

Pressure ratings for pipes, tubes and fittings

Wall thickness calculations for straight pipe under internal pressure

The following equations and tables are based on those provided in the Process Piping Specification, ASME 31.3a-1996, ASME Code for Pressure Piping (see Notes for references to source paragraphs and tables in this specification).

Firstly, anyone of the following four equations may be used to calculate the 'pressure design wall thickness' (t) of a straight pipe subject to internal pressure.

The equations assume $t < D/6$ (for pipe with $t \geq D/6$ or $P/SE > 0.385$ additional factors need to be considered).

The four alternative equations are:

$$t = \frac{PD}{2(SE + PY)}$$

$$t = \frac{PD}{2SE}$$

$$t = \frac{D}{2} \left(1 - \sqrt{\frac{SE - P}{SE + P}} \right)$$

$$t = \frac{P(d + 2c)}{2[SE - P(1 - Y)]}$$

Where:

- t = Pressure design thickness
- d = Inside diameter of pipe. For pressure design calculation, the inside diameter of the pipe is the maximum value allowable under the purchase specification
- P = Internal design pressure
- D = Outside diameter pipe as listed in tables of standards or specifications or as measured
- E = Quality factor. See the table "Basic quality factors 'E' for longitudinal weld joints in stainless steel pipes, tubes and fittings" on page 53
- S = Stress value for material from the table "Basic allowable stresses 'S' in tension for stainless steels" on page 54
- Y = Coefficient from table "Values of coefficient 'Y' for $t < O/S$ " on page 53

Secondly, the minimum required wall thickness t_m of straight sections of pipe is determined in accordance with the following equation.

$$t_m = t + c$$

where:

- t_m = Minimum required thickness, including mechanical, corrosion- and erosion allowances
- c = The sum of the mechanical allowances (thread or groove depth) plus corrosion and erosion allowances. For threaded components, the nominal thread depth (dimension h of ASME B1.20.1, or equivalent) shall apply. For machined surfaces or grooves where the tolerance is not specified, the tolerance shall be assumed to be 0.5 mm (0.02 in) in addition to the specified depth of the cut.

The actual minimum thickness for the pipe selected, considering manufacturer's tolerance, shall not be less than t_m

Units of Measure for Calculations

It is important to use compatible units for pressure calculations. ASTM and ASME/ANSI specifications are based upon imperial sizes.

Pipe bends

The equations above may also be used for pipe bends provided the requirement for minimum wall thickness (t_m) is met.

Worked Example:

Taking the simplest equation: $t = \frac{PD}{2SE}$

A. If you wish to calculate what wall thickness should be used in a design for the following situation:

P = Internal Design Pressure – For this example lets say 2000 pounds per square inch = 2ksi

D = Outside Diameter – For this example lets say 4 inch nominal bore = 4.5 inches

S = Stress Value for material from table below taking into account operating temperature – For

this example lets take ASTM A312 TP 316L operating at 500OC for which $S = 14.4$ ksi (1ksi = 1,000 psi / psi = Pounds Pressure per Square Inch)

E = Quality Factor from table below according to manufacturing-specification – For this example we are using ASTM A312 TP 316L Seamless for which $E = 1.0$

So this gives: $t = \frac{2 \times 4.5}{2 \times 14.4 \times 1.0} = 0.313$ inches

Thus we would use 4 inch Nominal Bore Schedule 80S which has a wall thickness of 0.337 inches. If the wall thickness calculation leads to a heavier wall than is available then the pipe diameter must be increased. Depending upon the design of the system this may also reduce the pressure.

Stainless steel pressure ratings

Values of coefficient 'Y' for t<D/S

Materials	Temperature, °F (°C)					
	<900 (≤482)	950 (510)	1000 (538)	1050 (566)	1100 (593)	1150
Ferritic steels	0.4	0.5	0.7	0.7	0.7	0.7
Austenitic Steels	0.4	0.4	0.4	0.4	0.5	0.7
Cast Iron	0.0	-	-	-	-	-

Note:

- The above table and the equations are based on paragraph 304.1 of ASME B31.3a-1996
- The value for Y may be interpolated for intermediate temperatures. For $t > D/6$:

$$Y = \frac{d + 2c}{D + d + 2c}$$

Basic quality factors 'E' for longitudinal weld joints in stainless steel pipes, tubes and fittings

Specification No.	Class (or Type)	Description	E	Notes
A 182	-	Forgings and Fittings	1.00	-
	-	Seamless Tube	1.00	-
A268	-	Electric Fusion Welded Tube, Double Butt Seam	0.85	-
	-	Electric Fusion Welded Tube, Single Butt Seam	0.80	-
A269	-	Seamless Tube	1.00	-
	-	Electric Fusion Welded Tube, Double Butt Seam	0.85	-
	-	Electric Fusion Welded Tube, Single Butt Seam	0.80	-
A312	-	Seamless Pipe	1.00	-
	-	Electric Fusion Welded Pipe, Double Butt Seam	0.85	-
A358	-	Electric Fusion Welded Pipe, Single Butt Seam	0.80	-
	1, 3, 4	Electric Fusion Welded Pipe, 100% radiographed	1.00	-
	5	Electric Fusion Welded Pipe, Spot radiographed	0.90	-
A376	2	Electric Fusion Welded Pipe, Double Butt Seam	0.85	-
	-	Seamless Pipe	1.00	-
A403	-	Seamless Fittings	1.00	-
	-	Welded Fitting, 100% radiographed	1.00	1
	-	Welded Fitting, Double Butt Seam	0.85	-
A409	-	Welded Fitting, Single Butt Seam	0.80	-
	-	Electric Fusion Welded Pipe, Double Butt Seam	0.85	-
A430	-	Electric Fusion Welded Pipe, Single Butt Seam	0.80	-
	-	Seamless Pipe	1.00	-
A 789	-	Seamless	1.00	-
	-	Electric Fusion Welded Pipe, 100% radiographed	1.00	-
	-	Electric Fusion Welded Tube, Double Butt Seam	0.85	-
	-	Electric Fusion Welded Tube, Single Butt Seam	0.80	-
A 790	-	Seamless	1.00	-
	-	Electric Fusion Welded Pipe, 100% radiographed	1.00	-
	-	Electric Fusion Welded Pipe, Double Butt Seam	0.85	-
	-	Electric Fusion Welded Pipe, Single Butt Seam	0.80	-

Note:

- This table is based on Table A-1B of ASME B31.3a-1996
- 1. An E factor of 1.00 may be applied only if all welds, including welds in the base material, have passed 100% radiographic examination. Substitution of ultrasonic examination for radiography is not permitted for the purpose of obtaining an E of 1.00.

Basic allowable stress 'S' in tension for stainless steels

ASTM Spec No.	Grade	Min Temp °F (for °C see Notes)	Metal Temperature, °F (°C)										Notes
			Min Temp to 100 (37.8)	300 (149)	500 (260)	700 (371)	850 (454)	1000 (538)	1150 (621)	1300 (704)	1400 (760)	1500 (816)	
			Basic Allowable Stress, S ksi										
A 312	TP321	-325	16.7	16.7	16.1	14.6	14.0	13.5	5.0	1.7	0.8	0.3	1, 2
A 376	TP321	-325	16.7	16.7	16.1	14.6	14.0	13.5	5.0	1.7	0.8	0.3	1, 2
A 269	TP304L	-425	16.7	16.7	14.8	13.5	12.8	7.8	4.0	2.1	1.1	0.9	2, 3
A 312	TP304L	-425	16.7	16.7	14.8	13.5	12.8	7.8	4.0	2.1	1.1	0.9	-
A 358	304L	-425	16.7	16.7	14.8	13.5	12.8	7.8	4.0	2.1	1.1	0.9	2
A 269	TP316L	-325	16.7	16.7	14.4	12.9	12.1	11.2	8.8	3.5	1.8	1.0	2, 3
A 312	TP316L	-325	16.7	16.7	14.4	12.9	12.1	11.2	8.8	3.5	1.8	1.0	-
A 358	316L	-325	16.7	16.7	14.4	12.9	12.1	11.2	8.8	3.5	1.8	1.0	2
A 312	TP321	-325	16.7	16.7	16.1	14.6	14.0	13.5	6.9	3.2	1.9	1.1	1, 2, 4
A 376	TP321	-325	16.7	16.7	16.1	14.6	14.0	13.5	6.9	3.2	1.9	1.1	1, 2, 4
A 312	TP321H	-325	16.7	16.7	16.1	14.6	14.0	13.5	6.9	3.2	1.9	1.1	1, 2
A 376	TP321H	-325	16.7	16.7	16.1	14.6	14.0	13.5	6.9	3.2	1.9	1.1	-
A 268	TP409	-20	20.0	-	-	-	-	-	-	-	-	-	6
A 268	TP430Ti	-20	20.0	-	-	-	-	-	-	-	-	-	6, 7
A 376	16-8-2H	-325	20.0	-	-	-	-	-	-	-	-	-	5, 6, 8
A 268	TP405	-20	20.0	17.7	17.2	16.2	10.4	4.0	-	-	-	-	6
A 268	TP410	-20	20.0	17.7	17.2	16.2	10.4	6.4	1.8	-	-	-	6
A 268	TP430	-20	20.0	19.6	19.0	17.6	10.4	6.5	2.4	-	-	-	6, 7
A 312	TP317L	-325	20.0	20.0	17.7	16.2	15.2	-	-	-	-	-	-
A 312	TP310	-325	20.0	20.0	20.0	18.3	14.6	11.0	3.6	0.8	0.4	0.2	4, 6, 10
A 358	310S	-325	20.0	20.0	20.0	18.3	14.6	11.0	3.6	0.8	0.4	0.2	2, 4, 5, 6
A 409	TP310	-325	20.0	20.0	20.0	18.3	14.6	11.0	3.6	0.8	0.4	0.2	2, 4, 5, 6, 10
A 312	TP321	-325	20.0	20.0	19.3	17.5	16.7	16.2	5.0	1.7	0.8	0.3	1
A 358	321	-325	20.0	20.0	19.3	17.5	16.7	16.2	5.0	1.7	0.8	0.3	1, 2
A 376	TP321	-325	20.0	20.0	19.3	17.5	16.7	16.2	5.0	1.7	0.8	0.3	1, 2
A 409	TP321	-325	20.0	20.0	19.3	17.5	16.7	16.2	5.0	1.7	0.8	0.3	1, 2
A 312	TP309	-325	20.0	20.0	20.0	18.3	14.6	10.5	5.0	2.3	1.3	0.7	4, 6, 10
A 358	309S	-325	20.0	20.0	20.0	18.3	14.6	10.5	5.0	2.3	1.3	0.7	4, 5, 6, 2
A 409	TP309	-325	20.0	20.0	20.0	18.3	14.6	10.5	5.0	2.3	1.3	0.7	2, 4, 5, 6, 10
A 312	TP347	-425	20.0	20.0	19.9	18.6	18.2	18.0	6.1	2.2	1.2	0.8	-
A 358	347	-425	20.0	20.0	19.9	18.6	18.2	18.0	6.1	2.2	1.2	0.8	1, 2
A 376	TP347	-425	20.0	20.0	19.9	18.6	18.2	18.0	6.1	2.2	1.2	0.8	1, 2
A 409	TP347	-425	20.0	20.0	19.9	18.6	18.2	18.0	6.1	2.2	1.2	0.8	1, 2
A 312	TP348	-325	20.0	20.0	19.9	18.6	18.2	18.0	6.1	2.2	1.2	0.8	-
A 358	348	-325	20.0	20.0	19.9	18.6	18.2	18.0	6.1	2.2	1.2	0.8	1, 2
A 376	TP348	-325	20.0	20.0	19.9	18.6	18.2	18.0	6.1	2.2	1.2	0.8	1, 2
A 409	TP348	-325	20.0	20.0	19.9	18.6	18.2	18.0	6.1	2.2	1.2	0.8	1, 2
A 312	TP310	-325	20.0	20.0	20.0	18.3	14.6	11.0	7.3	3.5	1.6	0.8	4, 6, 10, 11
A 358	310S	-325	20.0	20.0	20.0	18.3	14.6	11.0	7.3	3.5	1.6	0.8	2, 4, 5, 6, 11
A 430	FP321	-325	20.0	20.0	19.3	17.5	16.7	16.2	6.9	3.2	1.9	1.1	1, 2
A 312	TP321	-325	20.0	20.0	19.3	17.5	16.7	16.2	6.9	3.2	1.9	1.1	1, 4
A 358	321	-325	20.0	20.0	19.3	17.5	16.7	16.2	6.9	3.2	1.9	1.1	1, 2, 4
A 376	TP321	-325	20.0	20.0	19.3	17.5	16.7	16.2	6.9	3.2	1.9	1.1	1, 2, 4
A 409	TP321	-325	20.0	20.0	19.3	17.5	16.7	16.2	6.9	3.2	1.9	1.1	1, 2, 4
A 430	FP321H	-325	20.0	20.0	19.3	17.5	16.7	16.2	6.9	3.2	1.9	1.1	1, 2
A 376	TP321H	-325	20.0	20.0	19.3	17.5	16.7	16.2	6.9	3.2	1.9	1.1	1, 2
A 312	TP321H	-325	20.0	20.0	19.3	17.5	16.7	16.2	6.9	3.2	1.9	1.1	-
A 430	FP316	-425	20.0	20.0	17.9	16.3	15.7	15.3	9.8	4.1	2.3	1.3	2, 5, 8,
A 430	FP316H	-325	20.0	20.0	17.9	16.3	15.7	15.3	9.8	4.1	2.3	1.3	2, 5, 8,
A 269	TP316	-425	20.0	20.0	17.9	16.3	15.7	15.3	9.8	4.1	2.3	1.3	2, 3, 4, 5, 8
A 312	TP316	-425	20.0	20.0	17.9	16.3	15.7	15.3	9.8	4.1	2.3	1.3	4, 8
A 358	316	-425	20.0	20.0	17.9	16.3	15.7	15.3	9.8	4.1	2.3	1.3	2, 4, 5, 8

Theoretical working pressure for stainless steel seamless pipe

Pressures in psi

NB mm	NPS inch	5S	10S	40	Pipe schedules				
					40S / STD	80	80S / XS	160	XXS
6	1/8	3241	4537	6296	6296	8796	8796		
8	1/4	3403	4514	6111	6111	8264	8264		
10	3/8	2722	3611	5056	5056	7000	7000		
15	1/2	2902	3705	4866	4866	6563	6563	8393	13125
20	3/4	2322	2964	4036	4036	5500	5500	7821	11000
25	1	1854	3108	3793	3793	5105	5105	7129	10209
32	1.1/4	1468	2462	3163	3163	4315	4315	5648	8630
40	1.1/2	1283	2151	2862	2862	3947	3947	5546	7895
50	2	1026	1721	2432	2432	3442	3442	5432	6884
65	2.1/2	1083	1565	2648	2648	3600	3600	4891	7200
80	3	889	1286	2314	2314	3214	3214	4693	6429
90	3.1/2	778	1125	2119	2119	2981	2981		5963
100	4	692	1000	1975	1975	2808	2808	4425	5617
125	5	735	903	1739	1739	2528	2528	4213	5056
150	6	617	759	1585	1585	2445	2445	4070	4891
200	8	474	644	1400	1400	2174	2174	3939	3804
250	10	467	576	1273	1273	2072	1744	3924	
300	12	459	529	1194	1103	2024	1471	3859	2941
350	14	418	504	1173	1004	2009	1339	3766	
400	16	387	441	1172	879	1978	1172	3736	
450	18	344	392	1171	781	1952	1042	3710	
500	20	353	409	1114	703	1933	938	3692	
600	24	341	391	1075	586	1905	781	3663	

Working pressures for ASTM 304 and 316 pipe to ASTM A312 between - 20°F and 100°F.

The ASME code suggests a safety factor of four based on burst pressure.

e.g. - 1" SCH40 = 3793PSI (15171 ÷ 4)

For higher temperatures multiply working pressure by: (according to ANSI B31.3)

	40°C	150°C	260°C	540°C
ASTM 304	1.000	1.000	0.875	0.715
ASTM 316	1.000	1.000	0.895	0.765
SAF 2304	1.445	1.350	1.260	
SAF 2205	1.500	1.445	1.360	
SAF 2507	1.935	1.655	1.570	

The information presented above are typical or average values and are not a guarantee of maximum or minimum values.

Conversion factors

1 MPa	= 1 N/mm ²
1 MPa	= 145.04 psi
1 psi	= 0.007 MPa
1 Kg f/mm ²	= 9.807 MPa
1 Kg f/mm ²	= 1422.34 psi
1 bar	= 14.5 psi
1 bar	= 0.1 MPa
1 MPa	= 1000 KPa

Welded pipe: use joint factor 0.85

STAINLESS STEEL PIPE DIMENSION AS PER ASTM & WEIGHT-KG. PER MTR. (ANSI B36.19)

Nominal Bore		Outside Diameter	Sch-5S		Sch-10S		Sch-40S		Sch-80S		Sch-160S		Sch-XXS	
mm	INCH	mm	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)
3	1/8	10.3	1.24	0.276	1.24	0.28	1.73	0.37	2.41	0.47	-	-	-	-
6	1/4	13.7	1.24	0.390	1.65	0.49	2.24	0.631	3.02	0.80	-	-	-	-
10	3/8	17.1	1.24	0.490	1.65	0.63	2.31	0.845	3.20	1.10	-	-	-	-
15	1/2	21.3	1.65	0.800	2.11	1.00	2.77	1.27	3.75	1.62	4.75	1.94	7.47	2.55
20	3/4	26.7	1.65	1.03	2.11	1.28	2.87	1.68	3.91	2.20	5.54	2.89	7.82	3.63
25	1	33.4	1.65	1.30	2.77	2.09	3.38	2.50	4.55	3.24	6.35	4.24	9.09	5.45
32	1 1/4	42.2	1.65	1.65	2.77	2.70	3.56	3.38	4.85	4.47	6.35	5.61	9.70	7.77
40	1 1/2	48.3	1.65	1.91	2.77	3.11	3.68	4.05	5.08	5.41	7.14	7.25	10.16	9.54
50	2	60.3	1.65	2.40	2.77	3.93	3.91	5.44	5.54	7.48	8.74	11.1	11.07	13.44
65	2 1/2	73.0	2.11	3.69	3.05	5.26	5.16	8.63	7.01	11.4	9.53	14.9	14.2	20.39
80	3	88.9	2.11	4.51	3.05	6.45	5.49	11.30	7.62	15.2	11.1	21.3	15.24	27.65
100	4	114.3	2.11	5.84	3.05	8.36	6.02	16.07	8.56	22.3	13.49	33.54	17.12	41.03
125	5	141.3	2.77	9.47	3.40	11.57	6.55	21.8	9.53	31.97	15.88	49.11	19.05	57.43
150	6	168.3	2.77	11.32	3.40	13.84	7.11	28.3	10.97	42.7	18.2	67.56	21.95	79.22
200	8	219.1	2.77	14.79	3.76	19.96	8.18	42.6	12.7	64.6	23.0	111.2	22.23	107.8
250	10	273.1	3.40	22.63	4.19	27.78	9.27	60.5	12.7	96.0	28.6	172.4	25.40	155.15
300	12	323.9	3.96	31.25	4.57	36.00	9.52	73.88	12.7	132.0	33.32	238.76	25.40	186.97
350	14	355.6	3.96	34.36	4.78	41.3	11.13	94.59	19.05	158.08	35.71	281.70	-	-
400	16	406.4	4.19	41.56	4.78	47.29	12.7	123.30	21.41	203.33	40.46	365.11	-	-
450	18	457.2	4.19	46.80	4.78	53.42	14.27	155.80	23.8	254.36	45.71	466.40	-	-
500	20	508.0	4.78	59.25	5.54	68.71	15.09	183.42	26.19	311.2	49.99	564.68	-	-
600	24	609.6	5.54	82.47	6.35	94.45	17.48	255.41	30.96	442.08	59.54	808.22	-	-

WEIGHT & THICKNESS OF S.S GAUGE PIPES

DIMENSION		10 SWG (3.2 MM)	12 SWG (2.6 MM)	14 SWG (2.1 MM)	16 SWG (1.65 MM)	18 SWG (1.2 MM)	19 SWG (1.0 MM)
Size	OD	Weight/MTR	Weight/MTR	Weight/MTR	Weight/MTR	Weight/MTR	Weight/MTR
1/2"	12.7	0.754	0.651	0.552	0.452	0.342	0.290
5/8"	15.875	1.006	0.856	0.718	0.582	0.437	0.369
3/4"	19.05	1.258	1.061	0.883	0.712	0.531	0.448
1"	25.4	1.762	1.470	1.214	0.972	0.720	0.605
1 1/4"	31.75	2.266	1.880	1.544	1.232	0.909	0.763
1 1/2"	38.1	2.770	2.289	1.875	1.492	1.098	0.920
2"	50.8	3.778	3.108	2.537	2.012	1.476	1.235
2 1/2"	63.5	4.786	3.928	3.198	2.531	1.854	1.550
3"	76.2	5.794	4.747	3.860	3.051	2.232	1.865
3 1/2"	88.9	6.802	5.566	4.521	3.571	2.610	2.180
4"	101.6	7.810	6.385	5.183	4.091	2.988	2.495

Carbon steel welded and seamless pipe

Seamless and welded carbon steel pipe acc. to ASTM specifications,
e.g. ASTM A106, ASTM A53, API 5L line pipe

Nominal dimensions and weights acc. to carbon steel Standard ASME B36.10M-04

(Theoretical ID included for reference - all dimensions are subject to tolerances nominated in relevant specifications)

Nom Pipe Size			Sch 10			Sch 20			Sch 30			Sch 40			Sch STD WEIGHT			Sch 60		
NB	NPS	O.D.	av w.t.	I.D.		av w.t.	I.D.		av w.t.	I.D.		av w.t.	I.D.		av w.t.	I.D.	kg/m	av w.t.	I.D.	
mm	inch	mm	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m
6	1/8	10.29	1.24	7.80	0.28	-	-	-	1.45	7.39	0.32	1.73	6.83	0.37	1.73	6.83	0.37	-	-	-
8	1/4	13.72	1.65	10.4	0.49	-	-	-	1.85	10.0	0.54	2.24	9.2	0.63	2.24	9.2	0.63	-	-	-
10	3/8	17.15	1.65	13.8	0.63	-	-	-	1.85	13.4	0.70	2.31	12.5	0.84	2.31	12.5	0.84	-	-	-
15	1/2	21.34	2.11	17.1	1.00	-	-	-	2.41	16.5	1.12	2.77	15.8	1.27	2.77	15.8	1.27	-	-	-
20	3/4	26.67	2.11	22.5	1.28	-	-	-	2.41	21.9	1.44	2.87	20.9	1.69	2.87	20.9	1.69	-	-	-
25	1	33.40	2.77	27.9	2.09	-	-	-	2.90	27.6	2.18	3.38	26.6	2.50	3.38	26.6	2.50	-	-	-
32	1.1/4	42.16	2.77	36.6	2.69	-	-	-	2.97	36.2	2.87	3.56	35.1	3.39	3.56	35.1	3.39	-	-	-
40	1.1/2	48.26	2.77	42.7	3.11	-	-	-	3.18	41.9	3.53	3.68	40.9	4.05	3.68	40.9	4.05	-	-	-
50	2	60.33	2.77	54.8	3.93	-	-	-	3.18	54.0	4.48	3.91	52.5	5.44	3.91	52.5	5.44	-	-	-
65	2.1/2	73.03	3.05	66.9	5.26	-	-	-	4.78	63.5	8.04	5.16	62.7	8.63	5.16	62.7	8.63	-	-	-
80	3	88.90	3.05	82.8	6.46	-	-	-	4.78	79.3	9.92	5.49	77.9	11.29	5.49	77.9	11.29	-	-	-
90	3.1/2	101.60	3.05	95.5	7.41	-	-	-	4.78	92.0	11.41	5.74	90.1	13.57	5.74	90.1	13.57	-	-	-
100	4	114.30	3.05	108.2	8.37	-	-	-	4.78	104.7	12.91	6.02	102.3	16.08	6.02	102.3	16.08	-	-	-
125	5	141.30	3.40	134.5	11.56	-	-	-	-	-	-	6.55	128.2	21.77	6.55	128.2	21.77	-	-	-
150	6	168.28	3.40	161.5	13.83	-	-	-	-	-	-	7.11	154.1	28.26	7.11	154.1	28.26	-	-	-
200	8	219.08	3.76	211.6	19.97	6.35	187.3	33.32	7.04	205.0	36.82	8.18	202.7	42.55	8.18	202.7	42.55	-	-	-
250	10	273.05	4.19	264.7	27.78	6.35	237.3	41.76	7.80	257.5	51.01	9.27	254.5	60.29	9.27	254.5	60.29	12.70	248	81.53
300	12	323.85	4.57	314.7	35.98	6.35	287.3	49.71	8.38	307.1	65.19	10.31	303.2	79.71	9.53	304.8	73.86	14.27	295	108.93
350	14	355.6	6.35	343	55	7.92	334	68	9.53	337	81	11.13	333	95	9.53	337	81	15.09	325	127
400	16	406.4	6.35	394	63	7.92	384	78	9.53	387	93	12.7	381	123	9.53	387	93	16.66	373	160
450	18	457.2	6.35	445	71	7.92	434	88	11.13	435	122	14.27	429	156	9.53	438	105	19.05	419	206
500	20	508.0	6.35	495	79	9.53	481	117	12.70	483	155	15.09	478	183	9.53	489	117	20.62	467	248
550	22	558.8	6.35	546	87	9.53	531	129	12.70	533	171	-	-	-	9.53	540	129	22.23	514	294
600	24	609.6	6.35	597	95	9.53	581	141	14.27	581	210	17.48	575	255	9.53	591	141	24.61	560	355
650	26	660.4	7.92	645	127	12.70	625	203	-	-	-	-	-	-	9.53	641	153			
700	28	711.2	7.92	695	137	12.70	675	219	15.88	679	272	-	-	-	9.53	692	165			
750	30	762.0	7.92	746	147	12.70	725	235	15.88	730	292	-	-	-	9.53	743	180			
800	32	812.8	7.92	797	157	12.70	775	251	15.88	781	312	17.48	778	343	9.53	794	189			
850	34	863.6	7.92	848	167	12.70	825	267	15.88	832	332	17.48	829	365	9.53	845	201			
900	36	914.4	7.92	899	177	12.70	875	282	15.88	883	352	19.05	876	420	9.53	895	213			
950	38	965	7.92	949	187							17.48	930	408	9.53	946	225			
1000	40	1016	7.92	1000	197							17.48	981	430	9.53	997	237			
1050	42	1067	11.13	1045	290							17.48	1032	452	9.53	1048	249			
1100	44	1118	11.13	1096	304							17.48	1083	482	9.53	1099	261			
1150	46	1168	11.13	1146	318							17.48	1133	504	9.53	1149	272			
1200	48	1219	11.13	1197	352							17.48	1184	526	9.53	1200	284			
1300	52	1321							11.13	1299	360									
1350	54	1372							11.13	1350	379									
1400	56	1422							11.13	1400	393									
1500	60	1524							11.13	1502	422									
1600	64	1626							11.13	1604	450									
1700	68	1727							11.13	1705	478									
1800	72	1829							11.13	1807	507									
1900	76	1930							11.13	1908	535									
2000	80	2032							11.13	2010	563									

 = Equivalent stainless steel dimensions for quick comparison to carbon steel sizes

av w.t. = average wall thickness

Carbon steel welded and seamless pipe

*ASME B36.10M-04 does not include Sch 160 or XXS wall thickness for 6 NB, 8 NB and 10 NB.

For reference these non standard thicknesses are listed acc. to Forged Fitting Standard ASME B16.11-09 Table 8

Nom Pipe Size			SCH XS			SCH 80			SCH 100			SCH 120			SCH 140			SCH 160			SCH XXS		
NB	NPS	O.D.	av w.t	I.D.		av w.t	I.D.		av w.t	I.D.		av w.t	I.D.		av w.t	I.D.		av w.t	I.D.		av w.t	I.D.	
mm	inch	mm	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m
6	1/8	10.29	2.41	5.46	0.47	2.41	5.46	0.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	1/4	13.72	3.02	7.7	0.80	3.02	7.67	0.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	3/8	17.15	3.20	10.7	1.10	3.20	10.74	1.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	1/2	21.34	3.73	13.9	1.62	3.73	13.87	1.62	-	-	-	-	-	-	-	-	-	4.78	7.59	1.95	7.47	2.21	2.55
20	3/4	26.67	3.91	18.8	2.20	3.91	18.85	2.20	-	-	-	-	-	-	-	-	-	5.56	10.21	2.90	7.82	5.69	3.64
25	1	33.40	4.55	24.3	3.24	4.55	24.31	3.24	-	-	-	-	-	-	-	-	-	6.35	13.97	4.24	9.09	8.48	5.45
32	1 1/4	42.16	4.85	32.5	4.47	4.85	32.46	4.47	-	-	-	-	-	-	-	-	-	6.35	20.70	5.61	9.70	14.00	7.77
40	1 1/2	48.26	5.08	38.1	5.41	5.08	38.10	5.41	-	-	-	-	-	-	-	-	-	7.14	27.89	7.25	10.15	21.86	9.55
50	2	60.33	5.54	49.3	7.48	5.54	49.25	7.48	-	-	-	-	-	-	-	-	-	8.74	30.78	11.11	11.07	26.11	13.44
65	2 1/2	73.03	7.01	59.0	11.41	7.01	59.00	11.41	-	-	-	-	-	-	-	-	-	9.53	41.28	14.92	14.02	32.28	20.39
80	3	88.90	7.62	73.7	15.27	7.62	73.66	15.27	-	-	-	-	-	-	-	-	-	11.13	50.77	21.35	15.24	42.55	27.68
90	3 1/2	101.60	8.08	85.4	18.64	8.08	85.45	18.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	4	114.30	8.56	97.2	22.32	8.56	97.18	22.32	-	-	-	11.13	79.3	28.32	-	-	-	13.49	74.63	33.54	17.12	67.36	41.03
125	5	141.30	9.53	122.3	30.97	9.53	122.25	30.97	-	-	-	12.70	88.9	40.28	-	-	-	15.88	82.55	49.12	19.05	76.20	57.43
150	6	168.28	10.97	146.3	42.56	10.97	146.33	42.56	-	-	-	14.27	112.8	54.21	-	-	-	18.26	104.78	67.57	21.95	97.41	79.22
200	8	219.08	12.7	193.7	64.64	12.70	193.68	64.64	15.09	138.1	75.92	18.26	131.8	90.44	20.62	127.0	100.93	23.01	122.25	111.27	22.23	123.83	107.93
250	10	273.05	12.7	247.7	81.53	15.09	242.87	95.98	18.26	182.6	114.71	21.44	176.2	133.01	25.40	168.3	155.10	28.58	161.93	172.27	25.40	168.28	155.10
300	12	323.85	12.7	298.5	97.44	17.48	288.90	132.05	21.44	230.2	159.87	25.40	222.3	186.92	28.58	215.9	208.08	33.32	206.40	238.69	25.40	222.25	186.92
350	14	355.6	12.7	330	107	19.05	318	158	23.83	276	195	27.79	268	225	31.75	260	254	35.71	252	282			
400	16	406.4	12.7	381	123	21.44	364	204	26.19	303	246	30.96	294	287	36.53	283	333	40.49	275	365			
450	18	457.2	12.7	432	139	23.83	410	255	29.36	348	310	34.93	337	364	39.67	327	408	45.24	316	459			
500	20	508.0	12.7	483	155	26.19	456	311	32.54	392	382	38.10	381	442	44.45	368	508	50.01	357	565			
550	22	558.8	12.7	533	171	28.58	502	374	34.93	438	451	41.28	425	527	47.63	413	601	53.98	400	672			
600	24	609.6	12.7	584	187	30.96	548	442	38.89	481	548	46.02	467	640	52.37	454	720	59.54	440	808			
650	26	660.4	12.7	635	203	30.96	598	527															
700	28	711.2	12.7	686	219	30.96	649	567															
750	30	762.0	12.7	737	235	30.96	700	n/a															
800	32	812.8	12.7	787	251	30.96	751	606															
850	34	863.6	12.7	838	267	30.96	802	646															
900	36	914.4	12.7	889	282																		
950	38	965	12.7	940	298																		
1000	40	1016	12.7	991	314																		
1050	42	1067	12.7	1042	330																		
1100	44	1118	12.7	1093	346																		
1150	46	1168	12.7	1143	362																		
1200	48	1219	12.7	1194	378																		
1300	52	1321	12.7	1296	410																		
1350	54	1372	12.7	1347	432																		
1400	56	1422	12.7	1397	448																		
1500	60	1524	12.7	1499	481																		
1600	64	1626	12.7	1601	513																		
1700	68	1727	12.7	1702	545																		
1800	72	1829	12.7	1804	577																		
1900	76	1930	12.7	1905	610																		
2000	80	2032	12.7	2007	642																		

= Equivalent stainless steel dimensions for quick comparison to carbon steel sizes