

A=432 – Chime Length Calculator for a Tube or Rod - Inches Version

unrestricted at both ends

To determine the resonant frequency for a rod set the ID=0 and enter the OD and Metal Type

Enter values in BLUE, answers in ORANGE (inches) and YELLOW (mm)

OD inches = 0.625 **ID inches = 0.569** **Metal = Copper** [< Click to](#)

Wall = 0.028 inches Length calculated for fundamental F Hang Point is for fundamental F node

Note	Freq Hz	Length inches	Hang Point	Length mm	Hang Point	Note	Freq Hz	Length inches	Hang Point*	Length mm
C1	32.12	56 15/16	12 3/4	1,446.2	324.2	C5	514.00	14 1/4	3 3/16	362.0
C#/D ^b	33.70	55 9/16	12 7/16	1,411.3	316.4	C#/D ^b	540.00	13 7/8	3 1/8	352.4
D	36.06	53 3/4	12 1/16	1,365.3	306.1	D	577.00	13 7/16	3	341.3
D#/E ^b	38.44	52 1/16	11 11/16	1,322.4	296.5	D#/E ^b	615.10	13	2 15/16	330.2
E	40.50	50 11/16	11 3/8	1,287.5	288.6	E	648.00	12 11/16	2 7/8	322.3
F	42.63	49 7/16	11 1/16	1,255.7	281.5	F	682.60	12 3/8	2 3/4	314.3
F#/G ^b	46.30	47 7/16	10 5/8	1,204.9	270.1	F#/G ^b	740.00	11 7/8	2 11/16	301.6
G	48.00	46 9/16	10 7/16	1,182.7	265.2	G	768.00	11 5/8	2 5/8	295.3
G#/A ^b	50.61	45 3/8	10 3/16	1,152.5	258.4	G#/A ^b	810.00	11 5/16	2 9/16	287.3
A	54.01	43 15/16	9 7/8	1,116.0	250.2	A	863.98	11	2 7/16	279.4
A#/B ^b	57.67	42 1/2	9 1/2	1,079.5	242.0	A#/B ^b	922.60	10 5/8	2 3/8	269.9
B	60.59	41 7/16	9 5/16	1,052.5	236.0	B	969.98	10 3/8	2 5/16	263.5
C2	64.24	40 1/4	9	1,022.4	229.2	C6	1,027.90	10 1/16	2 1/4	255.6
C#/D ^b	67.50	39 5/16	8 13/16	998.5	223.9	C#/D ^b	1,079.90	9 13/16	2 3/16	249.2
D	72.12	38	8 1/2	965.2	216.4	D	1,154.01	9 1/2	2 1/8	241.3
D#/E ^b	76.89	36 13/16	8 1/4	935.0	209.6	D#/E ^b	1,230.00	9 3/16	2 1/16	233.4
E	80.99	35 7/8	8 1/16	911.2	204.3	E	1,295.90	8 15/16	2	227.0
F	85.25	34 15/16	7 13/16	887.4	199.0	F	1,365.20	8 3/4	1 15/16	222.3
F#/G ^b	92.50	33 9/16	7 1/2	852.5	191.1	F#/G ^b	1,480.00	8 3/8	1 7/8	212.7
G	96.00	32 15/16	7 3/8	836.6	187.6	G	1,536.00	8 1/4	1 7/8	209.6
G#/A ^b	101.23	32 1/16	7 3/16	814.4	182.6	G#/A ^b	1,620.00	8	1 13/16	203.2
A	108.00	31 1/16	6 15/16	789.0	176.9	A	1,727.96	7 3/4	1 3/4	196.9
A#/B ^b	115.30	30 1/16	6 3/4	763.6	171.2	A#/B ^b	1,845.00	7 1/2	1 11/16	190.5
B	121.27	29 5/16	6 9/16	744.5	166.9	B	1,939.86	7 5/16	1 5/8	185.7
C3	128.49	28 1/2	6 3/8	723.9	162.3	C7	2,055.80	7 1/8	1 5/8	181.0
C#/D ^b	135.00	27 3/4	6 1/4	704.9	158.0	C#/D ^b	2,159.81	6 15/16	1 9/16	176.2
D	144.23	26 7/8	6	682.6	153.0	D	2,308.00	6 11/16	1 1/2	169.9
D#/E ^b	153.80	26	5 13/16	660.4	148.1	D#/E ^b	2,460.00	6 1/2	1 7/16	165.1
E	161.98	25 3/8	5 11/16	644.5	144.5	E	2,591.80	6 5/16	1 7/16	160.3
F	170.50	24 11/16	5 9/16	627.1	140.6	F	2,730.40	6 3/16	1 3/8	157.2
F#/G ^b	185.00	23 3/4	5 5/16	603.3	135.2	F#/G ^b	2,960.00	5 15/16	1 5/16	150.8
G	192.00	23 5/16	5 1/4	592.1	132.8	G	3,072.00	5 13/16	1 5/16	147.6
G#/A ^b	202.55	22 11/16	5 1/16	576.3	129.2	G#/A ^b	3,240.01	5 11/16	1 1/4	144.5
A	216.00	21 15/16	4 15/16	557.2	124.9	A	3,455.92	5 1/2	1 1/4	139.7
A#/B ^b	230.70	21 1/4	4 3/4	539.8	121.0	A#/B ^b	3,691.00	5 5/16	1 3/16	134.9
B	242.45	20 3/4	4 5/8	527.1	118.2	B	3,879.73	5 3/16	1 3/16	131.8
C4	256.95	20 1/8	4 1/2	511.2	114.6	C8	4,111.61	5 1/16	1 1/8	128.6
C#/D ^b	270.00	19 5/8	4 3/8	498.5	111.8	C#/D ^b	4,319.62	4 15/16	1 1/8	125.4
D	288.55	19	4 1/4	482.6	108.2	D	4,616.00	4 3/4	1 1/16	120.7
D#/E ^b	303.40	18 1/2	4 1/8	469.9	105.4	D#/E ^b	4,912.00	4 5/8	1 1/16	117.5
E	323.96	17 15/16	4	455.6	102.1	E	5,183.61	4 1/2	1	114.3
F	341.30	17 1/2	3 15/16	444.5	99.7	F	5,460.80	4 3/8	1	111.1
F#/G ^b	370.00	16 3/4	3 3/4	425.5	95.4	F#/G ^b	5,920.00	4 3/16	15/16	106.4
G	385.00	16 7/16	3 11/16	417.5	93.6	G	6,144.00	4 1/8	15/16	104.8
G#/A ^b	404.50	16 1/16	3 5/8	408.0	91.5	G#/A ^b	6,480.00	4	7/8	101.6
A	432.00	15 1/2	3 1/2	393.7	88.3	A	6,911.84	3 7/8	7/8	98.4
A#/B ^b	455.11	15 1/8	3 3/8	384.2	86.1	A#/B ^b	7,281.00	3 13/16	7/8	96.8
B	485.00	14 5/8	3 1/4	371.5	83.3	B	7,759.46	3 11/16	13/16	93.7
Calculate Length or Frequency for ID & OD entered above						C9	8,218.31	3 9/16	13/16	90.5
Enter F	528.00	14 1/16	3 1/8	357.2	80.1	Convert	2.000	inches to		50.800

		Enter L ↓				convert		25.4	mm to	1
F=	64.49	40 3/16	9	1,020.8	228.9	http://leehite.org/Chimes.htm				

select	
Hang Point	
81.1	
79.0	
76.5	
74.0	
72.3	
70.5	
67.6	
66.2	
64.4	
62.6	
60.5	
59.1	
57.3	
55.9	
54.1	
52.3	
50.9	
49.8	
47.7	
47.0	
45.6	
44.1	
42.7	
41.6	
40.6	
39.5	
38.1	
37.0	
35.9	
35.2	
33.8	
33.1	
32.4	
31.3	
30.3	
29.5	
28.8	
28.1	
27.0	
26.3	
25.6	
24.9	
23.8	
23.5	
22.8	
22.1	
21.7	
21.0	
20.3	
mm	

inches	
1.00	

Wind Chime Tubing Length Ratio Calculator

Can be used for a tube open at both ends or for a tube with end caps
by referencing a tube of known length & frequency.

Enter Values in Blue Boxes

Answers in Green Boxes

Enter	Enter	Enter	Answer	Answer
measured tubing length	measured tubing frequency	desired tubing frequency	length of tubing for desired frequency	Hang point for tube open at both ends
mm or Inches	Hz	Hz		
18.25	440.0	392	19 5/16	4 5/16

If you have a chime tube for which you know the exact musical note or the exact frequency, you can use that tube to make other chimes in the same family of size and metal. The tube does not need to match any particular note or frequency. The important measurement is that you know the exact frequency and length.

For example, say you have a 3/4" type L copper pipe that you know is tuned for A4 (440 Hz) and it's length is 18 1/4" inches, and you want a tube tuned for 392 Hz. Enter those values in the blue boxes. The green boxes provide the length for the 392 Hz chime and the hang point at 4 5/16".

Repeating the process until you have determined the correct length for all the chimes in your set. You then have lengths for notes using 3/4" type L copper pipe.

If you do not know the musical note or frequency for a length of tubing, use a piano or other musical instrument to determine the musical note. Maybe ask a musical friend to help out.

A good piano tuning program called Tune Lab Pro works well for measuring frequency. Do not use it for measuring musical notes as it is set up for a string instrument and not for a wind chime tube, but it will tell you the fundamental frequency.

See

www.tunelab-world.com/

February 20, 2010

Properties Used for Calculations

Modulus of Elasticity = 16,000,000 psi
 Density = 0.3226 Lbm / in³

Constants

Gravity Constant = 386.4 in / sec²
Euler's Constants = βl^2 **Suspension Point**
 1st = 22.370 0.2242
 2nd = 61.670 0.132
 3rd = 120.900 0.0944
 4th = 199.859 0.0735

Calculate Values

Area Moment of Inertia = 0.002 in⁴
 Area = 0.053 in²
 $K = \sqrt{(E \cdot I / (A \cdot p))} = 29251.8168002063$

Material Properties		Adjust Modulus of Elasticity and Density to fit your specific material of choice.
Material	Density	
	Lbm / in ³	
Aluminum	10,000,000	
Brass	17,000,000	
Cast Iron	13,400,000	
Copper	16,000,000	
Steel	30,000,000	
Stainless Steel	28,300,000	
Titanium	14,900,000	

	Nominal Values	Nominal Values
Aluminum	10,000,000 to 10,300,000	0.0925 to 0.098
Brass	15,000,000 to 17,000,000	0.303 to 0.315
Cast Iron	11,600,000 to 13,400,000	0.2456 to 0.2817
Copper	16,000,000 to 17,000,000	0.3226
Steel	30,000,000	0.2835
Stainless Steel	28,000,000 to 29,000,000	0.2702 to 0.2889
Titanium	14,500,000 to 14,900,000	0.162 to 0.164

All dimensions calculated are based on OD, ID in inches and Material type
 OD = outside dimension of tubing (inches), ID = inside dimension of tubing (inches)
 Material type = Aluminum, Brass, Cast Iron, Copper, Steel, Stainless Steel and titanium
 Note selection by frequency in Hz.
 The calculator uses nominal values for material properties; however, if you know the exact material density and modulus of elasticity, you can enter that data for your specific material.

Be aware that some tubing may produce a beating effect when struck. This is often due to variations in the tubing from variations and inconsistencies in the manufacturing process. The Elasticity and the Density may be different depending on where the tube is struck. The tube will produce two frequencies and these two frequencies will produce the beating effect.

Some people enjoy this type of effect, others may find it annoying. If you want to avoid this wah-wah effect, acquire high quality tubing – or test a small piece before buying in bulk. The problem with tubing which produces this effect is that it makes precise tuning more difficult.



the cross section of
density of the tubing will
two frequencies will

effect, make sure you
exhibits this type of

Note	A=432 Freq Hz	1st Overtone X 2.76	2nd Overtone X 5.40	3rd Overtone X 8.93	4th Overtone X 13.34	Note	Freq Hz	1st Overtone X 2.76	2nd Overtone X 5.40	3rd Overtone X 8.93	4th Overtone X 13.34
C0	16.11	44.38	86.99	143.85	214.89	G	385.00	1,060.68	2,079.00	3,438.05	5,135.90
C#/D ^b	16.85	46.42	90.99	150.48	224.79	G#/A ^b	404.50	1,114.40	2,184.30	3,612.19	5,396.03
D	18.08	49.80	97.62	161.43	241.15	A	432.00	1,190.16	2,332.80	3,857.76	5,762.88
D#/E ^b	19.22	52.95	103.79	171.63	256.39	A#/B ^b	455.11	1,253.83	2,457.59	4,064.13	6,071.17
E	20.25	55.78	109.33	180.81	270.09	B	485.00	1,336.18	2,619.00	4,331.05	6,469.90
F	21.31	58.71	115.07	190.30	284.28	C5	514.00	1,416.07	2,775.60	4,590.02	6,856.76
F#/G ^b	23.10	63.64	124.74	206.28	308.15	C#/D ^b	540.00	1,487.70	2,916.00	4,822.20	7,203.60
G	24.06	66.29	129.94	214.88	320.99	D	577.00	1,589.64	3,115.80	5,152.61	7,697.18
G#/A ^b	0.00	0.00	0.00	0.00	0.00	D#/E ^b	615.10	1,694.60	3,321.54	5,492.84	8,205.43
A	27.00	74.38	145.80	241.10	360.17	E	648.00	1,785.24	3,499.20	5,786.64	8,644.32
A#/B ^b	28.83	79.43	155.68	257.45	384.59	F	682.60	1,880.56	3,686.04	6,095.62	9,105.88
B	30.34	83.59	163.85	270.96	404.77	F#/G ^b	740.00	2,038.70	3,996.00	6,608.20	9,871.60
C1	32.12	88.49	173.44	286.82	428.47	G	768.00	2,115.84	4,147.20	6,858.24	10,245.12
C#/D ^b	33.70	92.85	181.99	300.95	449.58	G#/A ^b	810.00	2,231.55	4,374.00	7,233.30	10,805.40
D	36.06	99.34	194.70	321.98	480.99	A	863.98	2,380.27	4,665.49	7,715.34	11,525.50
D#/E ^b	38.44	105.90	207.58	343.27	512.79	A#/B ^b	922.60	2,541.76	4,982.04	8,238.82	12,307.48
E	40.50	111.59	218.72	361.70	540.32	B	969.98	2,672.30	5,237.89	8,661.92	12,939.54
F	42.63	117.45	230.20	380.69	568.68	C6	1,027.90	2,831.87	5,550.67	9,179.16	13,712.21
F#/G ^b	46.30	127.56	250.02	413.46	617.64	C#/D ^b	1,079.90	2,975.13	5,831.47	9,643.53	14,405.90
G	48.00	132.24	259.20	428.64	640.32	D	1,154.01	3,179.30	6,231.65	10,305.31	15,394.49
G#/A ^b	50.61	139.44	273.31	451.97	675.17	D#/E ^b	1,230.00	3,388.65	6,642.00	10,983.90	16,408.20
A	54.01	148.79	291.65	482.30	720.47	E	1,295.90	3,570.21	6,997.87	11,572.40	17,287.33
A#/B ^b	57.67	158.88	311.42	514.99	769.32	F	1,365.20	3,761.13	7,372.08	12,191.24	18,211.77
B	60.59	166.92	327.17	541.04	808.23	F#/G ^b	1,480.00	4,077.40	7,992.00	13,216.40	19,743.20
C2	64.24	176.97	346.88	573.64	856.93	G	1,536.00	4,231.68	8,294.40	13,716.48	20,490.24
C#/D ^b	67.50	185.96	364.50	602.78	900.45	G#/A ^b	1,620.00	4,463.10	8,748.00	14,466.60	21,610.80
D	72.12	198.70	389.46	644.05	962.11	A	1,727.96	4,760.53	9,330.99	15,430.69	23,051.00
D#/E ^b	76.89	211.83	415.21	686.63	1,025.71	A#/B ^b	1,845.00	5,082.98	9,963.00	16,475.85	24,612.30
E	80.99	223.12	437.33	723.22	1,080.38	B	1,939.86	5,344.32	10,475.26	17,322.97	25,877.77
F	85.25	234.86	460.35	761.28	1,137.24	C7	2,055.80	5,663.74	11,101.34	18,358.33	27,424.42
F#/G ^b	92.50	254.84	499.50	826.03	1,233.95	C#/D ^b	2,159.81	5,950.26	11,662.95	19,287.06	28,811.80
G	96.00	264.48	518.40	857.28	1,280.64	D	2,308.00	6,358.54	12,463.20	20,610.44	30,788.72
G#/A ^b	101.23	278.88	546.62	903.94	1,350.35	D#/E ^b	2,460.00	6,777.30	13,284.00	21,967.80	32,816.40
A	108.00	297.53	583.19	964.42	1,440.69	E	2,591.80	7,140.42	13,995.74	23,144.80	34,574.66
A#/B ^b	115.30	317.65	622.62	1,029.63	1,538.10	F	2,730.40	7,522.25	14,744.16	24,382.47	36,423.54
B	121.27	334.10	654.87	1,082.96	1,617.77	F#/G ^b	2,960.00	8,154.80	15,984.00	26,432.80	39,486.40
C3	128.49	353.98	693.82	1,147.37	1,713.99	G	3,072.00	8,463.36	16,588.80	27,432.96	40,980.48
C#/D ^b	135.00	371.93	729.00	1,205.55	1,800.90	G#/A ^b	3,240.01	8,926.23	17,496.05	28,933.29	43,221.73
D	144.23	397.34	778.82	1,287.93	1,923.97	A	3,455.92	9,521.06	18,661.98	30,861.38	46,101.99
D#/E ^b	153.80	423.72	830.52	1,373.43	2,051.69	A#/B ^b	3,691.00	10,168.71	19,931.40	32,960.63	49,237.94
E	161.98	446.24	874.67	1,446.44	2,160.75	B	3,879.73	10,688.64	20,950.52	34,645.94	51,755.53
F	170.50	469.73	920.70	1,522.57	2,274.47	C8	4,111.61	11,327.48	22,202.68	36,716.65	54,848.84
F#/G ^b	185.00	509.68	999.00	1,652.05	2,467.90	C#/D ^b	4,319.62	11,900.55	23,325.95	38,574.21	57,623.73
G	192.00	528.96	1,036.80	1,714.56	2,561.28	D	4,616.00	12,717.08	24,926.40	41,220.88	61,577.44
G#/A ^b	202.55	558.02	1,093.76	1,808.76	2,702.00	D#/E ^b	4,912.00	13,532.56	26,524.80	43,864.16	65,526.08
A	216.00	595.07	1,166.37	1,928.84	2,881.37	E	5,183.61	14,280.84	27,991.48	46,289.61	69,149.32
A#/B ^b	230.70	635.58	1,245.78	2,060.15	3,077.54	F	5,460.80	15,044.50	29,488.32	48,764.94	72,847.07
B	242.45	667.94	1,309.21	2,165.04	3,234.23	F#/G ^b	5,920.00	16,309.60	31,968.00	52,865.60	78,972.80
C4	256.95	707.90	1,387.53	2,294.57	3,427.72	G	6,144.00	16,926.72	33,177.60	54,865.92	81,960.96
C#/D ^b	270.00	743.85	1,458.00	2,411.10	3,601.80	G#/A ^b	6,480.00	17,852.40	34,992.00	57,866.40	86,443.20
D	288.55	794.95	1,558.17	2,576.74	3,849.25	A	6,911.84	19,042.13	37,323.95	61,722.76	92,203.98
D#/E ^b	303.40	835.87	1,638.36	2,709.36	4,047.36	A#/B ^b	7,281.00	20,059.16	39,317.40	65,019.33	97,128.54
E	323.96	892.51	1,749.39	2,892.97	4,321.64	B	7,759.46	21,377.31	41,901.08	69,291.98	103,511.20
F	341.30	940.28	1,843.02	3,047.81	4,552.94	C9	8,218.31	22,641.45	44,378.89	73,389.53	109,632.29
F#/G ^b	370.00	1,019.35	1,998.00	3,304.10	4,935.80						

Standard Dimension Tables for Aluminum Tubing (inches)

Tubing Gauge	22	20	18	17	16	14	12
Wall Thickness	0.028	0.035	0.049	0.058	0.065	0.083	0.109

* These sizes are extruded; all other sizes are drawn tubes.

OD inches	ID inches	Wall inches	OD inches	ID inches	Wall inches	OD inches	ID inches
0.500	0.444	0.028	1.000	0.930	0.035	1.625	1.555
	0.430	0.035		0.902	0.049		1.509
	0.402	0.049		0.884	0.058	1.750	1.634
	0.384	0.058		0.870	0.065		1.584
	0.370	0.065		0.834	0.083	1.875	1.759
0.625	0.569	0.028	1.125	1.055	0.035	2.000	1.902
	0.555	0.035		1.009	0.058		1.870
	0.527	0.049	1.250	1.180	0.035		1.834
	0.509	0.058		1.152	0.049		1.750
	0.495	0.065		1.134	0.058		1.500
0.750	0.680	0.035		1.120	0.065	2.250	2.152
	0.652	0.049		1.084	0.083		2.120
	0.634	0.058	1.375	1.305	0.035		2.084
	0.620	0.065		1.259	0.058	2.500	2.370
	0.584	0.083	1.500	1.430	0.035		2.334
0.875	0.805	0.035		1.402	0.049		2.250
	0.777	0.049		1.384	0.058		2.000
	0.759	0.058		1.370	0.065	3.000	2.870
	0.745	0.065		1.334	0.083		2.750
				1.250	*0.125		2.500
				1.000	*0.250		

Available Sizes

2024-T3 ALUMINUM TUBE	6061-T6 ALUMINUM TUBE	6063-T52 ALUMINUM TUBE
0.5" OD x 0.035" WALL x 0.43" ID	0.5" OD x 0.028" WALL x 0.444" ID	1.5" OD x 0.125" WALL x 1.25" ID
0.5" OD x 0.049" WALL x 0.402" ID	0.5" OD x 0.035" WALL x 0.43" ID	2" OD x 0.125" WALL x 1.75" ID
0.5" OD x 0.065" WALL x 0.37" ID	0.5" OD x 0.049" WALL x 0.402" ID	2.5" OD x 0.125" WALL x 2.25" ID
0.5" OD x 0.083" WALL x 0.334" ID	0.5" OD x 0.058" WALL x 0.384" ID	3" OD x 0.125" WALL x 2.75" ID
0.625" OD x 0.035" WALL x 0.555" ID	0.5" OD x 0.065" WALL x 0.37" ID	3" OD x 0.188" WALL x 2.624" ID
0.625" OD x 0.049" WALL x 0.527" ID	0.5" OD x 0.083" WALL x 0.334" ID	3.5" OD x 0.125" WALL x 3.25" ID
0.625" OD x 0.058" WALL x 0.509" ID	0.5" OD x 0.125" WALL x 0.25" ID	4" OD x 0.125" WALL x 3.75" ID
0.625" OD x 0.065" WALL x 0.495" ID	0.625" OD x 0.049" WALL x 0.527" ID	4" OD x 0.188" WALL x 3.624" ID
0.625" OD x 0.095" WALL x 0.435" ID	0.625" OD x 0.065" WALL x 0.495" ID	5" OD x 0.125" WALL x 4.75" ID
0.75" OD x 0.035" WALL x 0.68" ID	0.625" OD x 0.125" WALL x 0.375" ID	5" OD x 0.1875" WALL x 4.625" ID
0.75" OD x 0.049" WALL x 0.652" ID	0.75" OD x 0.035" WALL x 0.68" ID	6" OD x 0.125" WALL x 5.75" ID
0.75" OD x 0.058" WALL x 0.634" ID	0.75" OD x 0.058" WALL x 0.634" ID	
0.75" OD x 0.065" WALL x 0.62" ID	0.75" OD x 0.065" WALL x 0.62" ID	
0.75" OD x 0.083" WALL x 0.584" ID	0.75" OD x 0.083" WALL x 0.584" ID	
0.75" OD x 0.095" WALL x 0.56" ID	0.75" OD x 0.125" WALL x 0.5" ID	

0.75" OD x 0.156" WALL x 0.438" ID	0.875" OD x 0.049" WALL x 0.777" ID		
0.875" OD x 0.035" WALL x 0.805" ID	0.875" OD x 0.058" WALL x 0.759" ID		
0.875" OD x 0.049" WALL x 0.777" ID	0.875" OD x 0.065" WALL x 0.745" ID		
0.875" OD x 0.058" WALL x 0.759" ID	0.875" OD x 0.12" WALL x 0.635" ID		
0.875" OD x 0.065" WALL x 0.745" ID	1" OD x 0.035" WALL x 0.93" ID		
0.875" OD x 0.095" WALL x 0.685" ID	1" OD x 0.049" WALL x 0.902" ID		
0.875" OD x 0.12" WALL x 0.635" ID	1" OD x 0.058" WALL x 0.884" ID		
1" OD x 0.035" WALL x 0.93" ID	1" OD x 0.065" WALL x 0.87" ID		
1" OD x 0.049" WALL x 0.902" ID	1" OD x 0.083" WALL x 0.834" ID		
1" OD x 0.058" WALL x 0.884" ID	1" OD x 0.095" WALL x 0.81" ID		
1" OD x 0.065" WALL x 0.87" ID	1" OD x 0.125" WALL x 0.75" ID		
1" OD x 0.083" WALL x 0.834" ID	1" OD x 0.1875" WALL x 0.624" ID		
1" OD x 0.095" WALL x 0.81" ID	1.125" OD x 0.035" WALL x 1.055" ID		
1" OD x 0.12" WALL x 0.76" ID	1.125" OD x 0.058" WALL x 1.009" ID		
1.125" OD x 0.035" WALL x 1.055" ID	1.125" OD x 0.065" WALL x 0.995" ID		
1.125" OD x 0.049" WALL x 1.027" ID	1.125" OD x 0.125" WALL x 0.875" ID		
1.125" OD x 0.058" WALL x 1.009" ID	1.25" OD x 0.035" WALL x 1.18" ID		
1.125" OD x 0.065" WALL x 0.995" ID	1.25" OD x 0.058" WALL x 1.134" ID		
1.125" OD x 0.083" WALL x 0.959" ID	1.25" OD x 0.065" WALL x 1.12" ID		
1.125" OD x 0.095" WALL x 0.935" ID	1.25" OD x 0.083" WALL x 1.084" ID		
1.25" OD x 0.035" WALL x 1.18" ID	1.25" OD x 0.125" WALL x 1" ID		
1.25" OD x 0.049" WALL x 1.152" ID	1.25" OD x 0.25" WALL x 0.75" ID		
1.25" OD x 0.058" WALL x 1.134" ID	1.375" OD x 0.049" WALL x 1.277" ID		
1.25" OD x 0.065" WALL x 1.12" ID	1.375" OD x 0.058" WALL x 1.259" ID		
1.25" OD x 0.083" WALL x 1.084" ID	1.375" OD x 0.065" WALL x 1.245" ID		
1.25" OD x 0.095" WALL x 1.06" ID	1.375" OD x 0.125" WALL x 1.125" ID		
1.25" OD x 0.12" WALL x 1.01" ID	1.375" OD x 0.25" WALL x 0.875" ID		
1.375" OD x 0.035" WALL x 1.305" ID	1.5" OD x 0.035" WALL x 1.43" ID		
1.375" OD x 0.049" WALL x 1.277" ID	1.5" OD x 0.058" WALL x 1.384" ID		
1.375" OD x 0.065" WALL x 1.245" ID	1.5" OD x 0.065" WALL x 1.37" ID		
1.375" OD x 0.083" WALL x 1.209" ID	1.5" OD x 0.083" WALL x 1.334" ID		
1.375" OD x 0.095" WALL x 1.185" ID	1.5" OD x 0.125" WALL x 1.25" ID		
1.375" OD x 0.125" WALL x 1.125" ID	1.5" OD x 0.25" WALL x 1" ID		
1.5" OD x 0.035" WALL x 1.43" ID	1.5" OD x 0.375" WALL x 0.75" ID		
1.5" OD x 0.049" WALL x 1.402" ID	1.625" OD x 0.058" WALL x 1.509" ID		
1.5" OD x 0.065" WALL x 1.37" ID	1.625" OD x 0.125" WALL x 1.375" ID		
1.5" OD x 0.083" WALL x 1.334" ID	1.75" OD x 0.058" WALL x 1.634" ID		
1.5" OD x 0.095" WALL x 1.31" ID	1.75" OD x 0.065" WALL x 1.62" ID		
1.5" OD x 0.12" WALL x 1.26" ID	1.75" OD x 0.125" WALL x 1.5" ID		
1.5" OD x 0.25" WALL x 1" ID	1.75" OD x 0.25" WALL x 1.25" ID		
1.625" OD x 0.065" WALL x 1.495" ID	1.875" OD x 0.058" WALL x 1.759" ID		
1.75" OD x 0.035" WALL x 1.68" ID	2" OD x 0.058" WALL x 1.884" ID		
1.75" OD x 0.049" WALL x 1.652" ID	2" OD x 0.065" WALL x 1.87" ID		
1.75" OD x 0.083" WALL x 1.584" ID	2" OD x 0.125" WALL x 1.75" ID		
2" OD x 0.049" WALL x 1.902" ID	2" OD x 0.25" WALL x 1.5" ID		
2" OD x 0.083" WALL x 1.834" ID	2.25" OD x 0.049" WALL x 2.152" ID		
2" OD x 0.095" WALL x 1.81" ID	2.25" OD x 0.065" WALL x 2.12" ID		
2" OD x 0.12" WALL x 1.76" ID	2.25" OD x 0.125" WALL x 2" ID		
2.75" OD x 0.065" WALL x 2.62" ID	2.25" OD x 0.25" WALL x 1.75" ID		
2.75" OD x 0.125" WALL x 2.5" ID	2.5" OD x 0.065" WALL x 2.37" ID		
3.5" OD x 0.12" WALL x 3.26" ID	2.5" OD x 0.125" WALL x 2.25" ID		
	2.5" OD x 0.25" WALL x 2" ID		
	2.5" OD x 0.375" WALL x 1.75" ID		
	2.75" OD x 0.065" WALL x 2.62" ID		
	2.75" OD x 0.25" WALL x 2.25" ID		

			3" OD x 0.065" WALL x 2.87" ID		
			3" OD x 0.125" WALL x 2.75" ID		
			3" OD x 0.1875" WALL x 2.625" ID		
			3" OD x 0.25" WALL x 2.5" ID		
			3" OD x 0.375" WALL x 2.25" ID		
			3.5" OD x 0.065" WALL x 3.37" ID		
			3.5" OD x 0.125" WALL x 3.25" ID		
			3.5" OD x 0.1875" WALL x 3.125" ID		
			3.5" OD x 0.25" WALL x 3" ID		
			4" OD x 0.065" WALL x 3.87" ID		
			4" OD x 0.125" WALL x 3.75" ID		
			4" OD x 0.25" WALL x 3.5" ID		
			4.5" OD x 0.125" WALL x 4.25" ID		
			4.5" OD x 0.375" WALL x 3.75" ID		
			5" OD x 0.125" WALL x 4.75" ID		
			5" OD x 0.1875" WALL x 4.625" ID		
			5" OD x 0.25" WALL x 4.5" ID		
			6" OD x 0.125" WALL x 5.75" ID		
			6" OD x 0.1875" WALL x 5.625" ID		
			7" OD x 0.125" WALL x 6.75" ID		
			8" OD x 0.125" WALL x 7.75" ID		
			8" OD x 0.25" WALL x 7.5" ID		
			8" OD x 0.5" WALL x 7" ID		

Standard Dimension Tables for Brass							
Available sizes for Tube Brass				Available sizes for BRASS TUBE			
1/2" OD {A} x 0.436" ID {B} x .032" Wall				0.5" OD x 0.03" WALL x 0.44" ID			
1/2" OD {A} x 0.370" ID {B} x .065" Wall				0.5" OD x 0.042" WALL x 0.416" ID			
5/8" OD {A} x 0.561" ID {B} x .032" Wall				0.5" OD x 0.065" WALL x 0.37" ID			
5/8" OD {A} x 0.495" ID {B} x .065" Wall				0.625" OD x 0.029" WALL x 0.567" ID			
3/4" OD {A} x 0.686" ID {B} x .032" Wall				0.625" OD x 0.065" WALL x 0.495" ID			
3/4" OD {A} x 0.620" ID {B} x .065" Wall				0.75" OD x 0.029" WALL x 0.692" ID			
1" OD {A} x 0.870" ID {B} x .065" Wall				0.75" OD x 0.04" WALL x 0.67" ID			
1-1/4" OD {A} x 1.120" ID {B} x .065" Wall				0.75" OD x 0.065" WALL x 0.62" ID C330 TUBE			
1-1/2" OD {A} x 1.370" ID {B} x .065" Wall				0.75" OD x 0.12" WALL x 0.51" ID			
1-1/2" OD {A} x 1.250" ID {B} x .125" Wall				0.875" OD x 0.03" WALL x 0.815" ID			
1-5/8" OD {A} x 1.375" ID {B} x .125" Wall				0.875" OD x 0.065" WALL x 0.745" ID			
1-3/4" OD {A} x 1.620" ID {B} x .065" Wall				1" OD x 0.03" WALL x 0.94" ID			
2" OD {A} x 1.870" ID {B} x .065" Wall				1" OD x 0.065" WALL x 0.87" ID			
2-1/4" OD {A} x 2.120" ID {B} x .065" Wall				1.25" OD x 0.04" WALL x 1.17" ID			
				1.25" OD x 0.065" WALL x 1.12" ID			
				1.5" OD x 0.04" WALL x 1.42" ID			
				1.5" OD x 0.065" WALL x 1.37" ID			
				1.75" OD x 0.065" WALL x 1.62" ID			
				1.75" OD x 0.12" WALL x 1.51" ID			
				2" OD x 0.049" WALL x 1.902" ID			
				2" OD x 0.065" WALL x 1.87" ID			
				2" OD x 0.109" WALL x 1.782" ID			
				2" OD x 0.12" WALL x 1.76" ID			
				2.5" OD x 0.065" WALL x 2.37" ID			
				3" OD x 0.049" WALL x 2.902" ID			
				3" OD x 0.065" WALL x 2.87" ID			
				4" OD x 0.065" WALL x 3.87" ID C330 TUBE			

Standard Dimension Tables for Copper Tubing

Wall thickness of copper pipe varies with the pipe schedule.
 The four common standards are named K (Thick-Walled), L (Medium-Walled), M (Thin-Wall), and DWV (Drain/Waste/Vent - non-pressurized)
 The printing on the pipe is color coded for identification;
K is Green, L is Blue, M is Red, and DWV is Yellow.
Both type "M" & type "L" can be found in home plumbing at Home Depot & Lowes.

Nominal Pipe Size	Actual O.D.	I.D.				Wall Thickness		
		K	L	M	DWV	K	L	M
1/2"	0.625	0.527	0.545	0.569	-	0.049	0.04	0.028
5/8"	0.750	0.652	0.666	-	-	0.049	0.042	-
3/4"	0.875	0.745	0.785	0.811	-	0.065	0.045	0.032
1"	1.125	0.995	1.025	1.055	-	0.065	0.05	0.035
1-1/4"	1.375	1.245	1.265	1.291	1.295	0.065	0.055	0.042
1-1/2"	1.625	1.481	1.505	1.527	1.541	0.072	0.06	0.049
2"	2.125	1.959	1.985	2.009	2.041	0.083	0.07	0.058
2-1/2"	2.625	2.435	2.465	2.495	-	0.095	0.08	0.065
3"	3.125	2.907	2.945	2.981	3.03	0.109	0.09	0.072
3 1/2"	3.625	3.385	3.425	3.259		0.12	0.1	0.083
4"	4.125	3.857	3.897	3.707		0.134	0.114	0.095
5"	5.125	4.805	4.875	4.657		0.16	0.125	0.109
6"	6.125	5.741	5.845	5.601		0.192	0.14	0.122

Available sizes for

C101 H04 (FULL HARD) TUBE

- 0.5" OD x 0.035" WALL x 0.43" ID
- 0.5" OD x 0.0625" WALL x 0.375" ID
- 0.5" OD x 0.125" WALL x 0.25" ID
- 0.625" OD x 0.121" WALL x 0.383" ID
- 0.75" OD x 0.035" WALL x 0.68" ID
- 0.75" OD x 0.0625" WALL x 0.625" ID
- 0.75" OD x 0.125" WALL x 0.5" ID
- 1" OD x 0.125" WALL x 0.75" ID
- 1" OD x 0.25" WALL x 0.5" ID
- 1.25" OD x 0.125" WALL x 1" ID
- 1.5" OD x 0.125" WALL x 1.25" ID
- 1.5" OD x 0.25" WALL x 1" ID
- 1.5" OD x 0.375" WALL x 0.75" ID
- 1.625" OD x 0.049" WALL x 1.527" ID
- 1.75" OD x 0.065" WALL x 1.62" ID
- 1.75" OD x 0.375" WALL x 1" ID
- 2" OD x 0.063" WALL x 1.874" ID
- 2" OD x 0.125" WALL x 1.75" ID
- 2.125" OD x 0.25" WALL x 1.625" ID
- 2.25" OD x 0.3125" WALL x 1.625" ID
- 2.5" OD x 0.065" WALL x 2.37" ID
- 2.5" OD x 0.25" WALL x 2" ID

Available sizes for

C122 HARD DRAWN TUBE

- 0.5" OD x 0.032" WALL x 0.436" ID
- 0.5" OD x 0.065" WALL x 0.37" ID
- 0.625" OD x 0.065" WALL x 0.495" ID
- 0.75" OD x 0.065" WALL x 0.62" ID
- 0.875" OD x 0.065" WALL x 0.745" ID
- 1" OD x 0.065" WALL x 0.87" ID
- 1.25" OD x 0.065" WALL x 1.12" ID
- 1.5" OD x 0.065" WALL x 1.37" ID
- 2" OD x 0.065" WALL x 1.87" ID

2.5" OD x 0.375" WALL x 1.75" ID					
2.75" OD x 0.25" WALL x 2.25" ID					
2.75" OD x 0.375" WALL x 2" ID					
2.75" OD x 0.625" WALL x 1.5" ID					
3" OD x 0.25" WALL x 2.5" ID					
3" OD x 0.625" WALL x 1.75" ID					
3.5" OD x 0.062" WALL x 3.376" ID					
3.5" OD x 0.187" WALL x 3.126" ID					
3.5" OD x 0.25" WALL x 3" ID					
3.5" OD x 0.562" WALL x 2.376" ID					
3.75" OD x 0.5" WALL x 2.75" ID					
4" OD x 0.25" WALL x 3.5" ID					
4" OD x 0.5" WALL x 3" ID					
4" OD x 0.625" WALL x 2.75" ID					
4.5" OD x 0.109" WALL x 4.282" ID					
6.5" OD x 0.5" WALL x 5.5" ID					
7.5" OD x 0.125" WALL x 7.25" ID					

Standard Dimension Tables for Iron

Pipe is specified by a nominal dimension which bears little or no resemblance to the actual di

Wrought Iron Pipe (Schedule 40)

is used for water supply in older houses.

It comes either black or galvanized.

Joints are made by threading pipe into cast iron fittings

Nominal Pipe Size inches	O.D.	I.D.	Wall Thickness
1	1.315	1.049	0.133
1.250	1.660	1.380	0.140
1.500	1.900	1.610	0.145
2	2.375	2.067	0.154
2.500	2.875	2.468	0.204

Cast Iron Pipe is typically used for sewer lines and municipal water.

It comes in eight classes, A through H, rated by pressure in increments of 100 feet of head.

Nominal Pipe Size inches	Class A 100 Foot Head 43 psi			Class B 200 Foot Head 86 psi		
	O.D.	I.D.	Wall Thickness	O.D.	I.D.	Wall Thickness
3	3.800	3.020	0.390	3.960	3.120	0.420
4	4.800	3.960	0.420	5.000	4.100	0.450
6	6.900	6.020	0.440	7.100	6.140	0.480
8	9.050	8.130	0.460	9.050	8.030	0.510
10	11.100	10.100	0.500	11.100	9.960	0.570

Standard Dimension Tables for EMT, Cold Rolled &

Electrical Metallic Tubing (EMT) aka "thin-wall conduit"				
EMT	Actual			
Nominal inches	OD inches	ID inches	Wall Thickness	Gauge
3/8	0.577	0.493	0.042	19
1/2	0.706	0.622	0.042	19
3/4	0.922	0.824	0.049	18
1	1.163	1.049	0.057	17
1 1/4	1.510	1.380	0.065	16
1 1/2	1.740	1.610	0.065	16
2	2.197	2.067	0.065	16
2 1/2	2.875	2.731	0.072	15
3	3.500	3.356	0.072	15
3 1/2	4.000	3.834	0.083	14
4	4.500	4.334	0.083	14

Scroll down for available sizes for
Cold Rolled and Stainless

A513 - TYPE 5 STEEL TUBE DOM Cold Rolled

0.5" OD x 0.035" WALL x 0.43" ID
 0.5" OD x 0.049" WALL x 0.4" ID
 0.5" OD x 0.065" WALL x 0.37" ID
 0.5" OD x 0.095" WALL x 0.31" ID
 0.5" OD x 0.12" WALL x 0.26" ID
 0.625" OD x 0.058" WALL x 0.509" ID
 0.625" OD x 0.065" WALL x 0.5" ID
 0.625" OD x 0.083" WALL x 0.459" ID
 0.625" OD x 0.095" WALL x 0.435" ID
 0.625" OD x 0.12" WALL x 0.39" ID
 0.75" OD x 0.035" WALL x 0.68" ID
 0.75" OD x 0.049" WALL x 0.652" ID
 0.75" OD x 0.065" WALL x 0.62" ID
 0.75" OD x 0.083" WALL x 0.58" ID
 0.75" OD x 0.095" WALL x 0.56" ID
 0.75" OD x 0.109" WALL x 0.53" ID
 0.75" OD x 0.12" WALL x 0.51" ID
 0.75" OD x 0.156" WALL x 0.438" ID
 0.75" OD x 0.188" WALL x 0.37" ID
 0.875" OD x 0.049" WALL x 0.78" ID
 0.875" OD x 0.065" WALL x 0.75" ID
 0.875" OD x 0.083" WALL x 0.71" ID
 0.875" OD x 0.095" WALL x 0.685" ID
 0.875" OD x 0.109" WALL x 0.657" ID
 0.875" OD x 0.12" WALL x 0.64" ID
 0.875" OD x 0.156" WALL x 0.563" ID
 0.875" OD x 0.188" WALL x 0.499" ID
 1" OD x 0.049" WALL x 0.9" ID

1" OD x 0.065" WALL x 0.87" ID		
1" OD x 0.083" WALL x 0.834" ID		
1" OD x 0.095" WALL x 0.81" ID		
1" OD x 0.109" WALL x 0.782" ID		
1" OD x 0.12" WALL x 0.76" ID		
1" OD x 0.156" WALL x 0.688" ID		
1" OD x 0.188" WALL x 0.63" ID		
1" OD x 0.25" WALL x 0.5" ID		
1.125" OD x 0.065" WALL x 0.995" ID		
1.125" OD x 0.095" WALL x 0.935" ID		
1.125" OD x 0.12" WALL x 0.89" ID		
1.125" OD x 0.156" WALL x 0.813" ID		
1.25" OD x 0.065" WALL x 1.12" ID		
1.25" OD x 0.083" WALL x 1.084" ID		
1.25" OD x 0.095" WALL x 1.06" ID		
1.25" OD x 0.109" WALL x 1.03" ID		
1.25" OD x 0.12" WALL x 1.01" ID		
1.25" OD x 0.188" WALL x 0.87" ID		
1.25" OD x 0.25" WALL x 0.75" ID		
1.25" OD x 0.3125" WALL x 0.625" ID		
1.3125" OD x 0.188" WALL x 0.94" ID		
1.313" OD x 0.12" WALL x 1.072" ID		
1.375" OD x 0.049" WALL x 1.28" ID		
1.375" OD x 0.065" WALL x 1.25" ID		
1.375" OD x 0.095" WALL x 1.185" ID		
1.375" OD x 0.12" WALL x 1.14" ID		
1.375" OD x 0.156" WALL x 1.063" ID		
1.375" OD x 0.188" WALL x 1" ID		
1.375" OD x 0.375" WALL x 0.625" ID		
1.5" OD x 0.065" WALL x 1.37" ID		
1.5" OD x 0.095" WALL x 1.31" ID		
1.5" OD x 0.12" WALL x 1.26" ID		
1.5" OD x 0.156" WALL x 1.188" ID		
1.5" OD x 0.188" WALL x 1.12" ID		
1.5" OD x 0.25" WALL x 1" ID		
1.5" OD x 0.313" WALL x 0.875" ID		
1.5" OD x 0.375" WALL x 0.75" ID		
1.625" OD x 0.065" WALL x 1.495" ID		
1.625" OD x 0.12" WALL x 1.385" ID		
1.625" OD x 0.1875" WALL x 1.25" ID		
1.625" OD x 0.25" WALL x 1.125" ID		
1.75" OD x 0.095" WALL x 1.56" ID		
1.75" OD x 0.12" WALL x 1.51" ID		
1.75" OD x 0.134" WALL x 1.482" ID		
1.75" OD x 0.1875" WALL x 1.375" ID		
1.75" OD x 0.25" WALL x 1.25" ID		
1.75" OD x 0.313" WALL x 1.125" ID		
1.75" OD x 0.375" WALL x 1" ID		
1.875" OD x 0.095" WALL x 1.685" ID		
1.875" OD x 0.188" WALL x 1.5" ID		
1.875" OD x 0.313" WALL x 1.25" ID		

1.875" OD x 0.375" WALL x 1.125" ID		
2" OD x 0.109" WALL x 1.782" ID		
2" OD x 0.12" WALL x 1.76" ID		
2" OD x 0.156" WALL x 1.687" ID		
2" OD x 0.188" WALL x 1.625" ID		
2" OD x 0.25" WALL x 1.5" ID		
2" OD x 0.313" WALL x 1.375" ID		
2" OD x 0.375" WALL x 1.25" ID		
2" OD x 0.5" WALL x 1" ID		
2.125" OD x 0.12" WALL x 1.885" ID		
2.25" OD x 0.065" WALL x 2.12" ID		
2.25" OD x 0.095" WALL x 2.06" ID		
2.25" OD x 0.12" WALL x 2.01" ID		
2.25" OD x 0.188" WALL x 1.875" ID		
2.25" OD x 0.25" WALL x 1.75" ID		
2.25" OD x 0.375" WALL x 1.5" ID		
2.375" OD x 0.156" WALL x 2.063" ID		
2.375" OD x 0.25" WALL x 1.875" ID		
2.375" OD x 0.313" WALL x 1.75" ID		
2.5" OD x 0.065" WALL x 2.37" ID		
2.5" OD x 0.12" WALL x 2.26" ID		
2.5" OD x 0.1875" WALL x 2.125" ID		
2.5" OD x 0.25" WALL x 2" ID		
2.5" OD x 0.313" WALL x 1.875" ID		
2.5" OD x 0.375" WALL x 1.75" ID		
2.5" OD x 0.5" WALL x 1.5" ID		
2.75" OD x 0.25" WALL x 2.25" ID		
3" OD x 0.1875" WALL x 2.625" ID		
3" OD x 0.313" WALL x 2.375" ID		
3" OD x 0.375" WALL x 2.25" ID		
3" OD x 0.5" WALL x 2" ID		
3.5" OD x 0.375" WALL x 2.75" ID		
4" OD x 0.083" WALL x 3.834" ID		
ROUND TUBING T-304/304L (SEAMLESS Stainless Steel)		
0.5" OD x 0.02" WALL x 0.46" ID		
0.5" OD x 0.028" WALL x 0.444" ID		
0.5" OD x 0.035" WALL x 0.43" ID		
0.5" OD x 0.049" WALL x 0.402" ID		
0.5" OD x 0.065" WALL x 0.37" ID		
0.5" OD x 0.083" WALL x 0.334" ID		
0.5" OD x 0.095" WALL x 0.31" ID		
0.5" OD x 0.109" WALL x 0.282" ID		
0.5" OD x 0.12" WALL x 0.26" ID		
0.5625" OD x 0.095" WALL x 0.3725" ID		
0.625" OD x 0.028" WALL x 0.569" ID		
0.625" OD x 0.035" WALL x 0.555" ID		
0.625" OD x 0.049" WALL x 0.527" ID		
0.625" OD x 0.065" WALL x 0.495" ID		
0.625" OD x 0.083" WALL x 0.459" ID		
0.625" OD x 0.095" WALL x 0.435" ID		

0.625" OD x 0.12" WALL x 0.385" ID		
0.75" OD x 0.028" WALL x 0.694" ID		
0.75" OD x 0.035" WALL x 0.68" ID		
0.75" OD x 0.049" WALL x 0.652" ID		
0.75" OD x 0.065" WALL x 0.62" ID		
0.75" OD x 0.083" WALL x 0.584" ID		
0.75" OD x 0.095" WALL x 0.56" ID		
0.75" OD x 0.109" WALL x 0.532" ID		
0.75" OD x 0.12" WALL x 0.51" ID		
0.75" OD x 0.1875" WALL x 0.375" ID		
0.75" OD x 0.25" WALL x 0.25" ID		
0.875" OD x 0.035" WALL x 0.805" ID		
0.875" OD x 0.049" WALL x 0.777" ID		
0.875" OD x 0.065" WALL x 0.745" ID		
0.875" OD x 0.083" WALL x 0.709" ID		
0.875" OD x 0.095" WALL x 0.685" ID		
0.875" OD x 0.12" WALL x 0.635" ID		
1" OD x 0.035" WALL x 0.93" ID		
1" OD x 0.049" WALL x 0.902" ID		
1" OD x 0.065" WALL x 0.87" ID		
1" OD x 0.083" WALL x 0.834" ID		
1" OD x 0.095" WALL x 0.81" ID		
1" OD x 0.109" WALL x 0.782" ID		
1" OD x 0.12" WALL x 0.76" ID		
1" OD x 0.134" WALL x 0.732" ID		
1" OD x 0.1875" WALL x 0.625" ID		
1" OD x 0.25" WALL x 0.5" ID		
1.125" OD x 0.065" WALL x 0.995" ID		
1.125" OD x 0.188" WALL x 0.749" ID		
1.25" OD x 0.049" WALL x 1.152" ID		
1.25" OD x 0.065" WALL x 1.12" ID		
1.25" OD x 0.083" WALL x 1.084" ID		
1.25" OD x 0.095" WALL x 1.06" ID		
1.25" OD x 0.109" WALL x 1.032" ID		
1.25" OD x 0.12" WALL x 1.01" ID		
1.25" OD x 0.134" WALL x 0.982" ID		
1.25" OD x 0.156" WALL x 0.938" ID		
1.25" OD x 0.188" WALL x 0.874" ID		
1.25" OD x 0.25" WALL x 0.75" ID		
1.375" OD x 0.049" WALL x 1.277" ID		
1.375" OD x 0.065" WALL x 1.245" ID		
1.5" OD x 0.049" WALL x 1.402" ID		
1.5" OD x 0.065" WALL x 1.37" ID		
1.5" OD x 0.083" WALL x 1.334" ID		
1.5" OD x 0.109" WALL x 1.282" ID		
1.5" OD x 0.12" WALL x 1.26" ID		
1.5" OD x 0.134" WALL x 1.232" ID		
1.5" OD x 0.156" WALL x 1.188" ID		
1.5" OD x 0.188" WALL x 1.124" ID		
1.5" OD x 0.25" WALL x 1" ID		
1.625" OD x 0.065" WALL x 1.495" ID		

1.75" OD x 0.065" WALL x 1.62" ID		
1.75" OD x 0.12" WALL x 1.51" ID		
2" OD x 0.049" WALL x 1.902" ID		
2" OD x 0.065" WALL x 1.87" ID		
2" OD x 0.083" WALL x 1.834" ID		
2" OD x 0.095" WALL x 1.81" ID		
2" OD x 0.109" WALL x 1.782" ID		
2" OD x 0.134" WALL x 1.732" ID		
2" OD x 0.156" WALL x 1.688" ID		
2" OD x 0.188" WALL x 1.624" ID		
2" OD x 0.25" WALL x 1.5" ID		
2.5" OD x 0.065" WALL x 2.37" ID		
3" OD x 0.065" WALL x 2.87" ID		
3" OD x 0.188" WALL x 2.624" ID		
ROUND TUBING T-316/316L (SEAMLESS Stainless Steel)		
0.5" OD x 0.02" WALL x 0.46" ID		
0.5" OD x 0.028" WALL x 0.444" ID		
0.5" OD x 0.035" WALL x 0.43" ID		
0.5" OD x 0.049" WALL x 0.402" ID		
0.5" OD x 0.065" WALL x 0.37" ID		
0.5" OD x 0.083" WALL x 0.334" ID		
0.5" OD x 0.095" WALL x 0.31" ID		
0.5" OD x 0.109" WALL x 0.282" ID		
0.5" OD x 0.12" WALL x 0.26" ID		
0.5" OD x 0.156" WALL x 0.188" ID		
0.5625" OD x 0.065" WALL x 0.4325" ID		
0.625" OD x 0.028" WALL x 0.569" ID		
0.625" OD x 0.035" WALL x 0.555" ID		
0.625" OD x 0.049" WALL x 0.527" ID		
0.625" OD x 0.065" WALL x 0.495" ID		
0.625" OD x 0.083" WALL x 0.459" ID		
0.625" OD x 0.095" WALL x 0.435" ID		
0.625" OD x 0.12" WALL x 0.385" ID		
0.75" OD x 0.049" WALL x 0.652" ID		
0.75" OD x 0.065" WALL x 0.62" ID		
0.75" OD x 0.083" WALL x 0.584" ID		
0.75" OD x 0.095" WALL x 0.56" ID		
0.75" OD x 0.109" WALL x 0.532" ID		
0.75" OD x 0.12" WALL x 0.51" ID		
0.75" OD x 0.156" WALL x 0.438" ID		
0.75" OD x 0.1875" WALL x 0.375" ID		
0.75" OD x 0.188" WALL x 0.374" ID		
0.75" OD x 0.25" WALL x 0.25" ID		
0.875" OD x 0.035" WALL x 0.805" ID		
0.875" OD x 0.049" WALL x 0.777" ID		
0.875" OD x 0.065" WALL x 0.745" ID		
0.875" OD x 0.083" WALL x 0.709" ID		
0.875" OD x 0.095" WALL x 0.685" ID		
0.875" OD x 0.12" WALL x 0.635" ID		
1" OD x 0.035" WALL x 0.93" ID		

1" OD x 0.049" WALL x 0.902" ID		
1" OD x 0.065" WALL x 0.87" ID		
1" OD x 0.083" WALL x 0.834" ID		
1" OD x 0.095" WALL x 0.81" ID		
1" OD x 0.109" WALL x 0.782" ID		
1" OD x 0.12" WALL x 0.76" ID		
1" OD x 0.134" WALL x 0.732" ID		
1" OD x 0.156" WALL x 0.688" ID		
1" OD x 0.1875" WALL x 0.625" ID		
1" OD x 0.25" WALL x 0.5" ID		
1.125" OD x 0.035" WALL x 1.055" ID		
1.125" OD x 0.065" WALL x 0.995" ID		
1.125" OD x 0.12" WALL x 0.885" ID		
1.25" OD x 0.049" WALL x 1.152" ID		
1.25" OD x 0.083" WALL x 1.084" ID		
1.25" OD x 0.095" WALL x 1.06" ID		
1.25" OD x 0.109" WALL x 1.032" ID		
1.25" OD x 0.12" WALL x 1.01" ID		
1.25" OD x 0.134" WALL x 0.982" ID		
1.25" OD x 0.156" WALL x 0.938" ID		
1.25" OD x 0.188" WALL x 0.874" ID		
1.25" OD x 0.25" WALL x 0.75" ID		
1.375" OD x 0.065" WALL x 1.245" ID		
1.5" OD x 0.049" WALL x 1.402" ID		
1.5" OD x 0.065" WALL x 1.37" ID		
1.5" OD x 0.083" WALL x 1.334" ID		
1.5" OD x 0.095" WALL x 1.31" ID		
1.5" OD x 0.109" WALL x 1.282" ID		
1.5" OD x 0.12" WALL x 1.26" ID		
1.5" OD x 0.134" WALL x 1.232" ID		
1.5" OD x 0.156" WALL x 1.188" ID		
1.5" OD x 0.188" WALL x 1.124" ID		
1.5" OD x 0.25" WALL x 1" ID		
1.625" OD x 0.065" WALL x 1.495" ID		
1.75" OD x 0.065" WALL x 1.62" ID		
1.75" OD x 0.12" WALL x 1.51" ID		
2" OD x 0.049" WALL x 1.902" ID		
2" OD x 0.065" WALL x 1.87" ID		
2" OD x 0.083" WALL x 1.834" ID		
2" OD x 0.095" WALL x 1.81" ID		
2" OD x 0.109" WALL x 1.782" ID		
2" OD x 0.12" WALL x 1.76" ID		
2" OD x 0.134" WALL x 1.732" ID		
2" OD x 0.156" WALL x 1.688" ID		
2" OD x 0.188" WALL x 1.624" ID		
2" OD x 0.25" WALL x 1.5" ID		
2.5" OD x 0.065" WALL x 2.37" ID		
2.5" OD x 0.12" WALL x 2.26" ID		
2.5" OD x 0.188" WALL x 2.124" ID		
3" OD x 0.065" WALL x 2.87" ID		
3" OD x 0.188" WALL x 2.624" ID		

Material Properties for Aluminum, Brass, Copper, Cold Rolled Steel & Stainless Steel

Aluminum 2024-T3

Minimum Properties	Ultimate Tensile Strength, psi	70,000
	Yield Strength, psi	50,000
	Brinell Hardness	120
	Rockwell Hardness	B75
Chemistry	Aluminum (Al)	90.7 - 94.7%
	Chromium (Cr)	0.1% max
	Copper (Cu)	3.8 - 4.9%
	Iron (Fe)	0.5% max
	Magnesium (Mg)	1.2 - 1.8%
	Manganese (Mn)	0.3 - 0.9%
	Silicon (Si)	0.5% max

Aluminum 6061-T6

Physical and Mechanical Properties	Ultimate Tensile Strength, psi	45,000
	Yield Strength, psi	40,000
	Brinell Hardness	95
	Rockwell Hardness	B60
Chemistry	Aluminum (Al)	95.8 - 98.6%
	Chromium (Cr)	0.04 - 0.35%
	Copper (Cu)	0.15 - 0.40%
	Iron (Fe)	0.70%
	Magnesium (Mg)	0.8 - 1.2%
	Manganese (Mn)	0.15% max
	Silicon (Si)	0.4 - 0.8%
Zinc (Zn)	0.25%	

Aluminum 6063-T52

Minimum Properties	Ultimate Tensile Strength, psi	27,000
	Yield Strength, psi	21,000
	Brinell Hardness	60
Chemistry	Aluminum (Al)	97.5% max
	Chromium (Cr)	0.1% max
	Copper (Cu)	0.1% max
	Iron (Fe)	0.35% max
	Magnesium (Mg)	0.45 - 0.90%
	Manganese (Mn)	0.1% max
	Silicon (Si)	0.2 - 0.6%

Brass C330

Minimum Properties	Ultimate Tensile Strength, psi	65,300
	Yield Strength, psi	50,000
	Elongation	32%
	Rockwell Hardness	B70
Chemistry	Copper (Cu)	65 - 68%
	Zinc (Zn)	33.50%
	Iron (Fe)	0.07% max
	Lead (Pb)	0.2 - 0.8%

Minimum Properties	Ultimate Tensile Strength, psi	87,000	
	Yield Strength, psi	72,000	
	Elongation	10.00%	
	Rockwell Hardness	B89	
Chemistry	Iron (Fe)	99.08 - 99.53%	
	Carbon (C)	0.18 - 0.23%	
	Manganese (Mn)	0.3 - 0.6%	
	Phosphorus (P)	0.04% max	
	Sulfur (S)	0.05% max	