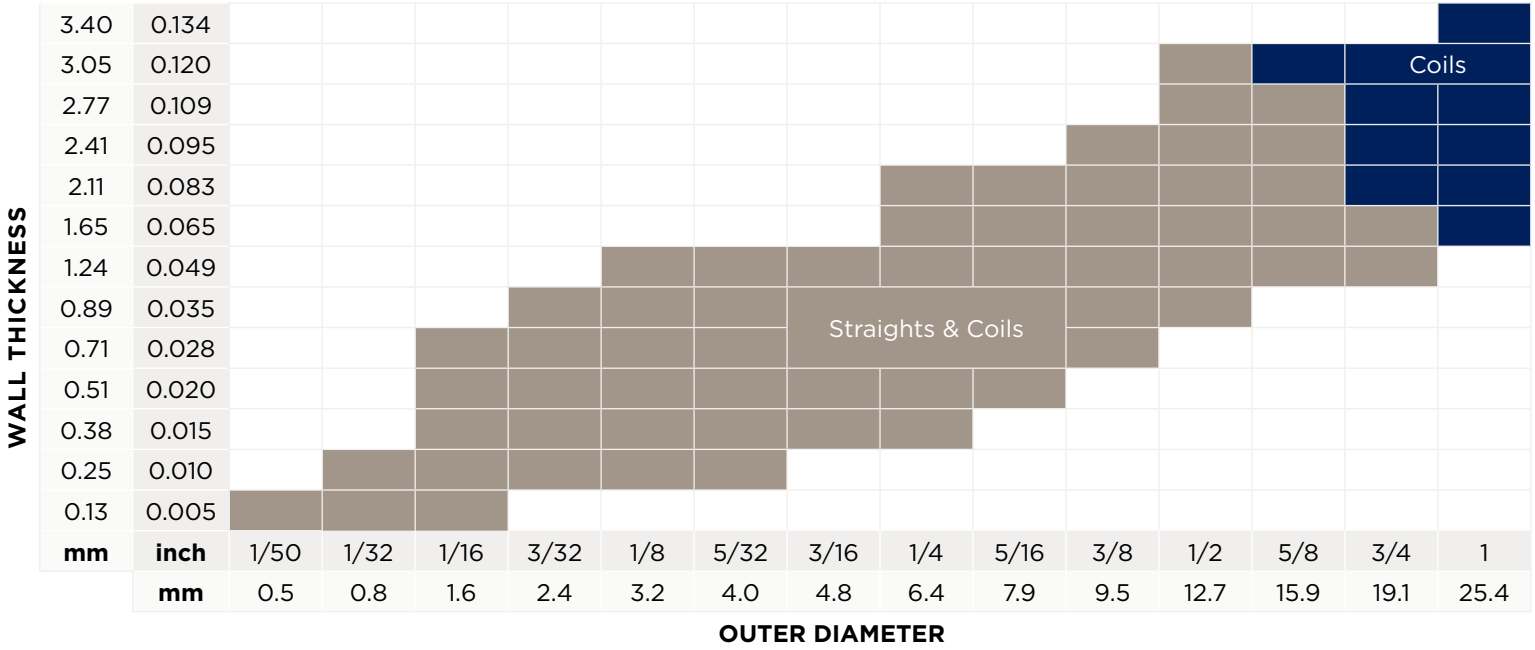
				PREN[B]	MECHANICAL PROPERTIES[C]					
Ti	Cu	Co	Other		Yield (ksi)	Yield (MPa)	UTS (ksi)	UTS (MPa)	Elong %	Hardness
-	-	-	-	18	30	205	75	515	35	90 HRB
-	-	-	-	18	75	515	105	725	20	N/A
-	-	-	-	18	75	515	120	825	15	N/A
-	-	-	-	18	110	760	150	1035	7	N/A
-	-	-	-	23	30	205	75	515	35	90 HRB
-	-	-	-	23	75	515	105	725	20	N/A
-	-	-	-	24	30	205	75	515	35	90 HRB
5X(C+N)-0.70	-	-	-	23	30	205	75	515	35	90 HRB
-	-	-	-	28	30	205	75	515	35	90 HRB
5X(C+N)-0.70	-	-	-	17	30	205	75	515	35	90 HRB
5X(C+N)-0.70	-	-	-	17	75	515	105	725	20	N/A
-	-	-	-	17	30	205	75	515	35	90 HRB
-	-	-	-	17	75	515	105	725	20	N/A
-	1.00-2.00	-	-	32	31	215	71	490	35	90 HRB

				PREN[B]	MECHANICAL PROPERTIES[C]					
Ti	Cu	Co	Other		Yield (ksi)	Yield (MPa)	UTS (ksi)	UTS (MPa)	Elong %	Hardness
-	-	-	V 0.10-0.30	29	55	380	100	690	35	25 HRC
-	0.50-1.00	-	-	42	45	310	98	675	35	96 HRB
-	0.5	-	-	14	35	240	80	550	30	92 HRB
0.40	-	1.0	Cb + Ta 3.15-4.15, Al 0.40	46	60	415	120	825	35	25 HRC
-	-	2.5	W 2.5-3.5, V 0.35	61	45	310	100	690	45	25 HRC
-	-	2.5	W 3.0-4.5, V 0.35	64	41	285	100	690	45	25 HRC
-	-	5.0	W 13.0-15.0, Al 0.50, La 0.005-0.050, B 0.015	23	45	310	110	760	40	N/A
-	28.0-34.0	-	-	-	28	195	70	485	35	N/A
1.0	-	bal-ance	B 0.015	49	35	240	115	795	50	N/A
-	0.25	-	-	-	15	105	55	380	35	N/A
0.6-1.2	1.5-3.0	-	Al 0.2	28	35	240	85	585	30	90 HRB

FIND YOUR PRODUCT

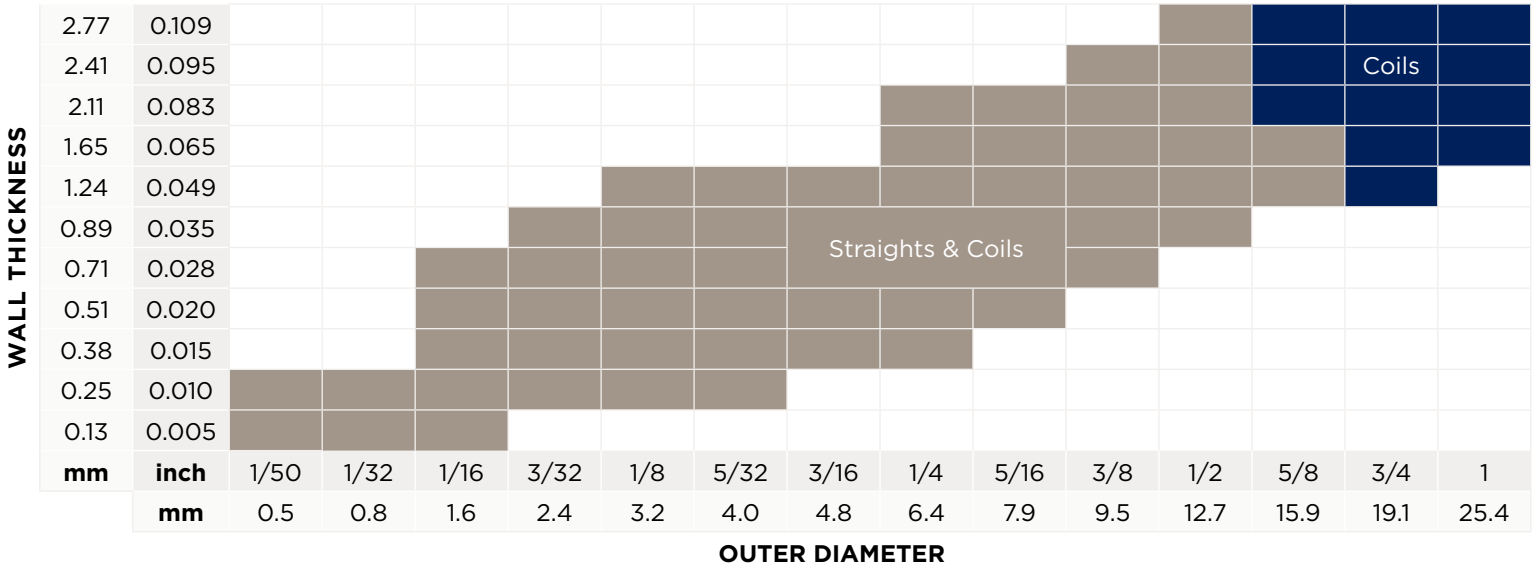
AUSTENITIC STAINLESS STEELS

(304/304L ,316/316L, 316 L2.5Mo, 316Ti, 317L, 321, 347, 904L)



HIGH-STRENGTH AUSTENITIC & NICKEL ALLOYS

(XM-19, 6Mo, Alloy 600, Alloy 325, Alloy 22, Alloy C276, Alloy 230, Alloy 400, MP35N, N200/N201, Alloy 825)



OD SIZING CHART

1/50” 0.50mm

1/8” 3.20mm

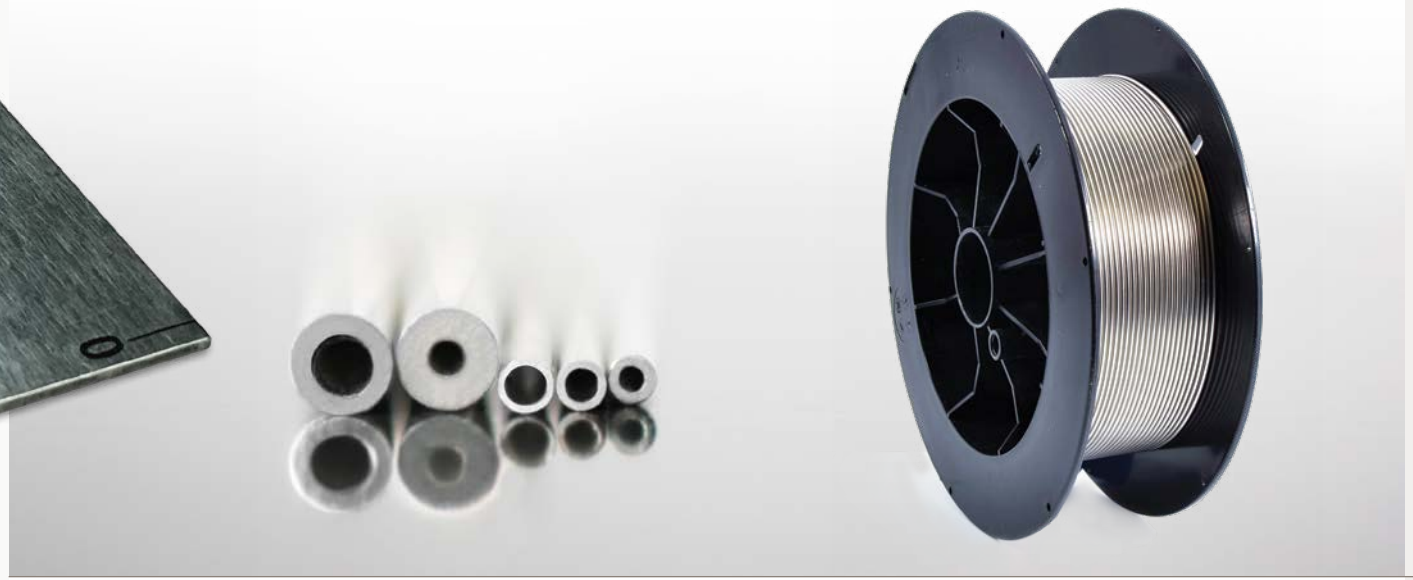
SMALL & ULTRA SMALL DIAMETER TUBING AVERAGE SIZE AND COIL LENGTHS

(Austenitic Stainless Steel + High Strength Austenitic & Nickel Alloys)

OD	WALL	LENGTH	
inch	inch	feet	meters
1/50	0.005	1000+	300+
1/32	0.010	1000+	300+
1/16	0.010	1000+	300+
1/16	0.015	1000+	300+
1/16	0.020	1000+	300+
3/32	0.010	1000+	300+
3/32	0.015	1000+	300+
3/32	0.020	1000+	300+
3/32	0.030	1000+	300+
1/8	0.010	500+	150+
1/8	0.015	500+	150+
1/8	0.020	500+	150+
1/8	0.030	500+	150+

OD	WALL	LENGTH	
mm	mm	feet	meters
0.50	0.13	1000+	300+
0.80	0.25	1000+	3 00+
1.60	0.25	1000+	300+
1.60	0.38	1000+	300+
1.60	0.50	1000+	300+
2.40	0.25	1000+	300+
2.40	0.38	1000+	300+
2.40	0.50	1000+	300+
2.40	0.75	1000+	300+
3.20	0.25	500+	150+
3.20	0.38	500+	150+
3.20	0.50	500+	150+
3.20	0.75	500+	150+

*Straight lengths available up to 24’ (7m)



HandyTube is constantly experimenting with new materials and sizes. If you don’t see what you’re looking for here, contact our Customer Service team to inquire about our ongoing research and development of new products.

AVERAGE SIZE AND COIL LENGTHS

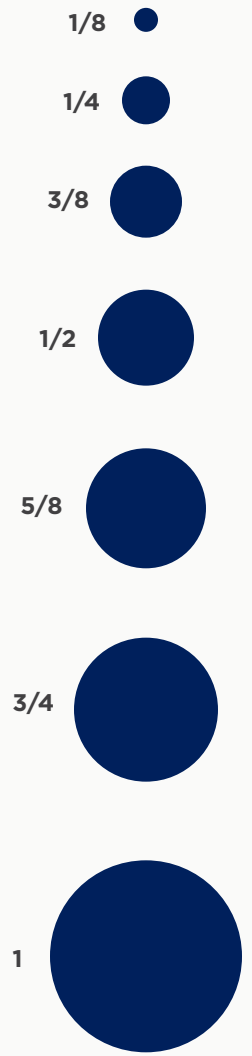
(304/304L, 316/316L 2.5Mo, 317L, 904L, 6Mo, I825)

OD	WALL	LENGTH	
inch	inch	feet	meters
1/8	0.035	2900	884
1/4	0.035	2855	870
1/4	0.049	2170	662
1/4	0.065	1770	539
3/8	0.035	1820	554
3/8	0.049	1350	412
3/8	0.065	1070	326
3/8	0.083	885	270
1/2	0.035	1285	392
1/2	0.049	980	299
1/2	0.065	765	233
1/2	0.083	625	190
5/8	0.035	1055	321
5/8	0.049	770	235
5/8	0.065	595	182
5/8	0.083	480	147
3/4	0.049	635	193
3/4	0.065	490	149
3/4	0.083	390	120
3/4	0.109	310	95
1	0.065	360	109
1	0.083	285	87
1	0.109	225	68
1	0.120	205	63
1	0.134	185	57

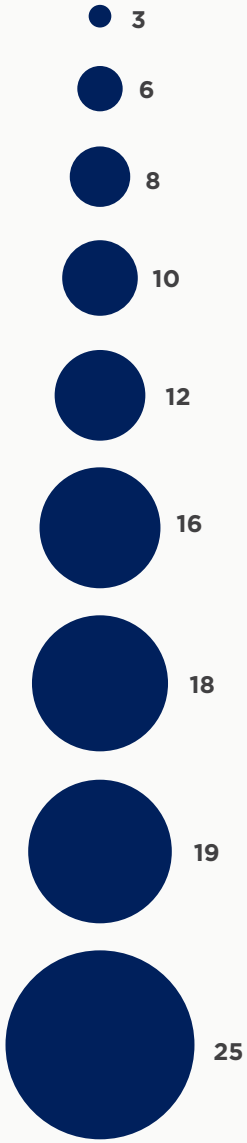
*Straight lengths available up to 24' (7m)

OD	WALL	LENGTH	
mm	mm	feet	meters
3.00	1.00	2900	884
6.00	1.00	2765	843
6.00	1.50	2035	620
8.00	1.00	1985	605
8.00	1.50	1420	433
10.00	1.00	1550	472
10.00	1.50	1090	332
10.00	2.00	865	264
12.00	1.00	1270	387
12.00	1.50	885	270
12.00	2.00	695	212
16.00	1.50	645	197
16.00	2.00	500	152
18.00	1.50	565	172
18.00	2.00	440	134
19.00	1.50	535	163
19.00	2.00	410	125
19.00	2.50	340	104
25.00	1.50	400	122
25.00	2.00	305	93
25.00	3.00	210	64

OD SIZING CHART (inches)



OD SIZING CHART (mm)



AVERAGE SIZE AND COIL LENGTHS

(321, 347, Alloy 22, C276, I625, I600, N200, M400)

OD	WALL	LENGTH	
inch	inch	feet	meters
1/8	0.035	2605	794
1/4	0.035	1120	341
1/4	0.049	855	261
1/4	0.065	695	212
3/8	0.035	715	218
3/8	0.049	530	162
3/8	0.065	420	128
3/8	0.083	350	107
1/2	0.035	525	160
1/2	0.049	385	117
1/2	0.065	300	91
1/2	0.083	245	75
5/8	0.035	415	126
5/8	0.049	300	91
5/8	0.065	235	72
5/8	0.083	190	58
3/4	0.049	250	76
3/4	0.065	190	58
3/4	0.083	155	47
3/4	0.109	120	37
1	0.065	140	43
1	0.083	110	34
1	0.109	90	27

*Straight lengths available up to 24' (7m)

OD	WALL	LENGTH	
mm	mm	feet	meters
3.00	1.00	2900	884
6.00	1.00	2765	843
6.00	1.50	2035	620
8.00	1.00	1985	605
8.00	1.50	1420	433
10.00	1.00	1550	472
10.00	1.50	1090	332
10.00	2.00	865	264
12.00	1.00	1270	387
12.00	1.50	885	270
12.00	2.00	695	212
16.00	1.50	645	197
16.00	2.00	500	152
18.00	1.50	565	172
18.00	2.00	440	134
19.00	1.50	535	163
19.00	2.00	410	125
19.00	2.50	340	104
25.00	1.50	400	122
25.00	2.00	305	93
25.00	3.00	210	64

FIND YOUR PRODUCT

Working Pressures [psi] for TP 316/316L Seamless Tubing*

		WALL THICKNESS (IN.)							
		0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.120
OUTER DIAMETER (IN.)	0.250	4,200	5,400	8,000	11,200	15,300			
	0.313	3,300	4,300	6,200	8,600	8,600	11,500		
	0.375	2,800	3,500	5,100	7,000	9,300	10,900	13,000	
	0.500		2,600	3,700	5,100	6,700	7,800	9,200	10,800
	0.625		2,000	2,900	4,000	5,200	6,000	7,100	8,300
	0.750			2,400	3,300	4,200	4,900	5,800	6,700
	1.000				2,400	3,100	3,600	4,200	4,900

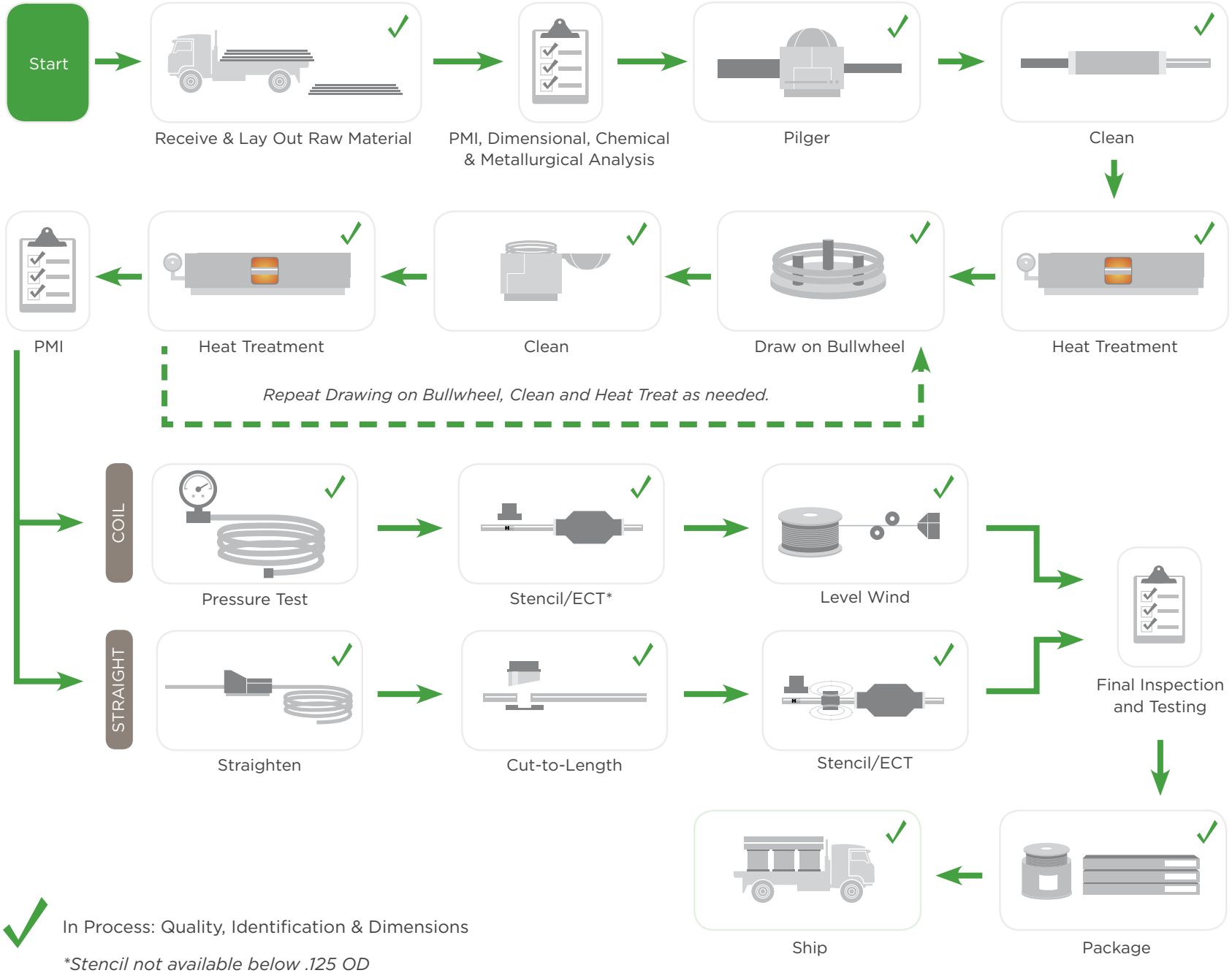
*Working pressures [psi] calculated per ASME B31.3 for temperatures range of -425 °F to 300 °F for annealed TP 316/316L (UNS S31600/S31603) seamless tubing with standard tolerances offered by HandyTube™. All design and service conditions must be considered by the specifying engineers and were not taken into consideration for the calculations above. Dual-certified 316/316L meets the minimum chemistry and the mechanical properties of both alloy grades and must be specified at time of order placement.

Working Pressures [bar] for TP 316/316L Seamless Tubing*

		WALL THICKNESS (MM)									
		0.8	1.0	1.2	1.5	1.8	2.0	2.2	2.5	2.8	3.0
OUTER DIAMETER (MM)	6	359	461	569	741						
	8		335	410	528						
	10		264	322	412	506	571				
	12		218	264	337	413	465	518			
	14		185	225	285	348	391	435			
	15		172	209	265	323	363	403			
	16		161	195	247	301	338	375			
	18			173	218	265	297	330	380	431	
	20			155	195	237	266	294	339	384	414
	22			140	177	214	240	266	305	346	373
	25			123	155	187	210	232	266	301	324

*Working pressures [bar] calculated per ASME B31.3 for temperatures range of -254 °C to 148 °C for annealed TP 316/316L (UNS S31600/S31603) seamless tubing with standard tolerances offered by HandyTube™. All design and service conditions must be considered by the specifying engineers and were not taken into consideration for the calculations above. Dual-certified 316/316L meets the minimum chemistry and the mechanical properties of both alloy grades and must be specified at time of order placement.

PROCESS FLOW



MARKETS

ALTERNATIVE ENERGY

Applications

- Hydrogen Fueling Stations and Material Handling
- Geothermal inhibitor tube
- Solar Heater Heads
- Solar Heat Exchangers

Solutions

- Long length coils
- Heavy-wall tubing for high-pressure applications
- Tempered tubing for use with cone-and-thread fittings

OIL & GAS

Applications

- Control lines for Sub-Sea Safety Valves
- CNG Fueling Stations
- Chemical Injection
- Data Transmission
- Intelligent Well Systems

Solutions

- Long length coils
- PVC and TPU Coatings
- Inert Coatings

SHIPBUILDING

Applications

- Hydraulic Tubing
- Multi-Core Tubing

Solutions

- Long length coils
- PVC and TPU Coatings

HEALTH CARE & LIFE SCIENCES

Applications

- Gas & Liquid Chromatography (GC and HPLC)
- Medical Device and Instrumentation

Solutions

- Ultra-Small Diameter (USD™)
- Chromat I.D.® *Smooth ID surface*
- Chroma Clean I.D.® *Enhanced Cleaning*
- Precision cutting & fabrication
- Inert Coatings

CHEMICAL PROCESS & INSTRUMENTATION

Applications

- Steam & Heat Trace Bundles
- Freeze protection and process temperature control
- Flow Measurement & Sensing

Solutions

- Long length coils
- PVC and TPU Coatings
- Heavy-wall tubing for high pressure applications
- Precision cutting and fabrication

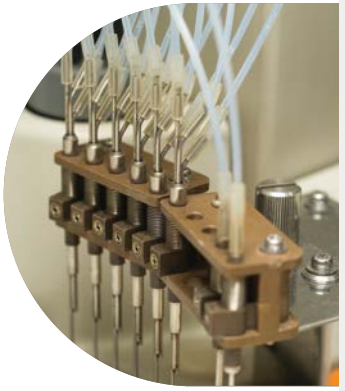
AEROSPACE & DEFENSE

Applications

- Fuel Lines
- Hydraulic Lines
- Gas Return Tubes for Automatic Weapons
- Mechanical Fasteners

Solutions

- Aerospace Material Specification (including Military Standards)
- Compliance with stringent military specifications
- Precision cutting and bending



MARKETS

For more information visit **www.HandyTube.com**

HANDYTUBE SOLUTIONS FOR CRITICAL PROJECTS

DATE	LOCATION	PRODUCT	TYPE	QUANTITY
2017	TX, USA	**316L:** 3/8" OD x .035"WT and 3/8" OD x .065" WT	Seamless Coils	16,000 ft
2017	TX, USA	**316L:** .125"OD x .028"WT	Seamless Coils	14,400 ft
2017	CA, USA	**316L:** 1"OD x .139"WT	Seamless Coils	3,960 ft
2017	Turkey	**316L:** 3/8OD x .035WT and 3/8ODx .065WT	Seamless Coils	39,000 ft
2017	China	**316L:** 10mm OD x 1mm WT	Seamless coils with local PVC coating	94,000 meters
2016	China	**IN825:** 1/4" x 0.049" & 3/8" x 0.065"	Seamless coil tubing with PVC coating	66,800 meters
2016	USA	**C6MOS0500S-5 UNS S31254:** .500" OD x .065" WT	Seamless Coils	1,811 meters
2015	Republic of Korea	**S6MOS0472S-5 UNS S31254:** 12 mm OD x 1 mm WT, 6 meter lengths	Seamless Straight Lengths	2,184 meters
2015	China	**316L:** 8 mm OD x 1 mm WT, 8 mm OD x 1.5 mm WT, 12 mm OD x 1.5 mm WT & 12 mm OD x 2 mm WT	Seamless Coils	100,000 meters
2015	India	**316L:** 0.250" OD x 0.035" WT	Seamless Coils	38,400 meters
2014	Korea	**316L:** 1/4" x 0.035", 1/2" x 0.065", 8 mm OD x 1 mm WT, 12 mm OD x 1.5 mm WT & 15 mm OD x 1.5 mm WT	Seamless Coils	125,000 meters
2014	India	**316L:** 0.250" OD x 0.035" WT	Seamless Coils	89,400 meters
2014	Qatar	**Inconel 625:** 6 mm OD x 1 mm WT & 12 mm OD x 1.5 mm WT	Seamless Coils	1,000 meters
2014	Republic of Korea	**Inconel 825:** 0.250" OD x 0.028" WT, 0.375" OD x 0.035" WT, 0.500" OD x 0.049" WT & 0.750" OD x 0.065" WT	Seamless Coils	2,140 meters
2014	Republic of Korea	**Monel 400:** 0.375" OD x 0.035" WT, 0.500" OD x 0.049" WT & 0.750" OD x 0.065" WT **Inconel 825:** 0.375" OD x 0.035" WT	Seamless Coils	7,260 meters
2014	China	**316L:** 0.250" OD x 0.049" WT, 0.500" OD x 0.049" WT, 0.500" OD x 0.083" WT & 0.750" OD x 0.065" WT	Seamless Straight Lengths	17,438 meters
2014	China	**316L:** 0.375" OD x 0.065" WT	Seamless Straight Lengths	2,052 meters
2014	China	0.250" OD x 0.065" WT	Seamless Coils	840 meters
2013	Republic of Korea	**Inconel 600**: .500" OD x 0.049" WT **Inconel 825:** 0.500" OD x 0.049" WT	Seamless Straight Lengths	3,696 meters
2013	China	**321L:** 15 mm OD x 1.5 mm WT	Seamless Coils	32,000 meters
2013	Kingdom of Saudi Arabia	**Monel 400:** 0.250" OD x 0.049" WT	Seamless Coils	90,000 meters
2013	China	**304L:** 12 mm OD x 1.5 mm WT	Seamless Coils	18,347 meters
2012	China	**Inconel 825:** 0.250" OD x 0.065" WT	Seamless Coils	900 meters
2012	United Arab Emirates	**316/316L:** 0.375" OD to 0.500" OD	Seamless Coils and Straight Lengths	62,000 meters
2012	United Arab Emirates	**316/316L:** .375" OD to 0.500" OD	Seamless Coils and Straight Lengths	16,080 meters

Detailed project reference lists are available upon request.

MASS

	LB	KG	TON (SHORT)	TON (METRIC)
1 LB	1	0.4536	0.0005	0.0004540
1 KG	2.20462	1	0.0011	0.0010
1 TON (SHORT)	2000	907.1847	1	0.90718
1 TON (METRIC)	2204.623	1000	1.1023	1

PRESSURE

	PSI	BAR	PA	ATM	MHG
1 PSI	1	0.06895	6.895E+03	0.06805	0.05171
1 BAR	14.50	1	1.0E+05	0.9869	0.7501
1 PA	1.45E-03	1.00E-05	1	9.8690E-06	7.50E-07
1 ATM	14.70	1.01325	1.01325E+05	1	0.76
1 MHG	19.34	1.3332	1.33E+05	1.3158	1

LENGTH

	CM	M	IN	FT	YARDS
1 CENTIMETER	1	0.01	0.3937	0.0328	0.0109
1 METER	100	1	39.37	32.81	1.0936
1 INCHES	2.540	0.0254	1	0.0833	0.0278
1 FEET	30.48	0.3048	12	1	0.3333
1 YARDS	91.44	0.9144	36	3	1

TEMPERATURE

°F to °C = 5/9 (°F-32°)	°C to °F = 9/5 (°C)+32°

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