* SPECIFICATIONS

TABLE OF CONTENTS

**All data supplied herein is theoretical and no responsibility is implied by Resistaloy Inc. as to actual field results which may vary.*

Analysis of Stainless Steel

DATA ON POPULAR STAINLESS GRADES

Type	C Max.	Mn Max.	Cr	Ni	Other Elements	Applications
304	.08	2.00	18.00/20.00	8.00/12.00	—	Aircraft, dairy, food, paper, petrochemical & textile industries.
304L	.03	2.00	18.00/20.00	8.00/12.00	—	Low carbon for fabrication by welding which cannot be subsequently annealed.
309	.20	2.00	22.00/24.00	12.00/15.00	—	Heat-resistant furnace parts, heater tubes pyrometer tubes, retorts, heat exchangers exhaust stacks, oil burner parts.
309S	.08	2.00	22.00/24.00	12.00/15.00	—	Heat-resistant furnace parts, heater tubes pyrometer tubes, retorts, heat exchangers exhaust stacks, oil burner parts. Lower Carbon for welding fabrication of parts.
310	.25	2.00	24.00/26.00	19.00/22.00	—	Chemical and petroleum industries, heat exchangers and furnace parts.
310S	.08	2.00	24.00/26.00	19.00/22.00	—	Chemical and Petroleum industries, heat exchangers and furnace parts. Lower Carbon for welding fabrication of parts.
316	.08	2.00	16.00/18.00	10.00/14.00	Mo 2.00/3.00	Chemical, food, paper, pharmaceutical industries & sea water atmosphere exposure. Better corrosion resistance & creep strength than Types 304 & 304L.
316L	.03	2.00	16.00/18.00	10.00/14.00	Mo 2.00/3.00	Lower carbon than Type 316 for fabricatio by welding which cannot be subsequently annealed.
317	.08	2.00	18.00/20.00	11.00/15.00	Mo 3.00/4.00	Better corrosion resistance & creep strength than Types 316 & 316L.
317L	.030	2.00	18.00/20.00	11.00/15.00	Mo 3.00/4.00	Lower carbon than Type 317 for fabricatio by welding which cannot be subsequently annealed.
321	.08	2.00	17.00/19.00	9.00/12.00	Ti 5 x C Min.	Aircraft exhaust manifolds, heater tubing sheaths & heat exchangers. Ti. stabilized for intermittent exposure at 800/1600°F. or subsequent welding.
347	.08	2.00	17.00/19.00	9.00/13.00	Columbium-Tantalum 10 x C Min.	Aircraft and chemical industries. Cb-Ta stabilized for intermittent exposure at 800/1600°F. or subsequent welding.
348	.08	2.00	17.00/19.00	9.00/13.00	Columbium-Tantalum 10 x C Min. Tantalum .10 Max.	Aircraft and missile industries. Cb stabilized for intermittent exposure at 800/1600°F. or subsequent welding.
409	.08	1.00	10.50/11.75	.50	Ti 5 x Carbon or .75 Max.	Moderate oxidation and corrosion resistance. Mufflers, exhaust parts, heater and combustion chamber parts.

P .045% max. S .030% max. except Type 409—.045% Si 1.00 max. except 310, 310S—1.50% max.

DATA ON POPULAR STAINLESS GRADES

A.S.T.M. Number	Explanation
A-213	Covers twenty eight grades of minimum wall thickness seamless alloy (chrome-moly) and stainless boiler and superheater tubes. Includes grade T-22 and Type 304 among others and covers a size range 1 8 to 5 inch O.D and 0.015 to 0.500 in minimum wall thickness. (including most 300 Series S S and other grades)
A-249	Covers twenty one grades of nominal wall thickness welded austenitic stainless steel tubing for use in boilers. superheaters. heat exchangers and condensers. (including most of the 300 series grades)
A-268	Covers ten grades of nominal wall thickness stainless steel tubing (welded or seamless) for general corrosion-resisting and high temperature service. (including Types 405. 410. 430. 443. 446 and 369)
A-269	Covers thirteen grades of nominal wall thickness stainless steel tubing for general corrosion resisting and low or high temperature service. Can be made welded or seamless. (including most of the 300 series stainless steel grades)
A-270	Covers T-304 stainless steel minimum wall thickness sanitary tubing for use in the dairy and food industry. Maximum size supplied is 4" O.D. with I.D. only polished or O.D. & I.D. polished.
A-271	Covers six grades of seamless stainless steel tubing in sizes 2" to 9" O.D. and over .220" minimum wall thickness for use in refineries. Grades T-304. T-321. T-347 and the H grades of each)
A-312	Covers twenty one grades of seamless and welded schedule thickness austenitic stainless steel pipe intended for high temperature and general corrosive service. (including most 300 series stainless steel grades.)

AS WELDED refers to Welded Stainless Steel Pipe with no anneal or pickle performed after welding. Commonly referred to as non-specification or paper mill grade for use in general applications where optimum specifications or quality is not required.

A.S.T.M. Number	Explanation
A-358	Covers thirteen grades electric fusion filler metal added welded controlled thickness stainless steel pipe for use in corrosive or high temperature service or both. Any size may be ordered although commercial practice usually limits size range to not less than 8 inch nominal diameter (8.625 O.D). Most grades of 300 series stainless steel are included. Five classes are included and should be determined at the time the initial inquiry is taken as: **Class 1**—Double welded. radiographed **Class 2**—No radiograph **Class 3**—Single welded. radiographed **Class 4**—Double welded (inside only no filler metal added) radiographed **Class 5**—Double welded spot radiographed
A-376	Covers twelve grades of seamless stainless steel pipe intended for high temperature central station service. (including most 300 series stainless steel grades)
A-409	Covers eight grades of welded large outside (14 to 30) diameter light walled (sch. 5S & 10S) stainless steel pipe for corrosive or high temperature service. (including most 300 series stainless steel grades)
A-450	Covers general requirements (tolerances. tests. weights. marking. and inspection) applicable to standard ASTM tubing specifications as specified therein.
A-530	Covers general requirements (tolerances. tests. weights. marking and inspection) applicable to standard ASTM pipe specification as specified therein.
A-554	Covers nineteen grades of stainless steel tubing for mechanical applications where appearance or corrosion resistance is needed in sizes from 1 2" to 16" in square. rounds or rectangles from .020" gauge & up. (including all 300 series and 429. 430 & 430Ti.)
A-688	Covers 5 grades of minimum and average wall thickness welded feedwater heater tubing both straight lengths and U-bent. (Grades are 304. 304L. 316. 316L and TP XM-29.)

DATA ON POPULAR STAINLESS GRADES

T303	Nominal Properties		Benefits	Applications
Chemical		**Mechanical**		
Carbon	.15 max.	Tensile psi (min.) 85,000	• Very superior machining and non-seizing characteristics • Non-Magnetic in annealed condition	• Automatic screw machines • Bolts, Bushings, Nuts • Shafts
Manganese	2.00 max.	Yield psi (min.) 35,000		
Phosphorus	.20 max.	Brinell (max.) Hardness 262		
Sulphur	.15 max.			
Silicon	1.00 max.			
Chromium	17.00–19.00	(BARS ANNEALED)		
Nickel	8.00–10.00			
Molybdenum	.60 max.			

T304	Nominal Properties		Benefits	Applications
Chemical		**Mechanical**		
Carbon	.08 max.	Tensile psi (min.) 75,000	• Easy fabrication and cleaning with good corrosion resistance • High tensile strength • Bright, smooth appearance • Optimum strength-to-weight ratio	• Kitchen equipment • Chemical processing equipment • Brewing and distilling • Power plant systems • Pressure vessels • Synthetic fuel facilities
Manganese	2.00 max.	Yield psi (min.) 30,000		
Phosphorus	.045 max.	Brinell (max.) Hardness 202		
Sulphur	.030			
Silicon	1.00 max.			
Chromium	18.00–20.00			
Nickel	8.00–10.50			

T304L	Nominal Properties		Benefits	Applications
Chemical		**Mechanical**		
Carbon	.03 max.	Tensile psi (min.) 70,000	• High corrosion resistance • Easy fabrication and cleaning • Lower carbon content restricting carbide precipitation during during welding • Resists intergranular corrosion	• Fertilizer towers • Tank fabrication • Field welding of all types
Manganese	2.00 max.	Yield psi (min.) 25,000		
Phosphorus	.045 max.	Brinell (max.) Hardness 183		
Sulphur	.030 max.			
Silicon	1.00 max.			
Chromium	18.00–20.00			
Nickel	8.00–12.00			

T309S	Nominal Properties		Benefits	Applications
Chemical		**Mechanical**		
Carbon	.08 max.	Tensile psi (min.) 75,000	• High heat resistant qualities • Corrosion oxidation resistance • Easy to weld • Ductile	• Heating and chemical • Furnace parts • Pump parts • Oven linings • Tube supports
Manganese	2.00 max.	Yield psi (min.) 30,000		
Phosphorus	.045 max.	Brinell (max.) Hardness 217		
Sulphur	.030 max.			
Silicon	1.00 max.			
Chromium	22.00–24.56			
Nickel	12.00–15.00			

DATA ON POPULAR STAINLESS GRADES

T310S	Nominal Properties		Benefits	Applications
Chemical		**Mechanical**		
Carbon	.08 max.	Tensile psi (min.) 75,000	• Oxidation resistant	• Heating and chemical equipment
Manganese	2.00 max.	Yield psi (min.) 30,000	• High heat resistant qualities	• Furnace parts
Phosphorus	.045 max.	Brinell (max.) Hardness 217	• Corrosion resistant	• Engine rings
Sulphur	.030 max.		• Ductile	
Silicon	1.50 max.			
Chromium	24.00–26.00			
Nickel	19.00–22.00			

T316	Nominal Properties		Benefits	Applications
Chemical		**Mechanical**		
Carbon	.08 max.	Tensile psi (min.) 75,000	• Superior corrosion resistance	• Fertilizer equipment
Manganese	2.00 max.	Yield psi (min.) 30,000	• Heat resistant with superior creep strength at elevated temperatures	• Pulp and paper processing equipment
Phosphorus	.045 max.	Brinell (max.) Hardness 217	• Good pitting resistance	• Smoke stacks
Sulphur	.030 max.			• Chemical storage tanks
Silicon	1.00 max.			• Marine chemical environments
Chromium	16.00–18.00			• Corn products equipment
Nickel	10.00–14.00			• Phosphate industry parts
Molybdenum	2.00–3.00			• Textile finishing equipment

T316L	Nominal Properties		Benefits	Applications
Chemical		**Mechanical**		
Carbon	.030 max.	Tensile psi (min.) 70,000	• Superior resistance to intergranular corrosion following welding or stress relieving	• Food processing equipment
Manganese	2.00 max.	Yield psi (min.) 25,000	• Deep drawing ability	• Field yielding of all types
Phosphorus	.045 max.	Brinell (max.) Hardness 217	• Good creep strength	• Tanks. piping and valves
Sulphur	.030 max.			
Silicon	1.00 max.			
Chromium	16.00–18.00			
Nickel	10.00–14.00			
Molybdenum	2.00–3.00			

T317L	Nominal Properties		Benefits	Applications
Chemical		**Mechanical**		
Carbon	.30 max.	Tensile psi (min.) 75,000	• Excellent corrosion resistance	• Inks and dyeing equipment
Manganese	2.00 max.	Yield psi (min.) 30,000	• Minimizes metallic contamination	• Storage tanks for corrosive materials
Phosphorus	.045 max.	Brinell (max.) Hardness 217	• High creep and tensile strengths	• Pulp and paper processing
Sulphur	.030 max.		• High stress-to-rupture strength	• Scrubbers
Silicon	1.00 max.			
Chromium	18.00–20.00			
Nickel	11.00–15.00			
Molybdenum	3.00–4.00			

DATA ON POPULAR STAINLESS GRADES

T321

Nominal Properties			Benefits	Applications
Chemical		**Mechanical**		
Carbon	.08 max.	Tensile psi (min.) 75.000	• High immunity to high temperatures • High strength • Excellent corrosion resistance • Stabilized by titanium	• For welding of parts that cannot be subsequently annealed • Aircraft engine parts • Pressure vessels • Stack liners
Manganese	2.00 max.	Yield psi (min.) 30.000		
Phosphorus	.045 max.	Brinell (max.) Hardness 217		
Sulphur	.030 max.			
Silicon	1.00 max.			
Chromium	17.00–19.00			
Nickel	9.00–12.00			
Titanium	5XC min.			

T347

Nominal Properties			Benefits	Applications
Chemical		**Mechanical**		
Carbon	.08 max.	Tensile psi (min.) 75.000	• High temperature immunity • High strength • Excellent corrosion resistance and welding properties • Stabilized by Columbium and Tantalum	• Aircraft engines • Pressure vessels • Annealing box covers • Organic chemical tanks
Manganese	2.00 max.	Yield psi (min.) 30.000		
Phosphorus	.045 max.	Brinell (max.) Hardness 202		
Sulphur	.030 max.			
Silicon	1.00 max.			
Chromium	17.00–19.00			
Nickel	9.00–13.00			
Columbium + Tantalum	10XC min.			

T409

Nominal Properties			Benefits	Applications
Chemical		**Mechanical**		
Carbon	.08 max.	Tensile psi (min.) 55.000	• Superior mechanical and corrosion resistant properties • Oxidation resistant	• Auto exhaust systems • Transformer and capacitor cases • Catalytic converters • Farm equipment • Fins for heater tubes
Manganese	1.00 max.	Yield psi (min.) 30.000		
Phosphorus	.045 max.	Brinell (max.) Hardness 150		
Sulphur	.045 max.			
Silicon	1.00 max.			
Chromium	10.50–11.75			
Nickel	.50			
Titanium	6XC min.			

T410

Nominal Properties			Benefits	Applications
Chemical		**Mechanical**		
Carbon	.15 max.	Tensile psi (min.) 65.000	• Corrosion and heat resistant with high impact strength • Good scaling resistance • Good mechanical properties • Easily welded	• Hand tools • Coal processing equipment • Cutlery • Fastening • Bolts, nuts, screw • Valve parts • Furnace parts and burners operating below 1200°
Manganese	1.00 max.	Yield psi (min.) 30.000		
Phosphorus	.040 max.	Brinell (max.) Hardness 217		
Sulphur	.030 max.			
Silicon	1.00 max.			
Chromium	11.50–13.50			
Nickel	.75			

Stainless Pipe Specifications

ASTM No.	A-312	A-358	A-409	A-778
Normal Size Range	1/8" and larger	8" and larger	14" through 30"	3" through 48"
Weld-Bead Finish	May or may not be full finish	Bead may be removed Maximum 1/8" bead crown	Bead may be removed Maximum 1/16" bead crown No valley or groove	Bead may be removed Maximum 1/16"on either surface
Welding Process	Seamless or automatic welding No filler metal No X-ray required	Double welded Class 1, 2 & 5 Singled welded Class 3 & 4 Filler metal required all passes except root pass Class 4 100% X-ray to ASME UW-51 for Class 1, 3 & 4 No X-ray required Class 2 Spot X-ray to ASME UW-52 for Class 5	Manual or automatic Filler metal allowed No X-ray required	Manual or automatic welding Straight or spiral sear Filler metal allowed
Heat Treating	Annealed minimum 1900° F. and rapidly cooled	Annealed minimum 1900° F. and rapidly cooled unless marked "HT-_____", "HT-O", or "HT-SO"	Annealed minimum 1900° F. and rapidly cooled unless marked "HT_____", "HT-O", or "HT-SO"	Not required
Cleaning	Pickled and Passivated	Pickled and Passivated	Pickled and Passivated	Pickled and Passivated
Hydrostatic Test	Required	Required unless waived and marked "N-H"	Required	Not required
Lengths	1/8" through 8" - 15' to 24' 10" and up - not specified Specific lengths Tol. -+ 1/4" - 0" Butt welds not allowed unless otherwise agreed upon	As agreed Butt welds allowed	22" and smaller - 9' to 12' Above 22" - minimum 5' Butt welds allowed	10' lengths and over Butt welds allowed
Variations in Outside Diameter & Ovality	See A-530	Outside diameter ± - 0.5% of nominal wraparound Ovality maximum 1% difference between major/minor outside diameter	Less than .188" wall ± 0.20% of specified outside diameter .188" wall and larger, ± 0.40% of specified outside diameter Ovality major/minor outside diameter maximum 1.5% difference between major/minor outside diameter	See A-530
Wall Thickness Variations	Maximum 12.5% under nominal	Maximum 0.01" under nominal	Maximum 0.018" under nominal	Maximum 12.5% under/over nominal
Alignment	Maximum 1/8" in 10 feet	Maximum 1/8" in 10 feet	Maximum 3/16" in 10 feet	Maximum 1/4" in 10 feet
End Preparation	Plain ends	Plain ends	Plain ends	Plain ends

Stainless Steel Pipe Sizes

THEORETICAL INTERNAL BURSTING PRESSURES*

Nominal I.P.S. (in.)	Nominal O.D. (in.)	SCHEDULE 5S		SCHEDULE 10S		SCHEDULE 40S		SCHEDULE 80S	
		Wall (in.)	Pressure (psi)	Wall (in.)	Pressure (psi)	Wall (in.)	Pressure (psi)	Wall (in.)	Pressure (psi)
⅛	.405			.049	18150	.068	25175	.095	35175
¼	.540			.065	18050	.088	24450	.119	33050
⅜	.675			.065	14450	.091	20225	.126	28000
½	.840	.065	11600	.083	14825	.109	19475	.147	26250
¾	1.050	.065	9275	.083	11850	.113	16150	.154	22000
1	1.315	.065	7425	.109	12450	.133	15175	.179	20425
1¼	1.660	.065	5875	.109	9850	.140	12650	.191	17250
1½	1.900	.065	5125	.109	8600	.145	11450	.200	15800
2	2.375	.065	4100	.109	6875	.154	9750	.218	13775
2½	2.875	.083	4325	.120	6250	.203	10600	.276	14400
3	3.500	.083	3550	.120	5150	.216	9250		
3½	4.000	.083	3100	.120	4500	.226	8475		
4	4.500	.083	2750	.120	4000	.237	7900		
5	5.563	.109	2950	.134	3625	.258	6950		
6	6.625	.109	2475	.134	3050	.280	6350		
8	8.625	.109	1900	.148	2575	.322	5600		
10	10.750	.134	1875	.165	2300	.365	5100		
12	12.750	.156	1825	.180	2125	.375	4400		
14	14.000	.156	1675	.188	2025				
16	16.000	.165	1550	.188	1775				
18	18.000	.165	1375	.188	1575				
20	20.000	.188	1400	.218	1625				
24	24.000	.218	1375	.250	1550				
30	30.000	.250	1250	.312	1550				

* Bursting pressure calculated using Barlow's formula: $P = \frac{2ST}{D}$

S = 75,000 psi fiber stress. T = nom. wall. D = nom. O.D.

Stainless Steel Pipe Sizes

A.S.A.PIPE SCHEDULES
DIMENSIONS & WEIGHTS IN POUNDS PER FOOT

Pipe Size	Outside Diameter (Inches)	5S	5	10S	10	20	30	40S & Stand-ard	40	60	80S & Extra Heavy	80	100	120	140	160	Double Extra Heavy
1/8	.405		.035 .1383	.049 .1863	.049 .1863			.068 .2447	.068 .2447		.095 .3145	.095 .3145					
1/4	.540		.049 .2570	.065 .3297	.065 .3297			.088 .4248	.088 .4248		.119 .5351	.119 .5351					
3/8	.675		.049 .3276	.065 .4235	.065 .4235			.091 .5676	.091 .5676		.126 .7388	.126 .7388					
1/2	.840	.065 .5383	.065 .5383	.083 .6710	.083 .6710			.109 .8510	.109 .8510		.147 1.088	.147 1.088				.187 1.304	.294 1.714
3/4	1.050	.065 .6383	.065 .6383	.083 .8572	.083 .8572			.113 1.131	.113 1.131		.154 1.474	.154 1.474				.218 1.937	.308 2.441
1	1.315	.065 .8678	.065 .8678	.109 1.404	.109 1.404			.133 1.679	.133 1.679		.179 2.172	.179 2.172				.250 2.844	.358 3.659
1-1/4	1.660	.065 1.107	.065 1.107	.109 1.806	.109 1.806			.140 2.273	.140 2.273		..191 2.997	.191 2.997				.250 3.765	.382 5.214
1-1/2	1.900	.065 1.274	.065 1.274	.109 2.085	.109 2.085			.145 2.718	.145 2.718		.200 3.631	.200 3.631				.281 4.859	.400 6.408
2	2.375	.065 1.604	.065 1.604	.109 2.638	.109 2.638			.154 3.653	.154 3.653		.218 5.022	.218 5.022				.343 7.444	.436 9.029
2-1/2	2.875	.083 2.475	.083 2.475	.120 3.531	.120 3.531			.203 5.793	.203 5.793		.276 7.661	.276 7.661				.375 10.01	.552 13.70
3	3.500	.083 3.029	.083 3.029	.120 4.332	.120 4.332			.216 7.576	.216 7.576		.300 10.25	.300 10.25				.437 14.32	.600 18.58
3-1/2	4.000	.083 3.472	.083 3.472	.120 4.973	.120 4.973			.226 9.109	.226 1.109		.318 12.51	.318 12.51					.636 22.85
4	4.500	.083 3.915	.083 3.915	.120 5.613	.120 5.613			.237 10.79	.237 10.79	.281 12.66	.337 14.98	.337 14.98		.437 19.01		.531 22.51	.674 27.54
4-1/2	5.000							.247 12.53			.355 17.61						.710 32.53
5	5.563	.109 6.349	.109 6.349	.134 7.770	.134 7.770			.258 14.62	.258 14.62		.375 20.78	.375 20.78		.500 27.04		.625 32.96	.750 38.55
6	6.625	.109 7.585	.109 7.858	.134 9.290	.134 9.290			.280 18.97	.280 18.97		.432 28.57	.432 28.57		.562 36.39		.718 45.30	.864 53.16
7	7.625							.301 23.57	.		.500 38.05						.875 63.08
8	8.625	.109 9.914	.109 9.914	.148 13.40	.148 13.40	.250 22.36	.277 24.70	.322 28.55	.322 28.55	.406 35.64	.500 43.39	.500 43.39	.593 50.87	.718 60.93	.812 67.76	.906 74.69	.875 72.42
9	9.625							.342 33.90			.500 48.72						
10	10.750	.134 15.19	.134 15.19	.165 18.70	.165 18.70	.250 28.04	.307 34.24	.365 40.48	.365 40.48	.500 54.74	.500 54.74	.593 64.33	.718 76.93	.843 89.20	1.000 104.1	1.125 115.7	
11	11.750							.375 45.55			.500 60.07						
12	12.750	.156 21.07	.165 22.18	.180 24.20	.180 24.20	.250 33.38	.330 43.77	.375 49.56	.406 53.53	.562 73.16	.500 65.42	.687 88.51	.843 107.2	1.000 125.5	1.125 139.7	1.312 160.3	
14	14.000	.156 23.07		.188 27.73	.250 36.71	.312 45.68	.375 54.57	.375 54.57	.437 63.67	.593 84.91	.500 72.09	.750 106.1	.937 130.7	1.093 150.7	1.250 170.2	1.406 189.1	
16	16.000	.165 27.90		.188 31.75	.250 42.05	.312 52.36	.375 62.58	.375 62.58	.500 82.77	.656 107.5	.500 82.77	.843 136.5	1.031 164.8	1.218 192.3	1.437 223.5	1.593 145.1	
18	18.000	.165 31.43		.188 35.76	.250 47.39	.312 59.03	.437 82.06	.375 70.59	.562 104.8	.750 138.2	.500 93.45	.937 170.8	1.156 208.0	1.375 244.1	1.562 274.2	1.781 308.5	
20	20.000	.188 39.78		.218 46.05	.250 52.73	.375 78.60	.500 104.1	.375 78.60	.593 122.9	.812 166.4	.500 104.1	1.031 208.9	1.280 256.1	1.500 296.4	1.750 341.1	1.968 379.0	
24	24.000	.218 55.37		.250 63.41	.250 63.41	.375 94.62	.562 140.8	.375 94.62	.687 171.2	.968 238.1	.500 125.5	1.218 296.4	1.531 367.4	1.182 429.4	2.062 483.1	2.343 541.9	

Sanitary Welded Tube Specifications

We inventory a large quantity of welded and seamless stainless tubing to meet your immediate needs. Readily available in 20 foot lengths from ¼" OD to 6" OD, are types 304L and 316L - produced to ASTM specifications A249, A269 or A270. Other diameters, specifications and lengths available on special order. Large orders of tubing are packaged in tri-wall corrugated cartons equipped with wooden ends.

POLISH ID/OD Sanitary Finish
Polished to 180 grit OD and ID meeting or exceeding 3A standards. After polishing, special attention is given to cleanliness by washing and packaging in individual sealed plastic sleeves.

Other Finishes
Tubing also available in ID or OD polish only or provided unpolished (bright annealed).

Special Pharmaceutical & Electronic Finishes
ID polish to 15 RA or 20 RA, followed by electropolishing is available on special orders.

STAINLESS STEEL TUBING SPECIFICATIONS

Size (Tube OD)	Gauge	Wall	lbs/ft
1/2"	18	.049	.2365
3/4"	18	.049	.3670
1"	18	.049	.4980
1"	16	.065	.6490
11/2"	16	.065	.9962
2"	16	.065	1.3430
2 1/2"	16	.065	1.6900
3"	16	.065	2.0370
4"	14	.083	3.4720
6"	12	.109	6.923
8"	12	.109	9.300

Engineering Data

***LOSS OF HEAD IN FEET DUE TO FRICTION IN 100 FT. OF OD SANITARY TUBING**

.S. CPM	Lbs. Min.	Lbs. Hr.	1	1½	2	2½	3	4
5	42	2520	1.93	.27				
10	83	4980	10.26	1.08				
15	125	7500	16.05	2.23				
20	167	10020	28.29	3.81				
25	208	12480	43.70	5.02				
30	250	15000	63.25	8.26				
35	292	17520	85.10	11.61				
40	333	19980		14.99	.20			
45	374	22440		18.74	1.76		.75	
50	416	24960			5.61		1.86	.80
75	624	37440			12.23		4.14	1.70
100	831	49860			21.75		7.36	3.01
.80								
125	1038	62280			34.27		11.24	4.57
1.21								
150	1245	74700			48.76		16.10	6.55
1.72								
75	1425	85500				21.75	8.55	2.28
200	1659	99540				28.68	11.59	2.90

*Established on products with viscosity and density similar to water or milk.

Sanitary Tube Volume Per Foot

Tube Size	U.S. Gallon	Imp. Gallons	Cu. In.
1	.033	.0275	7.67
1½	.080	.067	18.52
2	.143	.119	32.95
2½	.229	.191	52.94
3	.336	.280	77.63
4	.611	.500	141.16

***90° Elbow Friction Equivalent**

1"	ELL = 6 Ft.	Straight Pipe
1½"	ELL = 8 Ft.	" "
2"	ELL = 8 Ft.	" "
2½"	ELL = 11 Ft.	" "
3"	ELL = 15 Ft.	" "
4"	ELL = 15 Ft.	" "

Recommended Tube Size Low Viscosity Products

0 - 4250 Lbs. per Hour	1"	
4250 - 14500	"	1½"
14500 - 33400	"	2"
33400 - 51900	"	2½"
51900 - 82500	"	3"
Greater than 82500	"	4"

NOTE:
For Higher Viscosity Products Increase Tube Size. Our Engineering Department's Facilities are at your Service.

Stainless Steel Tube Sizes

THEORETICAL INTERNAL BURSTING PRESSURES

Theoretical Bursting Pressure, in pounds for welded stainless tubes. Based on Barlow's Formula: $P = \frac{2ST}{D}$

P Bursting pressure in psi. D = Outside diameter of tube in inches. S = Fiber stress of 75,000 psi ultimate for bursting pressure. T = Wall thickness.

The mill pressures used when hydrotesting are usually based on fiber stress of 20,000 psi (26.7% of burst pressures listed below) unless specifications require other pressures.

Specifications and code rulings assign maximum stresses in use which are dependent on factors such as inspection requirements, temperatures encountered, service life expected and alloy.

WALL THICKNESS — INCHES & B.W.G.

O.D. Inches	.020 25	.022 24	.025 23	.028 22	.032 21	.035 20	.042 19	.049 18	.058 17	.065 16	.072 15	.083 14	.095 13	.109 12	.120 11	.134 10	.148 9	.165 8
⅛	24,000	26,400	30,000	33,600	38,400	42,000	50,400	58,800										
¼	12,000	13,200	15,000	16,800	19,200	21,000	25,200	29,400	34,800	39,000								
⅜	8,000	8,800	10,000	11,200	12,800	14,000	16,800	19,600	23,200	26,000								
½	6,000	6,600	7,500	8,400	9,600	10,500	12,600	14,700	17,400	19,500	21,600	24,900	28,500					
⅝	4,800	5,300	6,000	6,725	7,675	8,400	10,075	11,750	13,925	15,600	17,275	19,925	22,800					
¾	4,000	4,400	5,000	5,600	6,400	7,000	8,400	9,800	11,600	13,000	14,400	16,600	19,000	21,800				
⅞	3,425	3,750	4,300	4,800	5,475	6,000	7,200	8,400	9,950	11,150	12,350	14,225	16,275	18,675				
1	3,000	3,300	3,750	4,200	4,800	5,250	6,300	7,350	8,700	9,750	10,800	12,450	14,250	16,350	18,000	20,100	22,200	
1⅛			3,325	3,750	4,275	4,650	5,600	6,550	7,750	8,650	9,600	11,050	12,650	14,550	16,000	17,875	19,725	
1¼			3,000	3,350	3,850	4,200	5,050	5,875	6,950	7,800	8,650	9,950	11,400	13,075	14,400	16,075	17,750	
1⅜			2,725	3,050	3,500	3,825	4,575	5,350	6,325	7,100	7,850	9,050	10,350	11,900	13,100	14,625	16,150	
1½			2,500	2,800	3,200	3,500	4,200	4,900	5,800	6,500	7,200	8,300	9,500	10,900	12,000	13,400	14,800	
1⅝			2,300	2,575	2,950	3,225	3,875	4,525	5,350	6,000	6,650	7,650	8,775	10,050	11,075	12,375	13,650	
1¾			2,150	2,400	2,750	3,000	3,600	4,200	4,975	5,575	6,175	7,125	8,150	9,350	10,275	11,475	12,675	
1⅞						2,800	3,350	3,925	4,650	5,200	5,750	6,650	7,600	8,725	9,600	10,725	11,850	
2						2,625	3,150	3,675	4,350	4,875	5,400	6,225	7,125	8,175	9,000	10,050	11,100	
2⅛						2,475	2,975	3,450	4,100	4,600	5,075	5,850	6,700	7,700	8,475	9,450	10,450	
2¼							2,800	3,275	3,875	4,350	4,800	5,550	6,350	7,275	8,000	8,975	9,875	
2⅜							2,650	3,100	3,675	4,100	4,550	5,250	6,000	6,900	7,575	8,475	9,350	10,425
2½							2,525	2,950	3,475	3,900	4,325	4,975	5,700	6,550	7,200	8,050	8,875	9,900
2⅝							2,400	2,800	3,325	3,725	4,125	4,750	5,425	6,225	6,850	7,650	8,450	9,425
2¾								2,675	3,150	3,550	3,925	4,525	5,175	5,950	6,550	7,300	8,075	9,000
2⅞								2,550	3,025	3,400	3,750	4,325	4,950	5,675	6,250	7,000	7,725	8,600
3								2,450	2,900	3,250	3,600	4,150	4,750	5,450	6,000	6,700	7,400	8,250
3⅛								2,350	2,775	3,125	3,450	3,975	4,550	5,225	5,550	6,425	7,100	7,925
3¼								2,250	2,675	3,000	3,325	3,825	4,375	5,025	5,525	6,175	6,825	7,600
3⅜								2,175	2,575	2,875	3,200	3,675	4,225	4,850	5,325	5,950	6,575	7,325
3½								2,100	2,475	2,775	3,075	3,550	4,075	4,675	5,150	5,750	6,350	7,075
3⅝								2,025	2,400	2,675	2,975	3,425	3,925	4,500	4,950	5,550	6,100	6,825

O.D. Inches	.049 18	.058 17	.065 16	.072 15	.083 14	.095 13	.109 12	.120 11	.134 10	.148 9	.165 8	.180 7	.203 6	.220 5	.238 4	.259 3	.284 2	.300 1
3¾	1,950	2,325	2,600	2,875	3,325	3,800	4,350	4,800	5,350	5,900	6,600	7,200	8,125	8,800				
3⅞	1,900	2,250	2,500	2,775	3,200	3,675	4,200	4,650	5,175	5,725	6,375	6,975	7,850	8,500				
4	1,825	2,175	2,425	2,700	3,100	4,075	4,090	4,500	5,025	5,550	6,175	6,750	7,600	8,250				
4¼	1,725	2,050	2,300	2,550	2,925	3,350	3,850	4,225	4,725	5,225	5,825	6,350	7,150	7,750				
4½	1,625	1,925	2,150	2,400	2,750	3,150	3,625	4,000	4,450	4,925	5,500	6,000	6,750	7,325	7,925			
4¾	1,550	1,825	2,050	2,275	2,625	3,000	3,450	3,775	4,225	4,675	5,200	5,675	6,400	6,950	7,500			
5	1,475	1,750	1,950	2,150	2,500	2,850	3,275	3,600	4,025	4,450	4,950	5,400	6,100	6,600	7,150			
5¼	1,400	1,650	1,850	2,050	2,375	2,700	3,100	3,425	3,825	4,225	4,700	5,150	5,800	6,275	6,800			
5½	1,325	1,575	1,775	1,950	2,250	2,600	2,975	3,275	3,650	4,025	4,500	4,900	5,550	6,000	6,500	7,050		
5¾	1,275	1,500	1,700	1,875	2,150	2,475	2,850	3,125	3,500	3,850	4,300	4,700	5,300	5,725	6,200	6,750		
6	1,220	1,450	1,625	1,800	2,075	2,375	2,325	3,000	3,350	3,700	4,125	4,500	5,075	5,500	5,950	6,475	7,100	
8	925	1,100	1,225	1,350	1,550	1,775	2,050	2,250	2,525	2,775	3,100	3,375	3,800	4,125	4,475	4,850	5,325	5,625
10	750	875	975	1,075	1,250	1,425	1,625	1,800	2,000	2,225	2,475	2,700	3,050	3,300	3,575	3,875	4,250	4,500
12	625	725	825	900	1,050	1,200	1,375	1,500	1,675	1,850	2,075	2,250	2,550	2,750	2,975	3,250	3,550	3,750
14	525	625	700	775	900	1,025	1,175	1,300	1,450	1,600	1,775	1,925	2,175	2,350	2,550	2,775	3,050	3,225
16	450	550	600	675	775	900	1,025	1,125	1,250	1,400	1,550	1,700	1,900	2,050	2,225	2,425	2,675	2,825
18	400	475	550	600	700	800	900	1,000	1,125	1,250	1,375	1,500	1,700	1,850	1,975	2,150	2,350	2,500
20	375	450	500	550	625	725	825	900	1,000	1,100	1,250	1,350	1,525	1,650	1,775	1,950	2,125	2,250
24	300	375	400	450	525	600	675	750	850	925	1,025	1,125	1,250	1,375	1,475	1,625	1,775	1,875
30	250	300	325	350	425	475	550	600	675	750	825	900	1,025	1,100	1,200	1,300	1,425	1,500

THEORETICAL WEIGHTS*

WALL THICKNESS		OUTSIDE DIAMETER IN INCHES AND POUNDS PER FOOT											
Fraction or B.W.G.	Decimal	1/8 .125	3/16 .187	1/4 .250	5/16 .313	3/8 .375	7/16 .438	1/2 .500	9/16 .563	5/8 .625	11/16 .688	3/4 .750	13/16 .813
31	.010	.0124	.0192	.0258	.0327	.0394	.0461	.0528	.0597	.0663	.0731	.0797	.0866
30	.012	.0146	.0228	.0308	.0390	.0469	.0551	.0631	.0713	.0793	.0874	.0955	.1037
29	.013	.0157	.0245	.0332	.0421	.0508	.0596	.0682	.0771	.0858	.0946	.1033	.1121
28	.014	.0167	.0262	.0356	.0451	.0545	.0640	.0734	.0829	.0923	.1017	.1110	.1206
27 or 1/64	.016	.0188	.0297	.0404	.0513	.0619	.0728	.0835	.0944	.1051	.1159	.1266	.1375
26	.018	.0208	.0330	.0450	.0572	.0692	.0815	.0936	.1058	.1178	.1300	.1420	.1542
25	.020	.0226	.0362	.0496	.0632	.0765	.0901	.1035	.1171	.1304	.1440	.1574	.1710
24	.022	.0244	.0394	.0541	.0690	.0837	.0986	.1133	.1283	.1430	.1580	.1727	.1877
23	.025	.0269	.0439	.0607	.0776	.0944	.1113	.1280	.1450	.1617	.1787	.1954	.2124
22	.028	.0293	.0482	.0670	.0860	.1048	.1238	.1424	.1615	.1802	.1993	.2179	.2369
21	.032	.0321	.0538	.0752	.0969	.1183	.1401	.1614	.1832	.2046	.2263	.2477	.2694
20	.035	.0339	.0577	.0812	.1049	.1283	.1520	.1754	.1993	.2226	.2464	.2698	.2936
19	.042			.0942	.1227	.1508	.1793	.2073	.2359	.2640	.2925	.3206	.3491
18	.049			.1062	.1395	.1722	.2055	.2382	.2715	.3043	.3376	.3703	.4036
17	.058			.1200	.1595	.1983	.2376	.2764	.3158	.3545	.3939	.4328	.4721
1/16	.063			.1270	.1698	.2119	.2547	.2968	.3396	.3817	.4245	.4666	.5094
16	.065			.1296	.1738	.2172	.2605	.3049	.3490	.3925	.4366	.4800	.5242
15	.072							.3322	.3812	.4292	.4782	.5263	.5752
14	.083							.3731	.4295	.4851	.5414	.5969	.6532
13	.095									.5428	.6074	.6709	.7354
12 or 7/64	.109											.7533	.8273
11	.120												
1/8	.125												
10	.134												
9/64	.141												
9	.148												
5/32	.156												
8	.165												
7	.180												
6 or 13/64	.203												
5	.220												
4	.238												
1/4	.250												
3	.259												
9/32	.281												
2	.284												
1	.300												
5/16	.313												

*The weights on these and the following pages were calculated according to the formula:

$W = 10.78 (D-t) \times t$

where

W = the weight in pounds, of one foot of tubing

D = the outside diameter of the tube in inches, and

t = the wall thickness in inches

This formula involves the density of tubing material. The formula, and therefore, the values given in these tables apply to types 302, 304, 305, 308, 309, 310, 316, 317, and 321. For other materials, multiply the figure in the tables by the following factors:

Types 347 and 348	1.014
Type 409	.972
Hastelloy B	1.168
Hastelloy C	1.129
Incoloy 800	1.014
Incoloy 825	1.028
Monel 400	1.115
Titanium	0.570
Low Carbon Steel	0.993

Note: For aluminum Tube multipy X .33 for approximate weight.

THEORETICAL WEIGHTS (continued)

WALL THICKNESS		OUTSIDE DIAMETER IN INCHES AND POUNDS PER FOOT											
Fraction or B.W.G.	Decimal	7/8 .875	15/16 .938	1 1.000	1 1/16 1.063	1 1/8 1.125	1 3/16 1.188	1 1/4 1.250	1 5/16 1.313	1 3/8 1.375	1 7/16 1.438	1 1/2 1.500	1 5/8 1.625
31	.010	.0933	.1000	.1067	.1136	.1202	.1270	.1336	.1405				
30	.012	.1116	.1198	.1278	.1360	.1439	.1521	.1602	.1683	.1763	.1845		
29	.013	.1208	.1296	.1383	.1472	.1558	.1646	.1733	.1822	.1909	.1997		
28	.014	.1299	.1395	.1488	.1583	.1677	.1772	.1865	.1960	.2054	.2149	.2243	
27 or 1/64	.016	.1482	.1591	.1697	.1806	.1913	.2022	.2129	.2237	.2344	.2453	.2560	.2775
26	.018	.1663	.1786	.1906	.2028	.2148	.2270	.2390	.2514	.2634	.2756	.2876	.3118
25	.020	.1843	.1980	.2113	.2249	.2382	.2519	.2652	.2788	.2921	.3058	.3191	.3460
24	.022	.2023	.2172	.2320	.2469	.2617	.2766	.2912	.3062	.3209	.3359	.3506	.3802
23	.025	.2291	.2461	.2628	.2797	.2965	.3134	.3302	.3472	.3639	.3809	.3975	.4312
22	.028	.2557	.2747	.2935	.3124	.3311	.3502	.3689	.3879	.4066	.4256	.4444	.4821
21	.032	.2908	.3125	.3339	.3557	.3770	.3988	.4202	.4419	.4634	.4851	.5065	.5496
20	.035	.3170	.3407	.3641	.3879	.4113	.4351	.4585	.4822	.5056	.5294	.5528	.5999
19	.042	.3772	.4057	.4338	.4623	.4904	.5189	.5470	.5755	.6036	.6321	.6602	.7168
18	.049	.4364	.4696	.5024	.5356	.5684	.6018	.6345	.6678	.7005	.7338	.7665	.8326
17	.058	.5109	.5503	.5890	.6284	.6672	.7066	.7454	.7848	.8235	.8629	.9017	.9799
1/16	.063	.5515	.5943	.6365	.6792	.7214	.7641	.8063	.8491	.8912	.9340	.9761	1.061
16	.065	.5676	.6117	.6553	.6994	.7429	.7870	.8304	.8746	.9180	.9621	1.006	1.093
15	.072	.6234	.6722	.7204	.7692	.8167	.8663	.9144	.9634	1.011	1.060	1.108	1.205
14	.083	.7088	.7651	.8206	.8769	.9318	.9888	1.044	1.100	1.156	1.212	1.268	1.380
13	.095	.7989	.8634	.9269	.9914	1.055	1.119	1.183	1.242	1.311	1.376	1.439	1.567
12 or 3/64	.109	.8995	.9743	1.047	1.121	1.194	1.268	1.341	1.415	1.488	1.562	1.634	1.782
11	.120					1.300	1.382	1.462	1.543	1.623	1.705	1.786	1.947
1/8	.125					1.347	1.432	1.516	1.601	1.685	1.770	1.853	2.022
10	.134					1.431	1.522	1.612	1.703	1.793	1.884	1.973	2.154
9/64	.141						1.592	1.686	1.782	1.876	1.971	2.065	2.256
9	.148												
5/32	.156												
8	.165												
7	.180												
6 or 13/64	.203												
5	.220												
4	.238												
1/4	.250												
3	.259												
9/32	.281												
2	.284												
1	.300												
5/16	.313												

[illegible] .33 [illegible]

THEORETICAL WEIGHTS (continued)

WALL THICKNESS		OUTSIDE DIAMETER IN INCHES AND POUNDS PER FOOT											
Fraction or B.W.G.	Decimal	1¾ 1.750	1⅞ 1.875	2 2.000	2⅛ 2.125	2¼ 2.250	2⅜ 2.375	2½ 2.500	2⅝ 2.625	2¾ 2.750	2⅞ 2.875	3 3.000	3⅛ 3.125
31	.010												
30	.012												
29	.013												
28	.014												
27 or 1/64	.016	.2991	.3206	.3422									
26	.018	.3361	.3603	.3846									
25	.020	.3730	.3999	.4269	.4538	.4808	.5077	.5347	.5616	.5886	.6155	.6425	.6694
24	.022	.4098	.4395	.4692	.4987	.5284	.5580	.5877	.6173	.6470	.6766	.7063	.7359
23	.025	.4650	.4987	.5323	.5660	.5996	.6333	.6670	.7007	.7344	.7681	.8018	.8355
22	.028	.5198	.5575	.5953	.6330	.6708	.7085	.7462	.7839	.8216	.8593	.8971	.9348
21	.032	.5927	.6359	.6790	.7221	.7652	.8083	.8515	.8945	.9376	.9807	1.024	1.067
20	.035	.6472	.6943	.7415	.7886	.8359	.8830	.9301	.9773	1.025	1.072	1.118	1.166
19	.042	.7734	.8300	.8866	.9433	.9998	1.056	1.113	1.170	1.226	1.283	1.340	1.396
18	.049	.8986	.9647	1.031	1.096	1.163	1.228	1.295	1.361	1.426	1.493	1.559	1.625
17	.058	1.058	1.137	1.214	1.292	1.371	1.449	1.527	1.605	1.684	1.761	1.839	1.918
1/16	.063	1.146	1.230	1.315	1.400	1.486	1.571	1.655	1.740	1.825	1.910	1.995	2.079
16	.065	1.181	1.269	1.356	1.443	1.531	1.619	1.706	1.794	1.882	1.969	2.056	2.144
15	.072	1.302	1.399	1.497	1.594	1.691	1.788	1.885	1.982	2.078	2.175	2.273	2.370
14	.083	1.485	1.604	1.715	1.827	1.939	2.051	2.163	2.274	2.386	2.498	2.610	2.723
13	.095	1.695	1.823	1.951	2.079	2.207	2.335	2.463	2.591	2.719	2.848	2.975	3.103
12 or 7/64	.109	1.928	2.075	2.222	2.369	2.516	2.663	2.809	2.957	3.103	3.250	3.397	3.544
11	.120	2.109	2.270	2.432	2.594	2.756	2.917	3.079	3.240	3.403	3.564	3.726	3.887
1/8	.125	2.190	2.358	2.527	2.695	2.864	3.032	3.201	3.370	3.537	3.706	3.874	4.043
10	.134	2.335	2.516	2.695	2.876	3.057	3.237	3.418	3.599	3.779	3.960	4.141	4.321
9/64	.141	2.446	2.636	2.825	3.016	3.206	3.395	3.583	3.780	3.970	4.150	4.350	
9	.148			2.955	3.155	3.354	3.553	3.753	3.952	4.152	4.351	4.551	4.751
5/32	.156						3.732	3.942	4.152	4.362	4.572	4.783	4.994
8	.165						3.931	4.153	4.376	4.598	4.820		5.265
7	.180												
6 or 13/64	.203												
5	.220												
4	.238												
1/4	.250												
3	.259												
9/32	.281												
2	.284												
1	.300												
5/16	.313												

□□e□□□r □□□□ □□□□ □□□e □ □□□□□ □ .33 □r □□□r□□□□ □□e □e□□□.

THEORETICAL WEIGHTS (continued)

WALL THICKNESS		OUTSIDE DIAMETER IN INCHES AND POUNDS PER FOOT											
Fraction or B.W.G.	Decimal	3¼ 3.250	3⅜ 3.375	3½ 3.500	3⅝ 3.625	3¾ 3.750	3⅞ 3.875	4 4.000	4⅛ 4.125	4¼ 4.250	4⅜ 4.375	4½ 4.500	4⅝ 4.625
31	.010												
30	.012												
29	.013												
28	.014												
27 or 1/64	.016												
26	.018												
25	.020	.6964	.7233	.7503	.7772	.8042	.8311	.8581					
24	.022	.7656	.7952	.8248	.8545	.8841	.9138	.9434					
23	.025	.8691	.9028	.9365	.9702	1.004	1.038	1.071					
22	.028	.9725	1.010	1.048	1.086	1.123	1.161	1.199	1.237	1.274	1.312	1.350	1.388
21	.032	1.110	1.153	1.196	1.239	1.283	1.326	1.369	1.412	1.455	1.498	1.541	1.584
20	.035	1.213	1.260	1.307	1.355	1.402	1.449	1.496	1.543	1.591	1.637	1.685	1.732
19	.042	1.453	1.509	1.566	1.622	1.679	1.735	1.792	1.848	1.906	1.961	2.019	2.075
18	.049	1.691	1.757	1.823	1.889	1.955	2.021	2.088	2.153	2.219	2.285	2.351	2.418
17	.058	1.996	2.074	2.152	2.231	2.309	2.386	2.465	2.543	2.622	2.699	2.778	2.856
1/16	.063	2.164	2.249	2.335	2.420	2.504	2.589	2.674	2.759	2.844	2.928	3.013	3.098
16	.065	2.232	2.320	2.408	2.494	2.582	2.670	2.758	2.845	2.932	3.020	3.108	3.196
15	.072	2.467	2.564	2.661	2.758	2.855	2.952	3.049	3.147	3.243	3.340	3.437	3.534
14	.083	2.834	2.946	3.058	3.170	3.282	3.393	3.505	3.617	3.729	3.841	3.952	4.064
13	.095	3.231	3.360	3.488	3.616	3.743	3.871	4.000	4.128	4.256	4.383	4.511	4.640
12 or 7/64	.109	3.692	3.838	3.985	4.132	4.279	4.426	4.573	4.719	4.867	5.013	5.160	5.307
11	.120	4.049	4.212	4.373	4.535	4.696	4.858	5.020	5.182	5.343	5.505	5.666	5.829
7/8	.125	4.212	4.380	4.549	4.717	4.885	5.053	5.222	5.391	5.559	5.728	5.896	6.065
10	.134	4.501	4.682	4.863	5.043	5.224	5.405	5.585	5.766	5.946	6.127	6.307	6.488
9/64	.141												
9	.148	4.949	5.149	5.341	5.548	5.747	5.947	6.147	6.346	6.545	6.744	6.944	7.144
5/32	.156	5.204	5.414	5.624	5.835	6.045	6.255	6.465	6.676	6.886	7.096	7.306	7.517
8	.165	5.488	5.711	5.933	6.155	6.377	6.600	6.822	7.044	7.267	7.489	7.711	7.934
7	.180												
6 or 13/64	.203												
5	.220												
4	.238												
1/4	.250												
3	.259												
9/32	.281												
2	.284												
1	.300												
5/16	.313												

[illegible] .33 [illegible]

THEORETICAL WEIGHTS (continued)

WALL THICKNESS		OUTSIDE DIAMETER IN INCHES AND POUNDS PER FOOT											
Fraction or B.W.G.	Decimal	4¾ 4.750	4⅞ 4.875	5 5.000	5⅛ 5.125	5¼ 5.250	5⅜ 5.375	5½ 5.500	5⅝ 5.625	5¾ 5.750	5⅞ 5.875	6 6.000	6⅛ 6.125
31	.010												
30	.012												
29	.013												
28	.014												
27 or 1/64	.016												
26	.018												
25	.020												
24	.022												
23	.025												
22	.028	1.425	1.463	1.501									
21	.032	1.628	1.671	1.714									
20	.035	1.779	1.826	1.874	1.921	1.967	2.015	2.062	2.109	2.156	2.203	2.251	
19	.042	2.132	2.188	2.245	2.302	2.358	2.415	2.471	2.528	2.584	2.641	2.698	
18	.049	2.483	2.550	2.616	2.681	2.748	2.813	2.879	2.945	3.011	3.077	3.143	
17	.058	2.934	3.012	3.090	3.169	3.246	3.325	3.403	3.481	3.559	3.637	3.715	
1/16	.063	3.184	3.269	3.353	3.438	3.523	3.608	3.693	3.777	3.862	3.948	4.033	4.118
16	.065	3.283	3.371	3.458	3.546	3.633	3.721	3.809	3.897	3.984	4.071	4.159	4.247
15	.072	3.631	3.728	3.825	3.923	4.020	4.117	4.214	4.310	4.407	4.504	4.601	4.699
14	.083	4.176	4.288	4.400	4.511	4.623	4.735	4.848	4.960	5.071	5.183	5.295	5.407
13	.095	4.768	4.896	5.024	5.151	5.280	5.408	5.536	5.664	5.792	5.920	6.048	6.176
12 or 7/64	.109	5.454	5.601	5.748	5.894	6.042	6.188	6.336	6.482	6.629	6.776	6.923	7.069
11	.120	5.990	6.152	6.313	6.475	6.637	6.799	6.960	7.122	7.283	7.446	7.607	7.769
1/8	.125	6.233	6.401	6.570	6.738	6.907	7.075	7.244	7.413	7.580	7.749	7.917	8.086
10	.134	6.669	6.849	7.030	7.211	7.391	7.571	7.752	7.933	8.113	8.294	8.475	8.655
9/64	.141												
9	.148	7.343	7.543	7.742	7.942	8.141	8.340	8.540	8.739	8.939	9.138	9.338	9.537
5/32	.156	7.727	7.937	8.147	8.358	8.568	8.778	8.987	9.197	9.407	9.618	9.828	10.04
8	.165	8.157	8.379	8.601	8.824	9.046	9.268	9.489	9.712	9.934	10.16	10.38	10.60
7	.180							10.32	10.57	10.81	11.05	11.29	11.54
6 or 13/64	.203							11.59	11.87	12.14	12.41	12.69	12.96
5	.220							12.52	12.82	13.11	13.41	13.71	14.00
4	.238							13.50	13.82	14.14	14.46	14.78	15.10
¼	.250												
3	.259												
9/32	.281												
2	.284												
1	.300												
5/16	.313												

[illegible] .33 [illegible]

Stainless Steel Bars

WEIGHT IN POUNDS PER FOOT

Size in Inches	Round	Square	Octa-gon	Hexa-gon	Size in Inches	Round	Square	Octa-gon	Hexa-gon	Size in Inches	Round	Square	Octa-gon
1/16	.010	.013	.011	.012	1 1/4	4.172	5.313	4.407	4.601	4 3/4	60.25	76.71	63.62
5/64	.017	.022	.018	.019	1 5/16	4.600	5.857	4.858	5.072	4 13/16	61.85	78.75	65.32
3/32	.023	.029	.024	.025	1 3/8	5.049	6.428	5.332	5.567	4 7/8	63.46	80.80	67.02
7/64	.031	.039	.033	.034	1 7/16	5.518	7.026	5.827	6.085	4 15/16	65.10	82.89	68.75
1/8	.042	.053	.044	.046	1 1/2	6.008	7.650	6.345	6.625	5	66.76	85.00	70.50
9/64	.053	.067	.056	.058	1 9/16	6.519	8.301	6.885	7.189	5 1/16	68.44	87.14	72.27
5/32	.065	.083	.069	.072	1 5/8	7.051	8.978	7.446	7.775	5 1/8	70.14	89.30	74.07
11/64	.079	.100	.083	.087	1 11/16	7.604	9.682	8.030	8.385	5 3/16	71.86	91.50	75.89
3/16	.094	.120	.099	.104	1 3/4	8.178	10.41	8.634	9.018	5 1/4	73.60	93.71	77.72
13/64	.110	.140	.116	.121	1 13/16	8.773	11.17	9.265	9.673	5 5/16	75.36	95.96	79.59
7/32	.128	.163	.135	.141	1 7/8	9.388	11.95	9.911	10.35	5 3/8	77.15	98.23	81.47
15/64	.147	.187	.155	.162	1 15/16	10.02	12.76	10.58	11.05	5 7/16	78.95	100.5	83.38
1/4	.167	.213	.176	.184	2	10.68	13.60	11.28	11.78	5 1/2	80.78	102.9	85.30
17/64	.188	.240	.199	.207	2 1/16	11.36	14.46	11.99	12.53	5 9/16	82.62	105.2	87.25
9/32	.211	.269	.223	.233	2 1/8	12.06	15.35	12.73	13.30	5 5/8	84.49	107.6	89.23
19/64	.235	.300	.248	.259	2 3/16	12.78	16.27	13.49	14.09	5 11/16	86.38	110.0	91.22
5/16	.261	.332	.275	.288	2 1/4	13.52	17.21	14.27	14.91	5 3/4	88.29	112.4	93.23
21/64	.288	.365	.304	.318	2 5/16	14.28	18.18	15.08	15.75	5 13/16	90.22	114.9	95.27
11/32	.316	.402	.334	.348	2 3/8	15.06	19.18	15.91	16.61	5 7/8	92.17	114.7	97.33
33/64	.345	.439	.364	.381	2 7/16	15.87	20.20	16.75	17.49	5 15/16	94.14	119.9	99.41
3/8	.376	.478	.397	.414	2 1/2	16.69	21.25	17.62	18.40	6	96.13	122.4	101.5
25/64	.408	.519	.431	.450	2 9/16	17.53	22.33	18.52	19.34	6 1/16	98.15	125.0	103.6
13/32	.441	.561	.466	.486	2 5/8	18.40	23.43	19.43	20.29	6 1/8	100.2	127.6	105.8
27/64	.475	.605	.502	.524	2 11/16	19.20	24.56	20.37	21.27	6 3/16	102.2	130.2	108.0
7/16	.511	.651	.540	.564	2 3/4	20.19	25.71	21.33	22.27	6 1/4	104.3	132.8	110.2
29/64	.548	.698	.579	.604	2 13/16	21.12	26.90	22.31	23.29	6 5/16	106.4	135.5	112.4
15/32	.587	.747	.620	.647	2 7/8	22.07	28.10	23.31	24.34	6 3/8	108.5	138.2	114.6
31/64	.627	.798	.662	.692	2 15/16	23.04	29.34	24.33	25.41	6 7/16	110.7	140.9	116.9
1/2	.668	.850	.705	.736	3	24.03	30.60	25.38	26.50	6 1/2	112.8	143.7	119.1
33/64	.710	.904	.750	.783	3 1/16	25.05	31.89	26.45	27.62	6 9/16	115.0	146.4	121.4
17/32	.754	.960	.796	.831	3 1/8	26.08	33.20	27.54	28.76	6 5/8	117.2	149.2	123.8
35/64	.799	1.017	.844	.881	3 3/16	27.13	34.55	28.65	29.92	6 11/16	119.4	152.1	126.1
9/16	.845	1.076	.892	.932	3 1/4	28.21	35.91	29.79	....	6 3/4	121.7	154.9	128.5
37/64	.893	1.136	.943	.985	3 5/16	29.30	37.21	30.94	....	6 13/16	123.9	157.8	130.9
19/32	.941	1.199	.994	1.038	3 3/8	30.42	38.73	32.12	....	6 7/8	126.2	160.7	133.3
39/64	.992	1.263	1.048	1.094	3 7/16	31.55	40.18	33.32	....	6 15/16	128.5	163.6	135.7
5/8	1.043	1.328	1.102	1.150	3 1/2	32.71	41.65	34.54	....	7	130.9	166.6	138.2
41/64	1.096	1.395	1.517	1.209	3 9/16	33.90	43.15	35.79	....	7 1/16	133.2	169.6	140.7
21/32	1.150	1.464	1.214	1.268	3 5/8	35.09	44.68	37.07	....	7 1/8	135.6	172.6	143.2
43/64	1.205	1.535	1.272	1.329	3 11/16	36.31	46.23	38.34	....	7 3/16	138.0	175.6	145.7
11/16	1.262	1.607	1.333	1.392	3 3/4	37.55	47.81	39.65	....	7 1/4	140.4	178.7	148.2
45/64	1.320	1.681	1.394	1.456	3 13/16	38.81	49.42	40.99	....	7 5/16	142.8	181.8	150.8
23/32	1.380	1.756	1.487	1.521	3 7/8	40.10	51.05	42.34	....	7 3/8	145.2	184.9	153.4
47/64	1.440	1.834	1.521	1.588	3 15/16	41.40	52.71	43.72	....	7 7/16	147.7	188.1	156.0
3/4	1.502	1.913	1.586	1.656	4	42.73	54.40	45.12	....	7 1/2	150.2	191.3	158.6
25/32	1.630	2.075	1.721	1.797	4 1/16	44.07	56.11	46.54	....	7 5/8	155.3	197.7	164.0
13/16	1.763	2.245	1.862	1.944	4 1/8	45.44	57.85	47.98	....	7 3/4	160.4	204.2	169.4
27/32	1.901	2.421	2.008	2.096	4 3/16	46.83	59.62	49.45	....	7 7/8	165.6	210.9	174.9
7/8	2.045	2.603	2.159	2.254	4 1/4	48.23	61.41	50.93	....	8	170.9	217.6	180.5
29/32	2.193	2.792	2.316	2.418	4 5/16	49.66	63.23	52.44	....	8 1/4	181.8	230.9	192.0
15/16	2.347	2.988	2.479	2.588	4 3/8	51.11	65.08	53.98	....	8 1/2	192.9	245.7	203.8
31/32	2.506	3.191	2.646	2.763	4 7/16	52.58	66.95	55.53	....	8 3/4	204.4	259.6	215.8
1	2.670	3.400	2.820	2.945	4 1/2	54.08	68.85	57.10	....	9	216.3	275.4	228.4
1 1/16	3.015	3.838	3.183	3.324	4 9/16	55.59	70.78	58.70	....	10	267.0	340.0	282.0
1 1/8	3.380	4.303	3.569	3.727	4 5/8	57.12	72.73	60.32	....	11	323.1	411.4	341.2
1 3/16	3.766	4.795	3.977	4.152	4 11/16	58.68	74.71	61.96	....	12	384.4	489.6	406.1

ALSO AVAILABLE IN HIGH NICKEL ALLOYS & ALUMINIUM.

Stainless Steel Flat Bars

WEIGHT IN POUNDS PER FOOT

WIDTH

THICKNESS (Inches)	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8
1/16	.053	.066	.080	.093	.106	.120	.133	.146	.159	.173	.186	.199	.213	.239	.266	.292	.319	.345	.372	.398
3/32	.080	.100	.120	.140	.159	.179	.199	.219	.239	.259	.279	.299	.319	.359	.398	.438	.478	.518	.558	.598
1/8	.106	.133	.159	.186	.213	.239	.266	.292	.319	.345	.372	.398	.425	.478	.531	.584	.638	.691	.744	.797
5/32	.133	.166	.199	.232	.266	.299	.332	.365	.398	.432	.465	.498	.531	.598	.664	.731	.797	.863	.930	.996
3/16	.159	.199	.239	.279	.319	.359	.398	.438	.478	.518	.558	.598	.638	.717	.797	.877	.956	1.04	1.12	1.20
1/4	.213	.266	.319	.372	.425	.478	.531	.584	.638	.691	.744	.797	.850	.956	1.06	1.17	1.28	1.38	1.49	1.59
5/16	.266	.332	.398	.465	.531	.598	.664	.731	.797	.863	.930	.996	1.06	1.20	1.33	1.46	1.59	1.73	1.86	1.99
3/8	.319	.398	.478	.558	.638	.717	.797	.877	.956	1.04	1.12	1.20	1.28	1.43	1.59	1.75	1.91	2.07	2.23	2.39
7/16	.372	.465	.558	.651	.744	.837	.930	1.02	1.12	1.21	1.30	1.40	1.49	1.67	1.86	2.05	2.31	2.42	2.60	2.79
1/2	.425	.531	.638	.744	.850	.956	1.06	1.17	1.28	1.38	1.49	1.59	1.70	1.91	2.13	2.34	2.55	2.76	2.98	3.19
9/16	.478	.598	.717	.837	.956	1.08	1.20	1.32	1.43	1.55	1.63	1.79	1.91	2.15	2.39	2.63	2.87	3.11	3.35	3.59
5/8	.531	.664	.797	.930	1.06	1.20	1.33	1.46	1.59	1.73	1.86	1.99	2.13	2.39	2.66	2.92	3.19	3.45	3.72	3.98
11/16	.584	.731	.877	1.02	1.17	1.32	1.46	1.61	1.75	1.90	2.05	2.19	2.34	2.63	2.92	3.21	3.51	3.80	4.09	4.38
3/4	.638	.797	.956	1.12	1.28	1.43	1.59	1.75	1.91	2.07	2.23	2.39	2.55	2.87	3.19	3.51	3.83	4.14	4.46	4.78
13/16	.691	.863	1.04	1.21	1.38	1.55	1.73	1.90	2.07	2.25	2.42	2.59	2.76	3.11	3.45	3.80	4.14	4.49	4.83	5.18
7/8	.744	.930	1.12	1.30	1.49	1.67	1.86	2.05	2.23	2.42	2.60	2.79	2.98	3.35	3.72	4.09	4.46	4.83	5.21	5.58
15/16	.797	.996	1.20	1.40	1.59	1.79	1.99	2.19	2.39	2.59	2.79	2.99	3.19	3.59	3.98	4.38	4.78	5.18	5.58	5.98
1	.850	1.06	1.28	1.49	1.70	1.91	2.13	2.34	2.55	2.76	2.98	3.19	3.40	3.83	4.25	4.68	5.10	5.53	5.95	6.38
1 1/8	.956	1.20	1.43	1.67	1.91	2.15	2.39	2.63	2.87	3.11	3.35	3.59	3.83	4.30	4.78	5.26	5.74	6.22	6.69	7.17
1 1/4	1.06	1.33	1.59	1.86	2.13	2.39	2.66	2.92	3.19	3.45	3.72	3.98	4.25	4.78	5.31	5.84	6.38	6.91	7.44	7.97
1 3/8	1.17	1.46	1.75	2.05	2.34	2.63	2.92	3.21	3.51	3.80	4.09	4.38	4.68	5.26	5.84	6.43	7.01	7.60	8.18	8.77
1 1/2	1.28	1.59	1.91	2.23	2.55	2.87	3.19	3.51	3.83	4.14	4.46	4.78	5.10	5.74	6.38	7.01	7.65	8.29	8.93	9.56
1 5/8	1.38	1.73	2.07	2.42	2.76	3.11	3.45	3.80	4.14	4.49	4.83	5.18	5.53	6.22	6.91	7.60	8.29	8.98	9.67	10.36
1 3/4	1.49	1.86	2.23	2.60	2.98	3.35	3.72	4.09	4.46	4.83	5.21	5.58	5.95	6.69	7.44	8.18	8.93	9.67	10.41	11.16
1 7/8	1.59	1.99	2.39	2.79	3.19	3.59	3.98	4.38	4.78	5.18	5.58	5.98	6.38	7.17	7.97	8.77	9.56	10.36	11.16	11.95
2	1.70	2.13	2.55	2.98	3.40	3.83	4.25	4.68	5.10	5.53	5.95	6.38	6.80	7.65	8.50	9.35	10.20	11.05	11.90	12.75
2 1/4	1.91	2.39	2.87	3.35	3.83	4.30	4.78	5.26	5.74	6.21	6.69	7.17	7.65	8.61	9.56	10.52	11.48	12.43	13.39	14.34
2 1/2	2.13	2.66	3.19	3.72	4.25	4.78	5.31	5.84	6.38	6.91	7.44	7.97	8.50	9.56	10.63	11.69	12.75	13.81	14.88	15.94
2 3/4	2.34	2.92	3.51	4.09	4.68	5.26	5.84	6.43	7.01	7.60	8.18	8.77	9.35	10.52	11.69	12.86	14.03	15.19	16.36	17.53
3	2.55	3.19	3.83	4.46	5.10	5.74	6.38	7.01	7.65	8.29	8.93	9.56	10.20	11.58	12.75	14.03	15.30	16.58	17.85	19.13

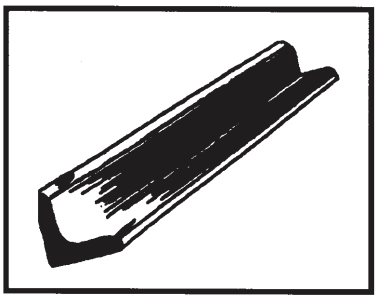
WIDTH

THICKNESS (Inches)	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4	6	8	10	12
1/16	.425	.478	.531	.584	.638	.691	.744	.797	.850	.903	.956	1.01	1.06	1.12	1.17	1.22	1.28	1.70	2.13	2.55
3/32	.638	.717	.797	.877	.956	1.04	1.12	1.20	1.28	1.36	1.43	1.51	1.59	1.67	1.75	1.83	1.91	2.55	3.19	3.83
1/8	.850	.956	1.06	1.17	1.28	1.38	1.49	1.59	1.70	1.81	1.91	2.02	2.13	2.23	2.34	2.44	2.55	3.40	4.25	5.10
5/32	1.06	1.20	1.33	1.46	1.59	1.73	1.86	1.99	2.13	2.26	2.39	2.52	2.66	2.79	2.92	3.06	3.19	4.25	5.31	6.38
3/16	1.28	1.43	1.59	1.75	1.91	2.07	2.23	2.39	2.55	2.71	2.87	3.03	3.19	3.35	3.51	3.67	3.83	5.10	6.38	7.65
1/4	1.70	1.91	2.13	2.34	2.55	2.76	2.98	3.19	3.40	3.61	3.83	4.04	4.25	4.46	4.68	4.89	5.10	6.80	8.50	10.20
5/16	2.13	2.39	2.66	2.92	3.19	3.45	3.72	3.98	4.25	4.52	4.78	5.05	5.31	5.58	5.84	6.11	6.38	8.50	10.63	12.75
3/8	2.55	2.87	3.19	3.51	3.83	4.14	4.46	4.78	5.10	5.42	5.74	6.06	6.38	6.69	7.01	7.33	7.65	10.20	12.75	15.30
7/16	2.98	3.35	3.72	4.09	4.46	4.83	5.21	5.58	5.95	6.32	6.69	7.07	7.44	7.81	8.18	8.55	8.93	11.90	14.88	17.85
1/2	3.40	3.83	4.25	4.68	5.10	5.53	5.95	6.38	6.80	7.23	7.65	8.08	8.50	8.93	9.35	9.78	10.20	13.60	17.00	20.40
9/16	3.83	4.30	4.78	5.26	5.74	6.22	6.69	7.17	7.65	8.13	8.61	9.08	9.56	10.04	10.52	11.00	11.48	15.30	19.13	22.95
5/8	4.25	4.78	5.31	5.84	6.38	6.91	7.44	7.97	8.50	9.03	9.56	10.09	10.63	11.16	11.69	12.22	12.75	17.00	21.25	25.50
11/16	4.68	5.26	5.84	6.43	7.01	7.60	8.18	8.77	9.35	9.93	10.52	11.10	11.69	12.27	12.86	13.44	14.03	18.70	23.38	28.05
3/4	5.10	5.74	6.38	7.01	7.65	8.29	8.93	9.56	10.20	10.84	11.48	12.11	12.75	13.39	14.03	14.66	15.30	20.40	25.50	30.60
13/16	5.53	6.22	6.91	7.60	8.29	8.98	9.67	10.36	11.05	11.74	12.43	13.12	13.81	14.50	15.19	15.88	16.58	22.10	27.63	33.15
7/8	5.95	6.69	7.44	8.18	8.93	9.67	10.41	11.16	11.90	12.64	13.39	14.13	14.88	15.62	16.36	17.11	17.85	23.80	29.75	35.70
15/16	6.38	7.17	7.97	8.77	9.56	10.36	11.16	11.95	12.75	13.55	14.34	15.14	15.94	16.73	17.53	18.33	19.13	25.50	31.88	38.25
1	6.80	7.65	8.50	9.35	10.20	11.05	11.90	12.75	13.60	14.45	15.30	16.15	17.00	17.85	18.70	19.55	20.40	27.20	34.00	40.80
1 1/8	7.65	8.61	9.56	10.52	11.48	12.43	13.39	14.34	15.30	16.26	17.21	18.17	19.13	20.08	21.04	21.99	22.95	30.60	38.25	45.90
1 1/4	8.50	9.56	10.63	11.69	12.75	13.81	14.88	15.94	17.00	18.06	19.13	20.19	21.25	22.31	23.38	24.44	25.50	34.00	42.50	51.00
1 3/8	9.35	10.52	11.69	12.86	14.03	15.19	16.36	17.53	18.70	19.87	21.04	22.21	23.38	24.54	25.71	26.88	28.05	37.40	46.75	56.10
1 1/2	10.20	11.48	12.75	14.03	15.30	16.58	17.85	19.13	20.40	21.68	22.95	24.33	25.50	26.78	28.05	29.33	30.60	40.80	51.00	61.20
1 5/8	11.05	12.43	13.81	15.19	16.58	17.96	19.34	20.72	22.10	23.48	24.86	26.24	27.63	29.01	30.39	31.77	33.15	44.20	55.25	66.30
1 3/4	11.90	13.39	14.88	16.36	17.85	19.34	20.83	22.31	23.80	25.29	26.78	28.26	29.75	31.24	32.73	34.21	35.70	47.60	59.50	71.40
1 7/8	12.75	14.34	15.94	17.53	19.13	20.72	22.31	23.91	25.50	27.09	28.69	30.28	31.88	33.47	35.06	36.66	38.25	51.00	63.75	76.50
2	13.60	15.30	17.00	18.70	20.40	22.10	23.80	25.50	27.20	28.90	30.60	32.30	34.00	35.70	37.40	39.10	40.80	54.40	68.00	81.60
2 1/4	15.30	17.21	19.13	21.04	22.96	24.86	26.78	28.68	30.60	32.52	34.42	36.34	38.26	40.16	42.08	43.99	45.90	61.20	76.50	91.80
2 1/2	17.00	19.13	21.26	23.38	25.50	27.62	29.76	31.88	34.00	36.12	38.26	40.38	42.50	44.63	46.75	48.88	51.00	68.00	85.00	102.0
2 3/4	18.70	21.04	23.38	25.72	28.06	30.38	32.72	35.06	37.40	39.74	42.08	44.42	46.76	49.09	51.43	53.76	56.10	74.80	93.50	112.2
3	20.40	22.96	25.50	28.06	30.60	33.16	35.70	38.26	40.80	43.36	45.90	48.46	51.00	53.55	56.10	58.65	61.20	81.60	102.0	122.4

ALSO AVAILABLE IN HIGH NICKEL ALLOYS & ALUMINIUM.

Stainless Steel Angles

HOT ROLLED, ANNEALED AND PICKLED
12 TO 20 FOOT RANDOM LENGTHS



SPECIFICATION ASTM A-276 **MILL TEST CERTIFICATES AVAILABLE**

Size (inches)	Size (mm)	Weight (lbs/ft)	Weight (kgs/m)	T304	T316	T316L
1 x 1 x 1/8	25.40 x 25.40 x 3.175	.8500	1.266	*	*	
1 1/4 x 1 1/4 x 1/8	31.75 x 31.75 x 3.175	1.030	1.532	*	*	
1 1/2 x 1 1/2 x 1/8	38.10 x 38.10 x 3.175	1.300	1.936	*	*	
1 1/4 x 1 1/4 x 3/16	31.75 x 31.75 x 4.763	1.490	2.218		*	
1 1/2 x 1 1/2 x 3/16	38.10 x 38.10 x 4.763	1.890	2.812	*	*	
1 x 2 x 3/16	50.80 x 50.80 x 4.763	2.560	3.806	*	*	*
1 1/2 x 1 1/2 x 1/4	38.10 x 38.10 x 6.350	2.500	3.707	*	*	
2 x 2 x 1/4	50.80 x 50.80 x 6.350	3.350	4.987	*	*	*
2 1/2 x 2 1/2 x 1/4	63.50 x 63.50 x 6.350	4.300	6.398	*	*	
3 x 3 x 1/4	76.20 x 76.20 x 6.350	5.050	7.513	*	*	
2 1/2 x 2 1/2 x 3/8	63.50 x 63.50 x 9.525	6.080	9.055		*	
3 x 3 x 3/8	76.20 x 76.20 x 9.525	7.344	10.925	*	*	

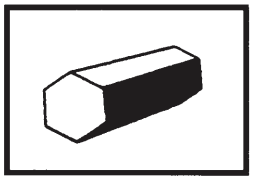
***Standard Production Sizes**
Larger sizes now available

HOT ROLLED, ANNEALED AND PICKLED
12 FOOT RANDOM LENGTHS

SPECIFICATION ASTM A-276 **MILL TEST CERTIFICATES AVAILABLE**

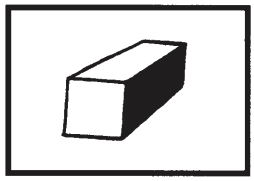
HEXAGON

Size (inches)	Size (mm)	Weight (lbs/ft)	Weight (kgs/m)	T316
3/8	9.525	.420	.627	*
7/16	11.11	.572	.853	*
1/2	12.70	.747	1.112	*
9/16	14.29	.946	1.408	*
5/8	15.88	1.170	1.742	*
11/16	17.46	1.312	1.952	*
3/4	19.05	1.680	2.500	*
7/8	22.23	2.280	3.379	*
1	25.40	2.980	4.429	*
1 1/16	26.99	3.324	4.954	*
1 1/8	28.58	3.790	5.643	*
1 1/4	31.75	4.760	7.087	*
1 5/16	33.34	5.072	7.546	*
1 3/8	34.93	5.650	8.399	*
1 1/2	38.10	6.720	10.006	*
1 3/4	34.45	9.160	13.615	*
2	50.80	11.960	17.782	*
2 1/4	57.15	14.910	22.178	*
2 1/2	63.50	18.680	27.788	*



SQUARES

Size (inches)	Size (mm)	Weight (lbs/ft)	Weight (kgs/m)	T316
1/8	3.175	.053	.079	*
3/16	4.763	.120	.177	*
1/4	6.350	.214	.318	*
3/8	9.525	.481	.715	*
1/2	12.70	.863	1.283	*
5/8	15.88	1.350	2.008	*
3/4	19.05	1.940	2.887	*
1	25.40	3.450	5.118	*
1 1/4	31.75	5.390	8.038	*
1 1/2	38.10	7.760	11.549	*
1 3/4	44.45	9.110	13.550	*
2	50.80	13.800	20.538	*



***Standard Production Sizes**

Stainless Steel Sheet

APPROXIMATE WEIGHTS

Sheet Size	8 GA .1719" 7.01 lb.	9 GA .1563" 6.37 lb.	10 GA .1406" 5.72 lb.	11 GA .1250" 5.10 lb.	12 GA .1094" 4.46 lb.	13 GA .0938" 3.83 lb.	14 GA .0781" 3.18 lb.	15 GA .0703" 2.87 lb.	16 GA .0625" 2.55 lb.	17 GA .0563" 2.29 lb.	18 GA .0500" 2.03 lb.
30 x 96	140.2	127.4	114.4	102.0	89.2	76.6	63.6	57.4	51.0	45.8	40.6
30 x 120	175.2	159.2	143.0	127.5	111.5	95.7	79.5	71.7	63.8	57.2	50.8
30 x 144	210.3	191.1	171.6	153.0	133.8	114.9	95.4	86.1	76.5	68.7	60.9
36 x 96	168.2	152.8	137.3	122.4	107.0	91.9	76.3	68.8	61.2	54.9	48.7
36 x 120	210.3	191.1	171.6	153.0	133.8	114.9	95.4	86.1	76.5	68.7	60.9
36 x 144	252.3	229.3	205.9	183.6	160.6	137.8	114.5	103.3	91.8	82.4	73.1
42 x 96	196.2	178.3	160.2	142.8	124.9	107.2	89.0	80.3	71.4	64.1	56.8
42 x 120	245.3	222.9	200.2	178.5	156.1	134.0	111.3	100.4	89.3	80.1	71.1
42 x 144	294.4	267.5	240.2	214.2	187.3	160.8	133.6	120.5	107.1	96.1	85.3
48 x 96	224.3	203.8	183.0	163.2	142.7	122.5	101.8	91.8	81.6	73.2	65.0
48 x 120	280.4	254.8	228.8	204.0	178.4	153.2	127.2	114.8	102.0	91.6	81.2
48 x 144	336.4	305.7	274.6	244.8	214.1	183.8	152.6	137.7	122.4	109.9	97.4
60 x 96	280.4	254.8	228.8	204.0	178.4	153.2	127.2	114.8	102.0	91.6	81.2
60 x 120	350.5	318.5	286.0	255.0	223.0	191.5	159.0	143.5	127.5	114.5	101.5
60 x 144	420.6	382.2	343.2	306.0	267.6	229.8	190.8	172.2	153.0	137.4	121.8
72 x 96	336.4	305.7	274.5	244.8	214.0	183.8	152.6	137.7	122.4	109.9	97.4
72 x 120	420.6	382.2	343.2	306.0	267.6	229.8	190.8	172.2	153.0	137.4	121.8
72 x 144	504.7	458.6	411.8	367.2	321.1	275.7	228.9	206.6	183.6	164.8	146.1

Sheet Size	19 GA .0438" 1.78 lb.	20 GA .0375" 1.52 lb.	21 GA .0344" 1.40 lb.	22 GA .0313" 1.27 lb.	23 GA .0281" 1.15 lb.	24 GA .0250" 1.02 lb.	25 GA .0219" .89 lb.	26 GA .0188" .76 lb.	28 GA .0156" .63 lb.	30 GA .0125" .51 lb.
30 x 96	35.6	30.4	28.0	25.4	23.0	20.4	17.8	15.2	12.6	10.2
30 x 120	44.5	38.0	35.0	31.8	28.7	25.5	22.2	19.0	15.7	12.7
30 x 144	53.4	45.6	42.0	38.1	34.5	30.6	26.7	22.8	18.9	15.3
36 x 96	42.7	36.5	33.6	30.5	27.6	24.5	21.3	18.2	15.1	12.2
36 x 120	53.4	45.6	42.0	38.1	34.5	30.6	26.7	22.8	18.9	15.3
36 x 144	64.0	54.7	50.4	45.7	41.4	36.7	32.0	27.4	22.6	18.3
42 x 96	49.8	42.6	39.2	35.6	32.2	28.6	24.9	21.3	17.6	14.2
42 x 120	62.3	53.2	49.0	44.5	40.2	35.7	31.1	26.6	22.0	17.8
42 x 144	74.7	63.8	58.8	53.3	48.3	42.8	37.3	31.9	26.4	21.4
48 x 96	56.9	48.6	44.8	40.6	36.8	32.6	28.4	24.3	20.1	16.3
48 x 120	71.2	60.8	56.0	50.8	46.0	40.8	35.6	30.4	25.2	20.4
48 x 144	85.4	73.0	67.2	61.0	55.2	49.0	42.7	36.5	30.2	24.4
60 x 96	71.2	60.8	56.0	50.8	46.0	40.8	35.6	30.4	25.2	20.4
60 x 120	89.0	76.0	70.0	63.5	57.5	51.0	44.5	38.0	31.5	25.5
60 x 144	106.8	91.2	84.0	76.2	69.0	61.2	53.4	45.6	37.8	30.6

ALSO AVAILABLE IN HIGH NICKEL ALLOYS.

DIMENSIONAL AND WEIGHTS DATA

Decimal Thickness Inches	Fraction of an Inch	Weight (Pounds per Square Foot)	mm	kgs/m2	Decimal Thickness Inches	Fraction of an Inch	Weight (Pounds per Square Foot)	mm	kgs/m2
.1875	3/16	8.579	4.76	41.9	.8125	13/16	34.627	20.64	169.1
.203125	13/64	9.294	5.16	45.4	.84375	27/32	35.959	21.43	175.6
.21875	7/32	10.009	5.56	48.8	.875	7/8	37.291	22.23	182.0
.234375	15/64	10.724	5.95	52.3	.90625	29/32	38.623	23.02	188.6
.2500	1/4	11.162	6.35	54.6	.9375	15/16	39.992	23.81	195.3
.265625	17/64	11.684	6.75	57.0	.96875	31/32	41.325	24.61	201.8
.28125	9/32	12.371	7.14	60.4	1.000	1	42.665	25.40	208.2
.3125	5/16	13.746	7.94	67.2	1.0625	1 1/16	45.324	26.99	221.4
.34375	11/32	15.121	8.73	73.9	1.1250	1 1/8	47.990	28.58	234.2
.375	3/8	16.496	9.53	80.5	1.1875	1 3/16	50.565	30.16	247.0
.40625	13/32	17.601	10.32	86.0	1.2500	1 1/4	53.226	31.75	259.7
.4375	7/16	18.955	11.11	92.6	1.3125	1 5/16	55.887	33.34	272.9
.46875	15/32	20.309	11.91	99.2	1.3750	1 3/8	58.549	34.93	285.9
.5000	1/2	21.663	12.70	105.7	1.4375	1 7/16	61.210	36.51	298.9
.53125	17/32	22.806	13.49	111.4	1.5000	1 1/2	63.871	38.10	311.7
.5625	9/16	24.148	14.29	117.9	1.5625	1 9/16	66.532	39.69	324.9
.59375	19/32	25.490	15.08	124.5	1.6250	1 5/8	69.194	41.28	337.9
.625	5/8	26.831	15.88	130.9	1.6875	1 11/16	71.855	42.86	350.9
.65625	21/32	28.173	16.67	137.6	1.7500	1 3/4	74.516	44.45	363.9
.6875	11/16	29.446	17.46	143.8	1.8125	1 13/16	77.177	46.04	376.9
.71875	23/32	30.785	18.26	150.4	1.8750	1 7/8	79.838	47.63	389.9
.75	3/4	32.123	19.05	156.8	1.9375	1 15/16	82.500	49.21	402.9
.78125	25/32	33.462	19.84	163.4	2.0000	2	85.161	50.80	415.6

ALSO AVAILABLE IN HIGH NICKEL ALLOYS & ALUMINIUM.

A.S.T.M. Product Cross Index

Metal	Type	Pipe	Tubing	Welding Fittings[1]	Flanges	Welding Rod
Stainless Austenitic Steel	Type 304 18 Cr-8 Ni	A312-TP304 A358-304 A376-TP304	A213-TP304 A249-TP304 A269-TP304 A271-TP304	A403-WP304	A182-F304	A298-E308-15
		312-TP304H 376-TP304H	A213-TP304H A249-TP304H A271-TP304H	A403-WP304H	A182-F304H	A298-E308-15
		A312-TP304L	A213-TP304L A249-TP304L A269-TP304L	A403-WP304L	A182-F304L	A298-E308ELC-15
	Type 309 25 Cr-12 Ni	A312-TP309 A358-309	A249-TP309	A403-WP309	A314-309	A298-E309-15
	Type 310 25 Cr-20 Ni	A312-TP310 A358-310	A213-TP310 A249-TP310	A403-WP310	A182-F310	A298-E310-15
	Type 316 16 Cr-13 Ni with 2½ Mo	A312-TP316 A358-316 A376-TP316	A213-TP316 A249-TP316 A269-TP316	A403-WP316	A182-F316	A298-E316-15
		A312-TP316H A376-TP316H	A213-TP316H A249-TP316H	A403-WP316H	A182-F316H	A298-E316-15
		A312-TP316L	A213-TP316L A249-TP316L A269-TP316L	A403-WP316L	A182-F316L	A298-E316ELC-15
	Type 317 16 Cr-13 Ni with 3½ Mo	A312-TP317	A249-TP317 A269-TP317	A403-WP317	A314-317	A298-E317-15
	Type 321 18 Cr-8 Ni with Ti	A312-TP321 A358-321 A376-TP321	A213-TP321 A249-TP321 A269-TP321 A271-TP321	A403-WP321	A182-F321	A298-E347-15
		A312-TP321H A376-TP321H	A213-TP321H A249-TP321H A271-TP321H	A403-WP321H	A182-F321H	A298-E347-15
	Type 347 18 Cr-8 Ni with Ta-Cb	A312-TP347 A358-347 A376-TP347	A213-TP347 A249-TP347 A269-TP347 A271-TP347	A403-WP347	A182-F347	A298-E347-15
		A312-TP347H A376-TP347H	A213-TP347H A249-TP347H A271-TP347H	A403-WP347H	A182-F347H	A298-E347-15
	Type 348 18 Cr-8 Ni with Cb	A312-TP348 A358-348 A376-TP348	A213-TP348 A249-TP348 A269-TP348 A271-TP348	A403-WP348	A182-F348	A298-E347-15
		A312-TP348H	A213-TP348H A249-TP348H A271-TP348H	A403-WP348H	A182-F348H	A298-E347-15
Nickel and Nickel Base Alloys	Nickel–200	B161	B161	B366-WPN	(2)	↑ B304-56T Bare Welding Wire B295-54T Covered Welding Electrodes ↓
	Nickel–201 (low carbon)	B161	B161	B366-WPNL	(2)	
	Monel–400 Ni-Cu	B165	B165	B366-WPNC	(2)	
	Inconel–600 Ni-Cr-Fe	B167	B167	B366-WPNCI	(2)	
	Alloy B–(Hastelloy) Ni-Mo	(2)	(2)	B366-WPHB	(2)	
	Alloy C–(Hastelloy) Ni-Mo-Cr	(2)	(2)	B366-WPHC	(2)	
Titanium	99.3% Ti	B337-1	B338-1	B363-WPT1	(2)	B382-61T
	99.2% Ti	B337-2	B338-2	B363-WPT2		B382-61T
	99.0% Ti	B337-3	B338-3	B363-WPT3		B382-61T
	98.0% Ti	B337-4	B338-4			

1. When fittings are of welded construction, the fitting manufacturer shall supplement the grade symbol marking with the letter "W".

2. No ASTM specification has been written. However, materials having chemical and physical properties comparable to the other materials listed may be used.

Corrosion Resistance Data

The following table lists commonly-known corrosive media and tabulates the theoretical corrosion resistance of Stainless Steels 20Cb-3, 304, 304L, 309, 310, 316, 316L, 321, 347, and 348; Nickel 200, Monel 400, Inconel 600, Incoloy Alloy 825, Hastelloy Alloy B and C under various temperature conditions. The symbols A, B, C, D, and E represent approximate corrosion ranges as defined in the accompanying table.

See footnotes for circumstances applicable under certain conditions.

This data, which has been reviewed and brought up to the date of publication of this bulletin by the producers of alloys used in Stainless Welding Fittings, is intended for general guidance only. Selection of a particular alloy for specific corrosion service should be based on actual tests and technical advice which is available from the basic metal producers.

SYMBOL				
A	B	C	D	E
DEFINITION				
Fully Resistant	Satisfactorily Resistant	Fairly Resistant	Slightly Resistant	Not Resistant
Less than .00035 inches penetration per month	.00035 to .0035 inches penetration per month	.0035 to .010 inches penetration per month	.010 to .035 inches penetration per month	Over .035 inches penetration per month

Substance and its Condition	Temp. °F	304 304L 347 348	316 316L 309 (1) 310 (1)	321	20Cb-3	Nickel 200	Monel 400	Inconel 600	Incoloy Alloy 825 (2)	Hastelloy Alloy B	Hastelloy Alloy C
A. S. T. M.		A-312	A-312	A-312	...	B-161	B-165	B-167	...	B-338-61T	B-334
A											
Acetic Acid											
5% and 10%	70	A	A	A	A	A	A	A	..	A	A
20%	70	A	A	A	A	A	A	A	..	A	A
50%	70	A	A	A	A	B	A	A	..	A	A
50%	Boiling	C	B	B	A	B	A	B	..	A	A
80%	70	A	A	A	A	B	A	A	..	A	A
80%	Boiling	D	B	C	B	B	A	B	..	A	A
100%	70	A	A	A	A	A	A	A	..	A	A
100%	Boiling	C	B	D	B	C	B	B	..	A	A
Acetic Anhydride	70	A	A	A	A	A	A	A	..	A	A
	Boiling	A	A	B	B	A	A	A	..	A	A
Acetic Vapors											
30%	Hot	C	B	C	B	..	..	..	..	..	..
100%	Hot	E	C	E	B	C	B	B	..	..	A
Acetone	70	A	A	A	A	A	A	A	..	A	A
	Boiling	A	A	A	A	A	A	A	..	A	A
Alcohol											
Ethyl 100%	70	A	A	A	A	A	A	A	A	..	..
	Boiling	A	A	..	A	A	A	A	..	A	A
Methyl	70	A	A	..	A	A	A	A	A	A	A
	150	†C	B	..	A	A	A	A	..	..	..
Alum. (Chrome 5%)	70	A	A	..	..	C	C	A	..	..	..
Aluminum Acetate											
Saturated		A	A	A	..	..	..	..	..	..	..
Aluminum Chloride	70	D	C	D	†A	B	B	C	..	A	..
Aluminum Chloride,											
Cold 100%	85	..	..	..	..	C	E	E	†E	A	..
Aluminum Fluoride	70	D	C	D	..	A	A	B	..	..	..
Aluminum Hydroxide											
Saturated		A	A	A	..	A	A	A	..	..	..
Aluminum	Molten	E	E	E	..	E	E	E	E	..	..
Aluminum Potassium Sulphate											
2% (alum.)	70	A	A	..	A	A	A	A	..	..	..
10%	70	A	A	A	A	A	A	A	..	..	B
10%	Boiling	B	A	B	A	B	A	B	..	..	..
Saturated	Boiling	C	B	C	B	C	B	B	..	..	..
Aluminum Sulfate											
10%	70	A	A	†B	A	A	A	A	..	..	A
10%	Boiling	B	A	B	A	B	A	B	..	..	B
Saturated	70	A	A	†B	A	A	A	A	..	..	..
Saturated	Boiling	B	A	C	B	B	A	B	..	..	..
Ammonia											
All Concentrations	70	A	A	A	A	A	A	A	..	B	B
Gas	Hot	D	..	..	..	A	A	A	A	..	..

..No data available.

(1) Corrosion resistance data on Stainless Steels 309 and 310 is not currently available in published form. Suppliers of these alloys report that corrosion data shown for type 316 is approximately representative of types 309 and 310.

(2) Formerly known as Ni-o-nel 825. Corrosion resistance data on Incoloy 800 is not currently available from supplier in published form. Contact Huntington Alloys Division, International Nickel Company on specific media.

†Pitting may sometimes occur under certain conditions, such as at the air line or when allowed to dry or when solutions are stagnant.

*May attack when sulphuric acid is present.

§May attack when hydrochloric acid is present.

‡Alkaline solutions.

**Applies to low carbon nickel.

Hastelloy is a registered trademark of Union Carbide Corporation.
20Cb-3 is a registered trademark of the Carpenter Steel Co.
Inconel, Incoloy and Monel are registered trademarks of the International Nickel Co.

Corrosion Resistance Data (cont'd)

Substance and its Condition	Temp. °F	304 304L 347 348	316 316L 309 (1) 310 (1)	321	20Cb-3	Nickel 200	Monel 400	Inconel 600	Incoloy Alloy 825 (2)	Hastelloy Alloy B	Hastelloy Alloy C
A. S. T. M.		A-312	A-312	A-312	...	B-161	B-165	B-167	...	B-338-61T	B-334
Ammonia Liquor	70	A	A	A	..	C	C	A	..	..	..
	Boiling	A	A	A	..	C	C	A	..	..	..
Ammonium											
0-95%	85	..	..	..	..	E	E	A	A	..	..
100%	600	..	..	..	..	A	A	A	A	..	..
Ammonium Bicarbonate	70	A	A	A	..	A	A	A	..	..	..
	Hot	A	A	A	..	A	A	A	..	..	..
0-100%	212	..	..	A	..	E	E	E	C	..	..
Ammonium Carbonate											
1 and 5%	70	A	A	A	A	A	A	A	..	..	..
Ammonium Chloride											
1% Solution	70	A	A	..	†A	A	A	A	..	..	..
10%	Boiling	†A	†A	†B	†B	A	A	B	..	A	A
28%	Boiling	†B	†A	†B	†B	A	A	B	..	A	A
50%	Boiling	†B	†A	†C	†B	A	A	B	..	A	A
Ammonium Nitrate											
0-100% Agitated or Aerated	70	A	A	..	A	C	C	A	..	..	..
Saturated	Boiling	A	A	A	A	E	E	B	B	..	..
Ammonium Oxalate											
5%	70	A	A	A	..	A	A	A	..	..	..
Ammonium Persulphate											
5%	70	A	A	A	..	E	E	A	..	..	..
Ammonium Phosphate											
5%	70	A	A	..	A	A	A	A	A	..	A
	212	..	..	..	..	C	C	C	C	..	..
Ammonium Sulphate											
1% and 5% Agitated	70	A	A	..	B	A	A	A	A	..	B
1% and 5% Aerated	70	A	A	..	B	A	A	A	..	..	B
10%	Boiling	†B	†A	†B	B	B	A	B	..	..	B
Saturated	Boiling	†B	†A	..	..	B	A	B	..	..	..
Ammonium Sulphite	Cold	A	A	A	..	C	B	B	..	..	..
	Boiling	A	A	B	..	E	C	C	..	..	..
Aniline											
3%	70	A	A	A	A	A	A	A	..	..	B
Conc. Crude	70	A	A	A	A	A	A	A	..	..	B
100%	85	..	..	..	..	C	C	C	C	..	B
Aniline Hypochloride	70	E	D	E	..	B	B	C	..	..	..
Antimony Trichloride	70	E	D	E	..	A	A	A	..	..	..
B											
Barium Carbonate	70	A	A	A	A	A	A	A	..	B	B
Barium Chloride											
5%	70	A	A	†B	A	A	A	A	..	B	B
0-40%	212	..	..	..	A	C	C	C	C	B	B
Saturated	70	A	B	†B	..	A	A	A	..	A	A
Aqueous Solution	Hot	†B	†A	..	..	A	A	B	..	..	..
Barium Nitrate											
Aqueous Solution	Hot	A	A	A	A	C	C	B	..	B	B
Barium Sulphate											
Barytes-BlancFixe	70	A	A	A	A	A	A	A	..	..	..
Benzene	70	A	A	A	A	A	A	A	..	B	B
0-75%	212	..	..	A	A	A	A	A	A	..	..
100%	212	..	..	..	A	A	A	A	A	B	B
Benzoic, Acid	70	A	A	A	A	A	A	A	A	..	..
Benzol	Hot	A	A	A	..	A	A	A	A	B	A
Boracic Acid											
5%	Hot or Cold	A	A	A	A	A	A	A	A	A	A
0-20% (Air Free)	212	..	..	..	A	C	C	C	A	A	A
Borax—5%	Hot	A	A	A	..	A	A	A	..	..	..
Bromide—Dry	70	..	..	..	A	A	A	A	..	..	..
Bromine Water	70	E	D	..	E	D	D	D	..	..	..
Butyric Acid											
5%	70	A	A	A	B	A	A	A	..	..	..
5%	150	A	A	A	B	A	A	A	..	..	..
Aqueous Solution—Sp. gr. 0.964	Boiling	A	A	..	..	..	..	A	..	..	..

..No data available.

(1) Corrosion resistance data on Stainless Steels 309 and 310 is not currently available in published form. Suppliers of these alloys report that corrosion data shown for type 316 is approximately representative of types 309 and 310.

(2) Formerly known as Ni-o-nel 825. Corrosion resistance data on Incoloy 800 is not currently available from supplier in published form. Contact Huntington Alloys Division, International Nickel Company on specific media.

†Pitting may sometimes occur under certain conditions, such as at the air line or when allowed to dry or when solutions are stagnant.

*May attack when sulphuric acid is present.

§May attack when hydrochloric acid is present.

‡Alkaline solutions.

**Applies to low carbon nickel.

Hastelloy is a registered trademark of Union Carbide Corporation.
20Cb-3 is a registered trademark of the Carpenter Steel Co.
Inconel, Incoloy and Monel are registered trademarks of the International Nickel Co.

Corrosion Resistance Data (cont'd)

Substance and its Condition	Temp. °F	304 304L 347 348	316 316L 309 (1) 310 (1)	321	20Cb-3	Nickel 200	Monel 400	Inconel 600	Incoloy Alloy 825 (2)	Hastelloy Alloy B	Hastelloy Alloy C
A. S. T. M.		A-312	A-312	A-312	...	B-161	B-165	B-167	...	B-338-61T	B-334
C											
Calcium Carbonate	70	A	A	A	B	A	A	A	..	..	..
Calcium Chlorate											
Dilute Solution	70	A	A	A	B	A	A	A	..	..	..
Dilute Solution	Hot	A	A	A	B	A	A	B	..	..	..
Calcium Chloride											
Dilute Solution	70	‡B	†A	**B	A	A	A	A	..	..	..
Conc. Solution	70	‡B	†A	**B	B	A	A	A	..	..	..
Calcium Hydroxide											
10%	Boiling	A	A	A	B	A	A	A	..	B	A
20%	Boiling	A	A	A	..	A	A	A	..	B	A
50%	Boiling	A	A	A	..	A	A	A	..	B	A
Calcium Hypochlorite											
2%	70	†B	†A	D	B	C	C	B	..	..	..
Calcium Sulphate											
Saturated	70	A	A	A	B	A	A	A	..	B	B
Carbolic Acid											
C.P.	Boiling	A	A	A	..	A	A	A	..	..	..
Crude	Boiling	A	A	A	B	A	A	A	..	..	..
C.P.	70	A	A	A	..	A	A	A	..	..	..
Carbon Bisulphide	70	A	A	A	B	..	..	..	..	..	..
	100	..	..	..	B	A	B	A	A	..	..
Carbon Monoxide Gas	1400	A	A	..	A	..	..	..	..	A	A
	1600	A	A	A	A	..	..	..	..	..	..
Carbon Tetrachloride											
Pure (Dry)	70	A	A	A	A	A	A	A	..	A	A
Aqueous—5-10%	70	†C	†A	*C	B	A	A	A	..	A	A
Dry	Boiling	A	..	A	B	..	..	..	..	..	..
Chloracetic Acid	70	D	C	D	..	A	A	A	..	..	..
Chlorbenzol Conc.-Pure	70	A	A	A	..	A	A	A	..	..	..
Chlorine (Dry) 100%	Limit	..	..	..	..	..	..	..	..	..	A
Gas—Dry	70	A	A	A	A	C	C	C	..	..	A
Gas—Moist	70	D	C	E	A	C	C	C	..	..	A
Gas	212	E	D	E	A	A	A	A	..	..	A
Chloroform	70	A	A	A	B	A	A	A	..	B	B
	212	..	..	..	A	A	A	A	C	B	B
Dry	70	A	..	..	A	..	..	..	..	B	B
Chromic Acid											
5%	70	A	A	..	B	A	A	A	..	..	B
10% C.P.	Boiling	C	B	..	E	C	B	C	..	..	B
10% C.P. (Free of SO_3)	70	B	..	A	E	..	..	..	..	..	B
50% Com. (Cont. SO_3)	Boiling	†D	C	E	E	..	..	..	..	..	B
50% C.P. (Free of SO_3)	70	A	..	C	A	..	..	..	..	..	B
	Boiling	C	..	..	E	..	..	..	..	..	..
Chromium Plating Bath	70	A	A	..	..	C	C	A	..	..	A
Citric Acid											
Air free 0-60%	212	..	..	..	A	C	C	C	A	A	A
5% Still	70	A	A	..	A	A	A	A	..	A	A
	150	A	A	..	A	A	A	A	..	A	A
15%	70	A	A	..	A	A	A	A	..	A	A
	Boiling	B	A	..	A	A	A	A	..	A	A
Concentrated	Boiling	C	B	..	A	B	A	B	..	A	A
50%	70	A	..	A	A	..	..	..	..	A	A
	Boiling	D	..	..	A	..	..	..	..	A	A
Copper Acetate											
Saturated Sol.	70	A	A	A	..	C	C	A	..	..	..
Copper Carbonate											
Sat. Sol. in 50% NH_4OH		A	A	A	..	C	C	A	..	..	..
Copper Chloride											
1% Agitated	70	†B	†A	..	..	B	B	A	..	..	..
1% Aerated	70	†B	†A	..	..	B	B	A	..	..	..
10%	Boiling	E	..	E	..	..	..	..	..	..	..
5% Agitated	70	†B	†A	..	..	C	C	C	..	..	..
5% Aerated	70	†E	†D	..	..	D	D	C	..	..	..
Copper Cyanide											
Saturated Sol.	Boiling	A	A	A	B	B	B	B	..	B	A
Copper Nitrate											
1% and 5%	70	A	A	A	A	C	C	A	..	..	B

..No data available.

(1) Corrosion resistance data on Stainless Steels 309 and 310 is not currently available in published form. Suppliers of these alloys report that corrosion data shown for type 316 is approximately representative of types 309 and 310.

(2) Formerly known as Ni-o-nel 825. Corrosion resistance data on Incoloy 800 is not currently available from supplier in published form. Contact Huntington Alloys Division, International Nickel Company on specific media.

†Pitting may sometimes occur under certain conditions, such as at the air line or when allowed to dry or when solutions are stagnant.

*May attack when sulphuric acid is present.

§May attack when hydrochloric acid is present.

‡Alkaline solutions.

**Applies to low carbon nickel.

Hastelloy is a registered trademark of Union Carbide Corporation.
20Cb-3 is a registered trademark of the Carpenter Steel Co.
Inconel, Incoloy and Monel are registered trademarks of the International Nickel Co.

Corrosion Resistance Data (cont'd)

Substance and its Condition	Temp. °F	304 304L 347 348	316 316L 309 (1) 310 (1)	321	20Cb-3	Nickel 200	Monel 400	Inconel 600	Incoloy Alloy 825 (2)	Hastelloy Alloy B	Hastelloy Alloy C
A. S. T. M.		A-312	A-312	A-312	...	B-161	B-165	B-167	...	B-338-61T	B-334
90% Aqueous	Hot	A	A	..	B	E	E	C	..	..	..
Copper Sulphate (Blue Vitrol) Saturated	212	A	A	A	A	..	..	..	..	..	A
Copper Sulphate 5%	70	A	A	..	A	B	B	A	..	..	..
0-30%	212	..	..	..	A	E	E	E	A	..	A
Saturated Sol.	Boiling	A	A	..	B	C	C	C	..	..	A
Creosote (Coal Tar)	Hot	A	A	A	..	A	A	A	..	..	..
Oil	Hot	A	A	A	..	A	A	A	..	..	..
Cyanogen Gas	70	A	A	A	..	A	A	A	..	..	..
D											
Dinitrochlorobenzol Melted and Solidified	70	A	A	A	..	..	..	..	..	..	..
E											
Ether—100%	70	A	A	A	..	A	A	A	..	..	..
Ethyl Chloride	70	A	A	..	..	A	A	A	..	..	..
Ethylene Chloride	85	A	A	A	..	A	A	A	..	..	..
F											
Ferric Chloride 1% Solution, Still	70	§†B	†A	†C	†E	B	C	C	..	..	A
	Boiling	§†D	†D	D	..	E	E	E	..	..	A
5% Solution, Still	70	§†C	†B	C	E	D	D	E	..	..	A
5% Agitated	70	§†C	A	..	E	D	D	C	..	..	A
5% Aerated	70	§†C	†C	..	E	D	D	C	..	..	A
Ferric Hydroxide (Hydrated Iron Oxide)	70	A	A	A	..	A	A	A	..	..	..
Ferric Nitrate 1% and 5%	70	A	A	A	A	D	D	A	..	..	A
Ferric Sulphate 1% and 5%	70	†A	A	..	A	C	C	A	..	..	A
10%	70	†A	..	..	A	..	..	..	..	..	..
	Boiling	A	..	..	A	..	..	..	..	..	..
0-30%	85	..	..	..	..	E	C	E	A	..	A
Ferrous Sulphate Dilute Sol.	70	A	A	†B	B	A	A	A	..	B	B
Fluorine	70	E	E	E	..	A	A	A	..	B	B
Formic Acid 5% Still	70	B	A	B	A	A	A	A	..	A	A
	150	B	A	B	B	A	A	A	..	A	A
Air-free—100%	212	..	..	..	B	C	C	C	C	A	A
Fuel Oil	Hot	A	A	A	..	B	B	A	..	..	..
Containing H_2SO_4		C	B	..	..	B	B	B	..	..	..
G											
Gallic Acid 5% Solution	70	A	A	..	B	A	A	A	..	B	B
5% Solution	150	A	A	..	B	A	A	A	..	B	B
100%	85	..	..	..	B	C	C	C	C	B	B
Saturated	212	A	..	A	B	..	..	..	..	B	B
Glue Acid Free	Hot	A	..	A	..	..	..	..	..	..	..
Acid Sol.	85	†B	A	..	..	A	A	A	A	..	..
Glycerine	70-85	A	A	A	A	A	A	A	A	..	..
H											
Hydrochloric Acid 1:85	70	E	E	C	B	B	B	C	..	C	A
	Boiling	E	..	E	E	..	..	..	..	B	D
Hydrocyanic Acid	70	A	A	A	..	A	A	A	C	..	..
Vapors	70	D	..	..	..	..	..	..	..	..	..
	212	D	..	..	..	..	..	..	..	..	..

..No data available.

(1) Corrosion resistance data on Stainless Steels 309 and 310 is not currently available in published form. Suppliers of these alloys report that corrosion data shown for type 316 is approximately representative of types 309 and 310.

(2) Formerly known as Ni-o-nel 825. Corrosion resistance data on Incoloy 800 is not currently available from supplier in published form. Contact Huntington Alloys Division, International Nickel Company on specific media.

†Pitting may sometimes occur under certain conditions, such as at the air line or when allowed to dry or when solutions are stagnant.

*May attack when sulphuric acid is present.

§May attack when hydrochloric acid is present.

‡Alkaline solutions.

**Applies to low carbon nickel.

Hastelloy is a registered trademark of Union Carbide Corporation.
20Cb-3 is a registered trademark of the Carpenter Steel Co.
Inconel, Incoloy and Monel are registered trademarks of the International Nickel Co.

Corrosion Resistance Data (cont'd)

Substance and its Condition	Temp. °F	304 304L 347 348	316 316L 309 (1) 310 (1)	321	20Cb-3	Nickel 200	Monel 400	Inconel 600	Incoloy Alloy 825 (2)	Hastelloy Alloy B	Hastelloy Alloy C
A. S. T. M.		A-312	A-312	A-312	...	B-161	B-165	B-167	...	B-338-61T	B-334
Hydrogen Peroxide	70	*A	A	A	A	A	A	A	..	..	..
	Boiling	*B	A	A	B	..	..	..	..	..	..
Acid Free	85	..	..	..	A	C	C	C	A	A	A
Hydrogen Sulfide		..	..	..	B	E	A	A	A	..	..
Dry		A	A	A	B	A	A	A	..	..	..
Wet		*B	*A	A	B	A	A	A	..	..	..
Hydrosulphite Soda (Hypo)		A	†A	†A	..	A	A	A	..	..	..
I											
Iodine		E	D	D	B	D	D	D	C	..	B
Iodoform		A	A	A	..	..	..	..	..	..	..
L											
Lactic Acid											
5%	70	A	A	A	B	A	A	A	..	B	B
5%	150	B	A	B	B	A	A	A	..	B	B
10%	Boiling	D	B	D	..	C	C	B	..	B	B
10%	150	C	B	C	B	B	B	B	..	B	B
Lead	Molten	B	B	C	..	D	D	B	..	..	..
Linseed Oil	70-85	A	A	A	..	A	A	A	..	..	..
M											
Magnesium Chloride											
1% and 5%, Still	70	†A	A	†B	A	A	A	A	A	A	A
	Hot	†C	†B	†C	A	A	A	A	..	A	A
Magnesium Sulphate	Hot or Cold	A	A	†B	A	A	A	A	..	A	A
0-60%	212	..	..	..	A	C	C	C	A	..	..
Malic Acid	Hot or Cold	B	A	B	B	A	A	A	..	..	..
Mayonnaise	70	†A	A	†A	..	B	B	A	..	..	..
Mercuric Chloride											
All Solutions		†E	†D	E	..	D	D	D	E	..	..
Mercury		A	A	A	..	A	A	A	..	..	..
Methanol (Methyl Alcohol)	70	A	A	A	..	A	A	A	A	..	..
Methyl Chloride 100%	85	..	..	A	A	C	C	C	A	..	..
Mixed Acids											
45% HNO_3	Cold	A	A	..	..	D	D	A	A	..	..
50% H_2SO_4 + 50% HNO_3	140	A	B	A	..	..	..	..	..	..	..
	200	B	..	B	..	..	..	..	..	..	..
	250	C	..	C	..	..	..	..	..	..	..
75% H_2SO_4 + 25% HNO_3	140	A	B	A	..	..	..	..	A	..	..
	200	B	..	B	..	..	..	..	..	..	..
	315	D	..	D	..	..	..	..	..	..	..
70% H_2SO_4 + 10% HNO_3 + 20% Water	140	A	..	A	..	..	..	..	A	..	..
	200	B	..	B	..	..	..	..	..	..	..
	335	E	..	E	..	..	..	..	..	..	..
30% H_2SO_4 + 75% HNO_3 + 65% Water	140	A	B	A	..	..	..	..	A	..	..
	200	A	..	A	..	..	..	..	..	..	..
	230	B	..	B	..	..	..	..	..	..	..
15% H_2SO_4 + 5% HNO_3 + 80% Water	140	A	B	A	..	..	..	..	..	..	..
	200	A	..	A	..	..	..	..	..	..	..
	220	A	..	A	..	..	..	..	..	..	..
Mixtures of Acids and Salts											
Fuming Nitric Acid (Sp.gr. 1.52) + 10% Potassium Nitrate	Boiling	B	..	B	..	..	..	..	..	..	..
Fuming Nitric Acid (Sp.gr. 1.52) + 10% Alum. Nitrate	Boiling	B	..	..	..	..	..	..	..	..	..
10% Sulphuric Acid + 10% Copper Sulphate	Boiling	A	..	A	..	..	..	..	..	..	..
10% Sulphuric Acid + 10% Ferrous Sulphate	Boiling	B	..	..	..	..	..	..	..	..	..
Molasses		A	A	A	..	A	A	A	..	..	..
Muriatic Acid	70	E	E	..	..	B	B	C	..	..	..
Mustard	70	†A	†A	†A	..	A	B	B	..	..	..

..No data available.

(1) Corrosion resistance data on Stainless Steels 309 and 310 is not currently available in published form. Suppliers of these alloys report that corrosion data shown for type 316 is approximately representative of types 309 and 310.

(2) Formerly known as Ni-o-nel 825. Corrosion resistance data on Incoloy 800 is not currently available from supplier in published form. Contact Huntington Alloys Division, International Nickel Company on specific media.

†Pitting may sometimes occur under certain conditions, such as at the air line or when allowed to dry or when solutions are stagnant.

*May attack when sulphuric acid is present.

§May attack when hydrochloric acid is present.

‡Alkaline solutions.

**Applies to low carbon nickel.

Hastelloy is a registered trademark of Union Carbide Corporation.
20Cb-3 is a registered trademark of the Carpenter Steel Co.
Inconel, Incoloy and Monel are registered trademarks of the International Nickel Co.

Corrosion Resistance Data (cont'd)

Substance and its Condition	Temp. °F	304 304L 347 348	316 316L 309 (1) 310 (1)	321	20Cb-3	Nickel 200	Monel 400	Inconel 600	Incoloy Alloy 825 (2)	Hastelloy Alloy B	Hastelloy Alloy C
A. S. T. M.		A-312	A-312	A-312	...	B-161	B-165	B-167	...	B-338-61T	B-334
N											
Nickel Chloride Sol.	70	†A	†A	..	..	B	B	B	B	A	A
Nickel Sulfate	Hot or Cold	A	A	..	B	A	A	A	A	..	..
Nitre Cake	Fused	B	A	B	..	..	..	..	..	..	..
Nitric Acid											
5% Sol.	70	A	A	A	A	E	E	B	A	E	A
20% Sol.	70	A	A	..	A	E	E	B	A	E	A
50% Sol.	70	A	A	A	A	E	E	A	A	E	A
	Boiling	A	A	A	B	E	E	C	C	E	A
65% Sol.	Boiling	B	B	..	B	E	E	D	C	E	C
Conc.	70	A	A	A	E	E	E	A	A	E	A
Conc.	Boiling	D	D	B	C	E	E	D	..	..	..
Nitrous Acid—5% Sol.	70	A	A	..	B	D	D	A	..	B	B
O											
Oils, Crude											
Asphalt Base	Cold or Hot	*A	*A	†A	..	A	A	A	A	..	..
Oils, Essential	85	..	..	..	..	A	A	A	A	..	..
Oils, Veg. Mineral	70-85	A	A	A	..	A	A	A	A	..	..
Oleic Acid	70-85	†A	A	..	B	A	A	A	C	..	..
Oxalic Acid											
5%	70	A	A	..	B	A	A	A	..	B	B
10%	70	A	A	A	B	A	A	A	..	B	B
10%	Boiling	D	C	D	B	B	A	B	..	B	B
25%	Boiling	B	..	D	B	..	..	..	..	B	B
50%	Boiling	D	B	D	B	..	..	..	..	B	B
Air-free	85	..	..	..	..	E	C	C	C	..	..
P											
Paraffin	Hot or Cold	A	A	A	..	A	A	A	..	..	..
Petroleum Ether		A	A	A	..	A	A	A	..	..	..
Phenol		A	A	..	B	A	A	A	A	..	..
Phosphoric Acid											
1%	70	§A	§A	A	A	A	A	A	A	A	A
	Boiling	A	..	B	..	..	..	..	A	A	A
5%	70	A	A	..	B	A	A	A	A	A	A
10%, Still	70	C	A	..	B	A	A	A	A	..	..
10% Agitated	70	C	B	..	..	B	B	B	A	..	..
10% Aerated	70	C	B	..	A	C	C	B	A	..	..
10%	Boiling	D	..	D	..	..	..	..	A	A	A
45%	Boiling	D	..	D	..	..	..	..	B	A	A
80%	140	C	..	C	..	..	..	..	A	A	A
	230	E	..	E	..	..	..	..	B	B	C
Picric Acid	70	A	A	A	B	..	..	..	..	..	B
Potassium Bichromate											
0-20%	212	..	..	A	..	C	C	C	C	..	..
	70	A	A	..	..	A	A	A	..	..	..
Potassium Bromide	70	†B	†A	†B	B	A	A	A	..	B	B
0-30% Air-Free	212	..	..	..	B	C	C	C	C	..	..
Potassium Carbonate	212	..	..	..	..	C	C	C	C	B	B
1%	70	A	A	..	B	A	A	A	..	B	B
1%	Hot	A	A	A	B	A	A	A	..	B	B
Potassium Chlorate		A	A	A	B	A	A	A	C	..	..
Potassium Chloride											
1% and 5%	70	†A	†A	†A	†A	A	A	A	†A	..	..
1% and 5%	Boiling	A	A	†A	†A	A	A	A	..	..	..
Potassium Ferricyanide											
5%	70	A	A	A	B	..	..	..	..	B	B
25%	70	A	..	..	B	..	..	..	..	B	B
Potassium Ferrocyanide 5%	70	A	A	..	B	..	..	..	..	B	B
Potassium Hydroxide											
5%	70	A	A	..	B	A	A	A	A	B	..
27%	Boiling	A	A	A	B	A	A	A	..	B	..
50%	Boiling	B	A	B	B	A	A	A	..	B	..
Melting	675	E	..	E	..	..	..	..	..	..	..
Potassium Nitrate											
Air-free	212	..	..	..	..	C	C	C	C	..	B

..No data available.

(1) Corrosion resistance data on Stainless Steels 309 and 310 is not currently available in published form. Suppliers of these alloys report that corrosion data shown for type 316 is approximately representative of types 309 and 310.

(2) Formerly known as Ni-o-nel 825. Corrosion resistance data on Incoloy 800 is not currently available from supplier in published form. Contact Huntington Alloys Division, International Nickel Company on specific media.

†Pitting may sometimes occur under certain conditions, such as at the air line or when allowed to dry or when solutions are stagnant.

*May attack when sulphuric acid is present.

§May attack when hydrochloric acid is present.

‡Alkaline solutions.

**Applies to low carbon nickel.

Hastelloy is a registered trademark of Union Carbide Corporation.
20Cb-3 is a registered trademark of the Carpenter Steel Co.
Inconel, Incoloy and Monel are registered trademarks of the International Nickel Co.

Corrosion Resistance Data (cont'd)

Substance and its Condition	Temp. °F	304 304L 347 348	316 316L 309 (1) 310 (1)	321	20Cb-3	Nickel 200	Monel 400	Inconel 600	Incoloy Alloy 825 (2)	Hastelloy Alloy B	Hastelloy Alloy C
A. S. T. M.		A-312	A-312	A-312	...	B-161	B-165	B-167	...	B-338-61T	B-334
1% and 5%	70	A	A	..	B	A	A	A	..	..	B
1% and 5%	Hot	A	A	..	B	A	A	A	..	..	B
Potassium Nitrate (saltpeter) 50%	70	A	..	A	B	..	..	..	..	..	B
	Boiling	A	..	A	B	..	..	..	..	..	B
Potassium Oxalate		A	A	A	B	A	A	A	..	..	..
Potassium Permanganate 5%	70	A	A	A	B	A	A	A	..	..	B
Potassium Sulphate 1% and 5%	70	A	A	B	B	A	A	A	..	D	B
	Hot	A	A	..	B	A	A	A	..	B	B
10%	85	..	..	..	B	C	C	C	C	B	C
Potassium Sulphide (salt)		A	A	A	..	A	A	A	..	..	..
Q											
Quinine Bisulphate—Dry		B	A	B	..	A	A	A	..	..	..
Quinine Sulphate—Dry		A	A	A	..	A	A	A	..	..	..
R											
Rosin 100%	Molten	A	A	A	B	A	A	A	..	..	..
S											
Sea Water		†A	†A	†B	A	A	A	A	..	..	A
	212	..	..	..	..	A	A	A	A	..	A
Sewage		†A	†A	†A	..	..	A	A	..	..	A
Silver Bromide		†B	†A	†C	..	..	..	..	..	..	..
Silver Chloride		E	E	..	..	..	..	..	..	..	..
Silver Nitrate—0-100%	Boiling	A	A	A	B	A	E	E	..	..	..
Soap	70	A	A	A	..	A	A	A	A	..	..
Sodium Acetate	85	..	..	..	B	C	C	C	A	B	B
Moist		†A	A	†A	..	A	A	A	..	..	..
Sodium Bicarbonate	70	A	A	A	..	A	A	A	..	..	B
5% Still	150	A	A	..	A	A	A	A	..	..	..
Sodium Carbonate 5%	70	A	A	A	A	A	A	A	..	B	B
5%	150	A	A	..	A	A	A	A	..	B	B
5%	Boiling	A	..	..	A	..	..	..	..	B	B
30%	85	..	..	..	..	C	C	C	C	B	..
50%	Boiling	A	..	A	..	..	..	..	..	B	..
Sodium Chloride 5%, Still	70	†A	A	..	B	A	A	A	..	A	A
	150	†A	A	..	B	A	A	A	..	A	A
20%, Aerated	70	†A	A	..	..	A	A	A	..	B	B
Saturated	70	†A	A	†A	..	A	A	A	..	..	..
	Boiling	†B	A	†B	..	A	A	A	..	..	..
Sodium Fluoride 5% Sol.		†B	†A	†B	..	A	A	A	..	..	..
Sodium Hydroxide	70	A	A	..	..	A	A	A	..	..	..
20%	230	A	..	A	B	A	..	A	..	A	A
34%	212	A	..	A	B	A	..	A	..	..	..
Melting	610	B	..	B	..	B	..	C	..	..	..
Sodium Hypochlorite—5% Still		†B	A	†C	..	C	C	C	..	..	..
Sodium Hyposulphite	70	*A	A	†A	..	A	A	A	..	..	..
0-50%	212	..	..	..	..	A	A	A	A	..	..
50-75%	212	..	..	..	..	A	A	A	C	..	..
75-100%	800	..	..	..	..	**B	..	**B	..	..	..
Sodium Nitrate	Fused	C	B	..	..	A	B	A	..	..	..
0-50%	212	..	..	..	A	C	C	A	A	..	..
Sodium Sulphate 5%, Still, All	70	A	A	B	A	A	A	A	..	B	B
0-30%	212	..	..	..	B	C	C	C	C	B	B
Sodium Sulphide Saturated		†B	A	†A	B	A	A	A	..	..	A
Sodium Sulphite 5%	70	A	A	..	A	A	A	A	..	..	B
10%	150	A	A	..	A	A	A	A	..	..	B

..No data available.

(1) Corrosion resistance data on Stainless Steels 309 and 310 is not currently available in published form. Suppliers of these alloys report that corrosion data shown for type 316 is approximately representative of types 309 and 310.

(2) Formerly known as Ni-o-nel 825. Corrosion resistance data on Incoloy 800 is not currently available from supplier in published form. Contact Huntington Alloys Division, International Nickel Company on specific media.

†Pitting may sometimes occur under certain conditions, such as at the air line or when allowed to dry or when solutions are stagnant.

*May attack when sulphuric acid is present.

§May attack when hydrochloric acid is present.

‡Alkaline solutions.

**Applies to low carbon nickel.

Hastelloy is a registered trademark of Union Carbide Corporation.
20Cb-3 is a registered trademark of the Carpenter Steel Co.
Inconel, Incoloy and Monel are registered trademarks of the International Nickel Co.

Corrosion Resistance Data (cont'd)

Substance and its Condition	Temp. °F	304 304L 347 348	316 316L 309 (1) 310 (1)	321	20Cb-3	Nickel 200	Monel 400	Inconel 600	Incoloy Alloy 825 (2)	Hastelloy Alloy B	Hastelloy Alloy C
A. S. T. M.		A-312	A-312	A-312	...	B-161	B-165	B-167	...	B-338-61T	B-334
Stannic Chloride											
Sol.	70	D	C	D	..	A	B	B	..	..	..
Sp. gr. 1.21	Boiling	E	E	E	..	B	B	C	..	..	..
Stannous Chloride											
Saturated		C	A	C	..	A	B	B	..	B	..
Dry—100%	85	..	..	..	..	E	E	E	E	..	..
Stearic Acid		A	A	A	B	A	A	A	A	A	A
Sulphate Black Liquor		..	..	..	B	..	..	A	A	A	A
Green Liquor		..	..	..	B	..	..	C	C	B	B
Sulphur	265	A	..	..	A	..	..	..	..	..	A
Boiling	830	E	..	..	A	..	..	..	..	..	A
Air Free	400	..	..	..	..	C	C	A	A	..	A
Sulphur Chloride		E	D	..	B	A	A	A	..	..	B
Sulphur Dioxide, Dry	Limit	..	..	..	B	..	..	..	..	..	B
Sulphur Dioxide Gas											
Moist	70	B	A	B	..	D	C	C	..	..	A
Dry	575	A	A	A	..	..	..	..	..	..	A
Sulphur—Dry	Molten	A	A	..	A	A	A	A	..	..	A
Wet		†B	†A	..	A	B	B	A	..	..	A
Sulphuric Acid											
5%	70	C	B	B	A	A	A	A	A	A	A
	Boiling	E	C	E	B	D	A	C	A	A	B
10%	70	C	B	C	A	B	A	B	A	A	A
	Boiling	E	D	E	B	C	A	C	B	A	B
50%	70	D	C	C	A	B	A	B	A	A	A
	Boiling	E	D	E	C	E	E	E	D	A	B
Conc.	70	A	A	A	A	B	B	B	A	A	A
	Boiling	D	D	..	..	E	E	E	D	E	D
	300	E	E	E	E	E	E	E	E	..	..
Fuming	70	C	B	..	..	C	B	B	A	E	A
Sulphurous Acid											
Saturated	70	C	B	..	B	E	E	E	..	..	B
60 psi	250	C	B	B	..	E	E	E	..	..	B
70/125 psi	310	C	B	E	..	E	E	E	..	..	B
150 psi	375	C	B	E	..	E	E	E	..	..	B
T											
Tannic Acid											
10%	85	A	A	A	B	C	C	C	C	B	B
	Boiling	A	..	A	B	..	C	C	C	B	B
0-100%	212	..	..	..	B	..	..	..	C	..	..
50%	Boiling	A	..	A	B	..	..	..	..	..	..
Tartaric Acid, Air-free	70	A	A	A	B	A	A	A	..	..	..
	150	B	A	A	B	A	A	A	..	..	..
0-50%	212	..	..	B	B	C	C	C	A	B	B
Tin	Molten	C	C	E	..	E	E	E	E	..	..
Trichloracetic Acid	70	E	E	E	..	B	C	B	E	..	..
V											
Varnish	85	A	A	A	..	A	A	A	A	..	..
	Hot	A	A	..	..	A	A	A	..	..	..
Vinegar—Still, Agitated or Aerated	70-85	A	A	A	..	A	A	A	A	..	..
Z											
Zinc	Molten	E	E	E	..	E	E	E	..	..	..
Zinc Chloride											
5% Still	70	†A	†A	..	A	A	A	A	..	B	..
	Boiling	†B	†B	..	B	B	B	B	..	B	..
Zinc Chloride Sol.											
Sp. gr. 2.05	100	†A	..	†C	..	..	..	..	..	..	..
1.09	Boiling	†A	..	D	..	..	..	..	..	..	..
Zinc Nitrate Sol.	Hot	A	..	A	..	..	..	..	..	..	..
Zinc Sulphate											
5%	70	A	A	..	A	A	A	A	A	B	B
Saturated	70	A	A	B	..	A	A	A	A	..	..
25%	Boiling	A	A	B	B	A	A	A	A	B	B

..No data available.

(1) Corrosion resistance data on Stainless Steels 309 and 310 is not currently available in published form. Suppliers of these alloys report that corrosion data shown for type 316 is approximately representative of types 309 and 310.

(2) Formerly known as Ni-o-nel 825. Corrosion resistance data on Incoloy 800 is not currently available from supplier in published form. Contact Huntington Alloys Division, International Nickel Company on specific media.

†Pitting may sometimes occur under certain conditions, such as at the air line or when allowed to dry or when solutions are stagnant.

*May attack when sulphuric acid is present.

§May attack when hydrochloric acid is present.

‡Alkaline solutions.

**Applies to low carbon nickel.

Hastelloy is a registered trademark of Union Carbide Corporation.
20Cb-3 is a registered trademark of the Carpenter Steel Co.
Inconel, Incoloy and Monel are registered trademarks of the International Nickel Co.