ENGINEERING
TOMORROW

Airflex® General Engineering Data

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Airflex® Inertia and Radius of Gyration

Moment of inertia of a body is determined by the distribution of its mass about an axis of rotation.

The radius of gyration of a body is the distance from its axis of rotation to a point at which its mass can be concentrated without changing its moment of inertia.

The moment of inertia J of a body with a mass m and radius of gyration k is:

$$J = m \cdot k^2$$

(All units are as given in the Table of Units and Measure)

In the English system, mass is equal to the body weight W in pounds divided by the gravitational constant g (32.2 ft/sec ^{2}), so that the expression can be written as:

$$J = \frac{W \cdot k^2}{g}$$

In most formulas g is included in one general constant, so that Wk^2 itself remains as a convenient expression. Most formulas require that Wk^2 have units of lb • ft^2.

The moment of inertia of a body is usually referred to an axis passing through its center of gravity. It is often necessary to refer the moment of inertia to another parallel axis. The transfer formula is:

$$J_{xx} = J_{gg} + m \cdot r^2$$

where:

J_{gg} is the moment of inertia about an axis through the center of mass.

m is the mass.

r is the perpendicular distance between the two parallel axes.

In like fashion, the following analogous relations exist between the centroidal axis and any parallel axis:

$$W k^2_{xx} = W k^2_{gg} + W r^2$$

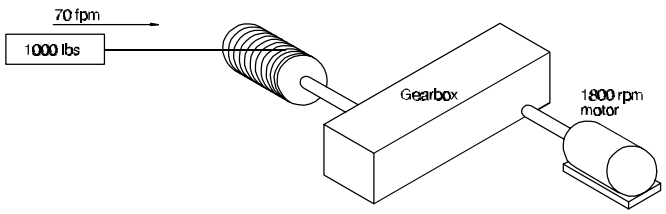
$$k^2_{xx} = k^2_{gg} + r^2$$

For referring the moment of inertia from one shaft to another shaft rotating at a different speed, the formula is:

$$J_2 = J_1 \cdot \left(\frac{n_1}{n_2}\right)^2$$

Example :

Determine the equivalent $W k^2$ of the sliding weight at the motor shaft.



$$W k^2 = \frac{W}{39.48} \cdot \left(\frac{fpm}{n}\right)^2$$

$$W k^2 = \frac{1000}{39.48} \cdot \left(\frac{70}{1800}\right)^2$$

$$W k^2 = 0.038 \ lb \cdot ft^2 \quad (0.001\,6 \ kg \cdot m^2)$$

$$W k_2^2 = W k_1^2 \cdot \left(\frac{n_1}{n_2}\right)^2$$

The equivalent inertia of a linearly moving body referred to an axis of rotation can be determined by equating its linear kinetic energy to rotary kinetic energy to obtain:

$$J = 91 \cdot m \cdot \left(\frac{v}{n}\right)^2$$

$$W k^2 = \frac{W}{39.48} \cdot \left(\frac{fpm}{n}\right)^2$$

Weight and Wk^2 values for cylindrical steel discs, one inch thick, appear in the following table. Weight, mass and radius of gyration formulas for common geometric solids are given on the following pages. Examples illustrate the use of these tables and formulas. Other tables

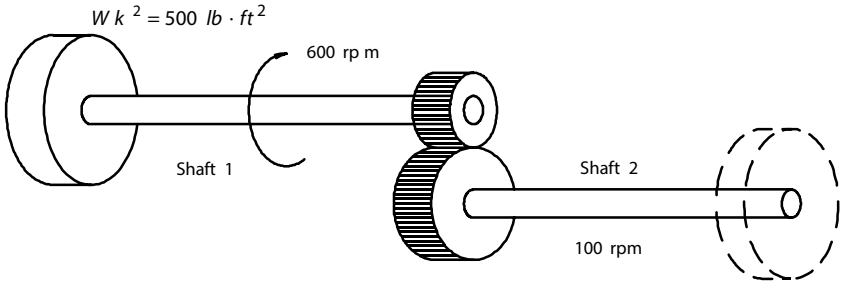
Example :

Determine the equivalent $W k^2$ at shaft 2.

$$W k_2^2 = W k_1^2 \cdot \left(\frac{n_1}{n_2}\right)^2$$

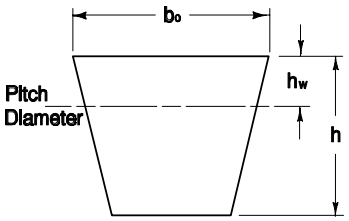
$$W k_2^2 = 500 \cdot \left(\frac{600}{100}\right)^2$$

$$W k_2^2 = 18{,}000 \ lb \cdot ft^2 \quad (756 \ kg \cdot m^2)$$



Airflex® Weight and Wk² for Steel Cylinders

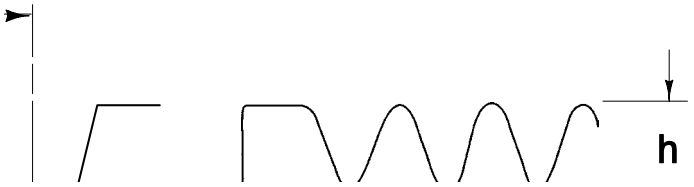
The table below lists the weight (lb) and Wk ² (lb • ft²) for various diameter steel cylinders one inch long. For other cylinder lengths multiply the table value by the length in inches. To obtain values for diameters not listed, use the follow - ing formulas:



Belt Cross Section

The table is based upon a steel density of 0.283 lb ¤ in3. For other common materials

Material	Factor
Aluminum	0.346
Bronze	1.120
Cast Iron	0.926
Copper	1.113
Lead	1.449



Diameter (in)	Weight (lb)	Wk ²(lb · ft ²)
1.0	0.222	0.0002
1.1	0.269	0.0003
1.2	0.320	0.0004
1.3	0.376	0.0006
1.4	0.436	0.0007
1.5	0.500	0.0010
1.6	0.569	0.0013
1.7	0.642	0.0016
1.8	0.720	0.0020
1.9	0.802	0.0025
2.0	0.889	0.0031
2.1	0.980	0.0038
2.2	1.076	0.0045
2.3	1.176	0.0054
2.4	1.280	0.0064
2.5	1.389	0.0075
2.6	1.503	0.0088
2.7	1.620	0.0103
2.8	1.743	0.0119
2.9	1.869	0.0136
3.0	2.000	0.0156
3.1	2.136	0.0178
3.2	2.276	0.0202
3.3	2.421	0.0229
3.4	2.569	0.0258
3.5	2.723	0.0290
3.6	2.881	0.0324
3.7	3.043	0.0362
3.8	3.210	0.0402
3.9	3.381	0.0446
4.0	3.556	0.0494
4.1	3.736	0.0545
4.2	3.921	0.0600
4.3	4.110	0.0660
4.4	4.303	0.0723
4.5	4.501	0.0791
4.6	4.703	0.0864
4.7	4.910	0.0941
4.8	5.121	0.1024
4.9	5.337	0.1112
5.0	5.557	0.1206
5.1	5.781	0.1305
5.2	6.010	0.1411
5.3	6.244	0.1522
5.4	6.481	0.1640
5.5	6.724	0.1765
5.6	6.970	0.1897
5.7	7.222	0.2037
5.8	7.477	0.2183
5.9	7.737	0.2338
6.0	8.002	0.2500
6.1	8.271	0.2671
6.2	8.544	0.2851
6.3	8.822	0.3039
6.4	9.104	0.3237
6.5	9.391	0.3444
6.6	9.682	0.3661
6.7	9.978	0.3888
6.8	10.28	0.4125
6.9	10.58	0.4373
7.0	10.89	0.4632
7.1	11.20	0.4903
7.2	11.52	0.5185
7.3	11.84	0.5479
7.4	12.17	0.5785
7.5	12.50	0.6104
7.6	12.84	0.6437
7.7	13.18	0.6782
7.8	13.52	0.7141
7.9	13.87	0.7515
8.0	14.23	0.7902
8.1	14.58	0.8305
8.2	14.95	0.8723
8.3	15.31	0.9156
8.4	15.68	0.9605
8.5	16.06	1.0071
8.6	16.44	1.0553
8.7	16.82	1.1053
8.8	17.21	1.1570
8.9	17.61	1.2105
9.0	18.00	1.2658
9.1	18.41	1.3230
9.2	18.81	1.3821
9.3	19.22	1.4432
9.4	19.64	1.5063
9.5	20.06	1.5714
9.6	20.48	1.6386
9.7	20.91	1.7080
9.8	21.35	1.7795
9.9	21.78	1.8533
10.0	22.23	1.9293
10.1	22.67	2.0076
10.2	23.12	2.0883
10.3	23.58	2.1714
10.4	24.04	2.2570
10.5	24.51	2.3451
10.6	24.97	2.4357
10.7	25.45	2.5289
10.8	25.93	2.6248
10.9	26.41	2.7234
11.0	26.89	2.8247
11.1	27.39	2.9288
11.2	27.88	3.0358
11.3	28.38	3.1457
11.4	28.89	3.2585
11.5	29.40	3.3744
11.6	29.91	3.4933
11.7	30.43	3.6153

Airflex® Weight and Wk² for Steel Cylinders

Diameter (in)	Weight (lb)	Wk ²(lb · ft ²)
11.8	30.95	3.7405
11.9	31.48	3.8689
12.0	32.01	4.0006
12.1	32.54	4.1356
12.2	33.08	4.2740
12.3	33.63	4.4159
12.4	34.18	4.5613
12.5	34.73	4.7102
12.6	35.29	4.8628
12.7	35.85	5.0190
12.8	36.42	5.1789
12.9	36.99	5.3427
13.0	37.56	5.5103
13.1	38.14	5.6818
13.2	38.73	5.8573
13.3	39.32	6.0368
13.4	39.91	6.2204
13.5	40.51	6.4082
13.6	41.11	6.6002
13.7	41.72	6.7964
13.8	42.33	6.9971
13.9	42.94	7.2021
14.0	43.56	7.4116
14.1	44.19	7.6256
14.2	44.82	7.8443
14.3	45.45	8.0676
14.4	46.09	8.2956
14.5	46.73	8.5285
14.6	47.38	8.7662
14.7	48.03	9.0088
14.8	48.69	9.2565
14.9	49.35	9.5092
15.0	50.01	9.7671
15.1	50.68	10.030
15.2	51.35	10.299
15.3	52.03	10.572
15.4	52.71	10.851
15.5	53.40	11.136
15.6	54.09	11.426
15.7	54.79	11.722
15.8	55.49	12.023
15.9	56.19	12.331
16.0	56.90	12.644
16.1	57.61	12.963
16.2	58.33	13.288
16.3	59.05	13.619
16.4	59.78	13.956
16.5	60.51	14.300
16.6	61.25	14.650
16.7	61.99	15.006
16.8	62.73	15.369
16.9	63.48	15.738
17.0	64.24	16.114
17.1	64.99	16.496
17.2	65.76	16.885
17.3	66.52	17.282
17.4	67.29	17.685
17.5	68.07	18.095
17.6	68.85	18.512
17.7	69.63	18.936
17.8	70.42	19.368
17.9	71.22	19.807
18.0	72.02	20.253
18.1	72.82	20.707
18.2	73.62	21.168
18.3	74.44	21.637
18.4	75.25	22.114
18.5	76.07	22.599
18.6	76.90	23.091
18.7	77.73	23.592
18.8	78.56	24.101
18.9	79.40	24.618
19.0	80.24	25.143
19.1	81.09	25.676
19.2	81.94	26.218
19.3	82.79	26.769
19.4	83.65	27.328
19.5	84.52	27.896
19.6	85.39	28.472
19.7	86.26	29.058
19.8	87.14	29.652
19.9	88.02	30.256
20.0	88.91	30.869
20.1	89.80	31.491
20.2	90.70	32.122
20.3	91.60	32.763
20.4	92.50	33.413
20.5	93.41	34.073
20.6	94.32	34.743
20.7	95.24	35.423
20.8	96.16	36.112
20.9	97.09	36.812
21.0	98.02	37.521
21.1	98.96	38.241
21.2	99.90	38.971
21.3	100.8	39.712
21.4	101.8	40.463
21.5	102.7	41.224
21.6	103.7	41.997
21.7	104.7	42.780
21.8	105.6	43.574
21.9	106.6	44.379
22.0	107.6	45.195
22.1	108.6	46.022
22.2	109.5	46.861
22.3	110.5	47.711
22.4	111.5	48.573
22.5	112.5	49.446
22.6	113.5	50.331
22.7	114.5	51.228
22.8	115.5	52.136
22.9	116.6	53.057
23.0	117.6	53.990
23.1	118.6	54.935
23.2	119.6	55.892
23.3	120.7	56.862
23.4	121.7	57.845
23.5	122.7	58.840
23.6	123.8	59.848
23.7	124.8	60.869
23.8	125.9	61.902
23.9	127.0	62.949
24.0	128.0	64.010
24.1	129.1	65.083
24.2	130.2	66.170
24.3	131.2	67.271
24.4	132.3	68.385
24.5	133.4	69.513
24.6	134.5	70.655
24.7	135.6	71.810
24.8	136.7	72.980
24.9	137.8	74.165
25.0	138.9	75.363
25.1	140.0	76.576
25.2	141.2	77.804
25.3	142.3	79.046
25.4	143.4	80.304
25.5	144.5	81.576
25.6	145.7	82.863
25.7	146.8	84.165
25.8	148.0	85.483
25.9	149.1	86.816
26.0	150.3	88.164
26.1	151.4	89.529
26.2	152.6	90.909
26.3	153.7	92.304
26.4	154.9	93.716
26.5	156.1	95.144
26.6	157.3	96.589
26.7	158.5	98.049
26.8	159.6	99.527
26.9	160.8	101.02
27.0	162.0	102.53
27.1	163.2	104.06
27.2	164.4	105.60
27.3	165.7	107.16
27.4	166.9	108.74
27.5	168.1	110.34
27.6	169.3	111.95
27.7	170.5	113.58
27.8	171.8	115.23
27.9	173.0	116.90

Airflex® Weight and Wk² for Steel Cylinders

Diameter (in)	Weight (lb)	Wk ²(lb · ft ²)
28.0	174.3	118.59
28.1	175.5	120.29
28.2	176.8	122.01
28.3	178.0	123.75
28.4	179.3	125.51
28.5	180.5	127.29
28.6	181.8	129.08
28.7	183.1	130.90
28.8	184.4	132.73
28.9	185.6	134.58
29.0	186.9	136.46
29.1	188.2	138.35
29.2	189.5	140.26
29.3	190.8	142.19
29.4	192.1	144.14
29.5	193.4	146.11
29.6	194.7	148.10
29.7	196.1	150.12
29.8	197.4	152.15
29.9	198.7	154.20
30.0	200.0	156.27
30.1	201.4	158.37
30.2	202.7	160.48
30.3	204.1	162.62
30.4	205.4	164.78
30.5	206.8	166.95
30.6	208.1	169.16
30.7	209.5	171.38
30.8	210.9	173.62
30.9	212.2	175.89
31.0	213.6	178.17
31.1	215.0	180.49
31.2	216.4	182.82
31.3	217.8	185.17
31.4	219.1	187.55
31.5	220.5	189.95
31.6	221.9	192.37
31.7	223.4	194.82
31.8	224.8	197.29
31.9	226.2	199.78
32.0	227.6	202.30
32.1	229.0	204.84
32.2	230.5	207.41
32.3	231.9	210.00
32.4	233.3	212.61
32.5	234.8	215.25
32.6	236.2	217.91
32.7	237.7	220.59
32.8	239.1	223.30
32.9	240.6	226.04
33.0	242.1	228.80
33.1	243.5	231.59
33.2	245.0	234.40
33.3	246.5	237.23
33.4	248.0	240.10
33.5	249.4	242.98
33.6	250.9	245.90
33.7	252.4	248.84
33.8	253.9	251.81
33.9	255.4	254.80
34.0	256.9	257.82
34.1	258.5	260.87
34.2	260.0	263.94
34.3	261.5	267.04
34.4	263.0	270.17
34.5	264.6	273.32
34.6	266.1	276.51
34.7	267.6	279.72
34.8	269.2	282.95
34.9	270.7	286.22
35.0	272.3	289.52
35.1	273.8	292.84
35.2	275.4	296.19
35.3	277.0	299.57
35.4	278.5	302.98
35.5	280.1	306.42
35.6	281.7	309.88
35.7	283.3	313.38
35.8	284.9	316.91
35.9	286.5	320.46
36.0	288.1	324.05
36.1	289.7	327.66
36.2	291.3	331.31
36.3	292.9	334.99
36.4	294.5	338.69
36.5	296.1	342.43
36.6	297.7	346.20
36.7	299.4	350.00
36.8	301.0	353.83
36.9	302.6	357.69
37.0	304.3	361.58
37.1	305.9	365.51
37.2	307.6	369.46
37.3	309.2	373.45
37.4	310.9	377.47
37.5	312.6	381.53
37.6	314.2	385.61
37.7	315.9	389.73
37.8	317.6	393.88
37.9	319.3	398.07
38.0	321.0	402.29
38.1	322.6	406.54
38.2	324.3	410.82
38.3	326.0	415.14
38.4	327.8	419.49
38.5	329.5	423.88
38.6	331.2	428.30
38.7	332.9	432.76
38.8	334.6	437.25
38.9	336.3	441.77
39.0	338.1	446.33
39.1	339.8	450.93
39.2	341.5	455.56
39.3	343.3	460.22
39.4	345.0	464.93
39.5	346.8	469.66
39.6	348.6	474.44
39.7	350.3	479.25
39.8	352.1	484.10
39.9	353.9	488.98
40.0	355.6	493.90
40.1	357.4	498.86
40.2	359.2	503.85
40.3	361.0	508.89
40.4	362.8	513.96
40.5	364.6	519.06
40.6	366.4	524.21
40.7	368.2	529.39
40.8	370.0	534.61
40.9	371.8	539.87
41.0	373.6	545.17
41.1	375.5	550.51
41.2	377.3	555.89
41.3	379.1	561.31
41.4	381.0	566.76
41.5	382.8	572.26
41.6	384.7	577.79
41.7	386.5	583.37
41.8	388.4	588.99
41.9	390.2	594.64
42.0	392.1	600.34
42.1	394.0	606.08
42.2	395.8	611.86
42.3	397.7	617.68
42.4	399.6	623.54
42.5	401.5	629.44
42.6	403.4	635.39
42.7	405.3	641.37
42.8	407.2	647.40
42.9	409.1	653.47
43.0	411.0	659.59
43.1	412.9	665.75
43.2	414.8	671.95
43.3	416.7	678.19
43.4	418.7	684.48
43.5	420.6	690.81
43.6	422.5	697.18
43.7	424.5	703.60
43.8	426.4	710.06
43.9	428.4	716.57
44.0	430.3	723.12
44.1	432.3	729.72

Airflex® Weight and Wk² for Steel Cylinders

Diameter (in)	Weight (lb)	Wk ²(lb · ft ²)
44.2	434.2	736.36
44.3	436.2	743.04
44.4	438.2	749.78
44.5	440.2	756.55
44.6	442.1	763.38
44.7	444.1	770.25
44.8	446.1	777.16
44.9	448.1	784.12
45.0	450.1	791.13
45.1	452.1	798.19
45.2	454.1	805.29
45.3	456.1	812.44
45.4	458.1	819.64
45.5	460.2	826.89
45.6	462.2	834.18
45.7	464.2	841.52
45.8	466.2	848.91
45.9	468.3	856.35
46.0	470.3	863.84
46.1	472.4	871.37
46.2	474.4	878.96
46.3	476.5	886.59
46.4	478.5	894.28
46.5	480.6	902.01
46.6	482.7	909.79
46.7	484.7	917.63
46.8	486.8	925.51
46.9	488.9	933.45
47.0	491.0	941.44
47.1	493.1	949.47
47.2	495.2	957.56
47.3	497.3	965.70
47.4	499.4	973.90
47.5	501.5	982.14
47.6	503.6	990.44
47.7	505.7	998.79
47.8	507.9	1007.2
47.9	510.0	1015.6
48.0	512.1	1024.2
48.1	514.2	1032.7
48.2	516.4	1041.3
48.3	518.5	1050.0
48.4	520.7	1058.7
48.5	522.8	1067.5
48.6	525.0	1076.3
48.7	527.2	1085.2
48.8	529.3	1094.2
48.9	531.5	1103.2
49.0	533.7	1112.2
49.1	535.9	1121.3
49.2	538.0	1130.5
49.3	540.2	1139.7
49.4	542.4	1149.0
49.5	544.6	1158.3
49.6	546.8	1167.7
49.7	549.0	1177.1
49.8	551.2	1186.6
49.9	553.5	1196.2
50.0	555.7	1205.8
50.2	560.1	1225.2
50.4	564.6	1244.9
50.6	569.1	1264.7
50.8	573.6	1284.9
51.0	578.1	1305.2
51.2	582.7	1325.8
51.4	587.2	1346.6
51.6	591.8	1367.7
51.8	596.4	1389.1
52.0	601.0	1410.6
52.2	605.7	1432.5
52.4	610.3	1454.5
52.6	615.0	1476.9
52.8	619.7	1499.5
53.0	624.4	1522.3
53.2	629.1	1545.4
53.4	633.8	1568.8
53.6	638.6	1592.4
53.8	643.3	1616.3
54.0	648.1	1640.5
54.2	652.9	1664.9
54.4	657.8	1689.6
54.6	662.6	1714.6
54.8	667.5	1739.9
55.0	672.4	1765.4
55.2	677.3	1791.2
55.4	682.2	1817.4
55.6	687.1	1843.7
55.8	692.1	1870.4
56.0	697.0	1897.4
56.2	702.0	1924.6
56.4	707.0	1952.2
56.6	712.1	1980.0
56.8	717.1	2008.1
57.0	722.2	2036.6
57.2	727.2	2065.3
57.4	732.3	2094.3
57.6	737.4	2123.7
57.8	742.6	2153.3
58.0	747.7	2183.3
58.2	752.9	2213.6
58.4	758.1	2244.1
58.6	763.3	2275.0
58.8	768.5	2306.3
59.0	773.7	2337.8
59.2	779.0	2369.7
59.4	784.2	2401.8
59.6	789.5	2434.4
59.8	794.8	2467.2
60.0	800.2	2500.4
60.2	805.5	2533.9
60.4	810.9	2567.7
60.6	816.3	2601.9
60.8	821.7	2636.4
61.0	827.1	2671.3
61.2	832.5	2706.5
61.4	837.9	2742.0
61.6	843.4	2777.9
61.8	848.9	2814.2
62.0	854.4	2850.8
62.2	859.9	2887.8
62.4	865.5	2925.1
62.6	871.0	2962.8
62.8	876.6	3000.8
63.0	882.2	3039.2
63.2	887.8	3078.0
63.4	893.4	3117.1
63.6	899.1	3156.7
63.8	904.7	3196.6
64.0	910.4	3236.8
64.2	916.1	3277.5
64.4	921.8	3318.5
64.6	927.6	3359.9
64.8	933.3	3401.7
65.0	939.1	3443.9
65.2	944.9	3486.5
65.4	950.7	3529.5
65.6	956.5	3572.9
65.8	962.3	3616.6
66.0	968.2	3660.8
66.2	974.1	3705.4
66.4	980.0	3750.4
66.6	985.9	3795.7
66.8	991.8	3841.5
67.0	997.8	3887.8
67.2	1004	3934.4
67.4	1010	3981.4
67.6	1016	4028.9
67.8	1022	4076.8
68.0	1028	4125.1
68.2	1034	4173.9
68.4	1040	4223.0
68.6	1046	4272.6
68.8	1052	4322.7
69.0	1058	4373.2
69.2	1064	4424.1
69.4	1071	4475.5
69.6	1077	4527.3
69.8	1083	4579.5
70.0	1089	4632.2
70.2	1095	4685.4
70.4	1102	4739.0
70.6	1108	4793.1

Airflex® Weight and Wk² for Steel Cylinders

Diameter (in)	Weight (lb)	Wk ²(lb · ft ²)
70.8	1114	4847.7
71.0	1120	4902.7
71.2	1127	4958.2
71.4	1133	5014.1
71.6	1139	5070.5
71.8	1146	5127.4
72.0	1152	5184.8
72.2	1159	5242.6
72.4	1165	5301.0
72.6	1172	5359.8
72.8	1178	5419.1
73.0	1184	5478.9
73.2	1191	5539.2
73.4	1197	5599.9
73.6	1204	5661.2
73.8	1211	5723.0
74.0	1217	5785.3
74.2	1224	5848.1
74.4	1230	5911.4
74.6	1237	5975.2
74.8	1244	6039.6
75.0	1250	6104.4
75.2	1257	6169.8
75.4	1264	6235.7
75.6	1270	6302.1
75.8	1277	6369.1
76.0	1284	6436.6
76.2	1291	6504.6
76.4	1297	6573.1
76.6	1304	6642.2
76.8	1311	6711.9
77.0	1318	6782.1
77.2	1325	6852.8
77.4	1332	6924.1
77.6	1338	6995.9
77.8	1345	7068.4
78.0	1352	7141.3
78.2	1359	7214.8
78.4	1366	7288.9
78.6	1373	7363.6
78.8	1380	7438.8
79.0	1387	7514.6
79.2	1394	7591.0
79.4	1401	7668.0
79.6	1408	7745.5
79.8	1415	7823.7
80.0	1423	7902.4
80.2	1430	7981.7
80.4	1437	8061.7
80.6	1444	8142.2
80.8	1451	8223.3
81.0	1458	8305.0
81.2	1466	8387.3
81.4	1473	8470.3
81.6	1480	8553.8
81.8	1487	8638.0
82.0	1495	8722.8
82.2	1502	8808.2
82.4	1509	8894.2
82.6	1516	8980.9
82.8	1524	9068.2
83.0	1531	9156.1
83.2	1539	9244.7
83.4	1546	9333.9
83.6	1553	9423.8
83.8	1561	9514.3
84.0	1568	9605.4
84.2	1576	9697.2
84.4	1583	9789.7
84.6	1591	9882.8
84.8	1598	9976.6
85.0	1606	10071
85.2	1613	10166
85.4	1621	10262
85.6	1629	10358
85.8	1636	10456
86.0	1644	10553
86.2	1652	10652
86.4	1659	10751
86.6	1667	10851
86.8	1675	10952
87.0	1682	11053
87.2	1690	11155
87.4	1698	11258
87.6	1706	11361
87.8	1713	11465
88.0	1721	11570
88.2	1729	11675
88.4	1737	11782
88.6	1745	11889
88.8	1753	11996
89.0	1761	12105
89.2	1769	12214
89.4	1776	12324
89.6	1784	12435
89.8	1792	12546
90.0	1800	12658
90.2	1808	12771
90.4	1816	12885
90.6	1824	12999
90.8	1833	13114
91.0	1841	13230
91.2	1849	13347
91.4	1857	13464
91.6	1865	13583
91.8	1873	13702
92.0	1881	13821
92.2	1889	13942
92.4	1898	14063
92.6	1906	14185
92.8	1914	14308
93.0	1922	14432
93.2	1931	14557
93.4	1939	14682
93.6	1947	14808
93.8	1956	14935
94.0	1964	15063
94.2	1972	15192
94.4	1981	15321
94.6	1989	15451
94.8	1998	15582
95.0	2006	15714
95.2	2014	15847
95.4	2023	15981
95.6	2031	16115
95.8	2040	16250
96.0	2048	16386
96.2	2057	16523
96.4	2066	16661
96.6	2074	16800
96.8	2083	16940
97.0	2091	17080
97.2	2100	17221
97.4	2109	17363
97.6	2117	17506
97.8	2126	17650
98.0	2135	17795
98.2	2143	17941
98.4	2152	18088
98.6	2161	18235
98.8	2170	18383
99.0	2178	18533
99.2	2187	18683
99.4	2196	18834
99.6	2205	18986
99.8	2214	19139
100.0	2223	19293
100.2	2232	19448
100.4	2241	19604
100.6	2249	19760
100.8	2258	19918
101.0	2267	20076
101.2	2276	20236
101.4	2285	20396
101.6	2294	20558
101.8	2303	20720
102.0	2312	20883
102.2	2322	21048
102.4	2331	21213
102.6	2340	21379
102.8	2349	21546
103.0	2358	21714

Airflex® Weight and Wk^2 for Steel Cylinders

Diameter (in)	Weight (lb)	Wk^2 (lb · ft^2)
103.2	2367	21884
103.4	2376	22054
103.6	2386	22225
103.8	2395	22397
104.0	2404	22570
104.2	2413	22744
104.4	2423	22919
104.6	2432	23095
104.8	2441	23273
105.0	2451	23451
105.2	2460	23630
105.4	2469	23810
105.6	2479	23991
105.8	2488	24174
106.0	2497	24357
106.2	2507	24541
106.4	2516	24727
106.6	2526	24913
106.8	2535	25101
107.0	2545	25289
107.2	2554	25479
107.4	2564	25669
107.6	2573	25861
107.8	2583	26054
108.0	2593	26248
108.2	2602	26443
108.4	2612	26639
108.6	2621	26836
108.8	2631	27034
109.0	2641	27234
109.2	2650	27434
109.4	2660	27636
109.6	2670	27838
109.8	2680	28042
110.0	2689	28247
110.2	2699	28453
110.4	2709	28660
110.6	2719	28868
110.8	2729	29078
111.0	2739	29288
111.2	2748	29500
111.4	2758	29713
111.6	2768	29927
111.8	2778	30142
112.0	2788	30358
112.2	2798	30575
112.4	2808	30794
112.6	2818	31014
112.8	2828	31235
113.0	2838	31457
113.2	2848	31680
113.4	2858	31905
113.6	2868	32130
113.8	2878	32357

Diameter (in)	Weight (lb)	Wk^2 (lb · ft^2)
114.0	2889	32585
114.2	2899	32814
114.4	2909	33045
114.6	2919	33277
114.8	2929	33509
115.0	2940	33744
115.2	2950	33979
115.4	2960	34216
115.6	2970	34453
115.8	2981	34692
116.0	2991	34933
116.2	3001	35174
116.4	3012	35417
116.6	3022	35661
116.8	3032	35906
117.0	3043	36153
117.2	3053	36401
117.4	3063	36650
117.6	3074	36900
117.8	3084	37152
118.0	3095	37405
118.2	3105	37659
118.4	3116	37915
118.6	3126	38171
118.8	3137	38430
119.0	3148	38689
119.2	3158	38950
119.4	3169	39212
119.6	3179	39475
119.8	3190	39740
120.0	3201	40006

Airflex® Mass and Inertia for Steel Cylinders

The table below lists the mass (kg) and inertia J (kg • m²) for various diameter steel cylinders one millimeter long. For other cylinder lengths multiply the table value by the length in millimeters. To obtain values for diameters not listed, use the following formulas:

$$\text{mass (kg/mm)} = 6.1457\text{E-}06 \cdot D^2$$

$$J\ (\text{kg.m}^2/\text{mm}) = 7.6875\text{E-}13 \cdot D^4$$

An example illustrating the use of this table appears in front of the Weight and Wk² tables.

Material	Factor
Aluminum	0.346
Bronze	1.120
Cast Iron	0.926
Copper	1.113
Lead	1.449

Diameter (mm)	Mass (kg)	Inertia (kg · m²)
30	0,006	6E-07
32	0,006	8E-07
34	0,007	1E-06
36	0,008	1E-06
38	0,009	2E-06
40	0,010	2E-06
42	0,011	2E-06
44	0,012	3E-06
46	0,013	3E-06
48	0,014	4E-06
50	0,015	5E-06
52	0,017	6E-06
54	0,018	7E-06
56	0,019	8E-06
58	0,021	9E-06
60	0,022	1E-05
62	0,024	1E-05
64	0,025	1E-05
66	0,027	1E-05
68	0,028	2E-05
70	0,030	2E-05
72	0,032	2E-05
74	0,034	2E-05
76	0,035	3E-05
78	0,037	3E-05
80	0,039	3E-05
82	0,041	3E-05
84	0,043	4E-05
86	0,045	4E-05
88	0,048	5E-05
90	0,050	5E-05
92	0,052	6E-05
94	0,054	6E-05
96	0,057	7E-05
98	0,059	7E-05
100	0,061	8E-05
102	0,064	8E-05
104	0,066	9E-05
106	0,069	1E-04
108	0,072	0,0001
110	0,074	0,0001
112	0,077	0,0001
114	0,080	0,0001
116	0,083	0,0001
118	0,086	0,0001
120	0,088	0,0002
122	0,091	0,0002
124	0,094	0,0002
126	0,098	0,0002
128	0,101	0,0002
130	0,104	0,0002
132	0,107	0,0002
134	0,110	0,0002
136	0,114	0,0003
138	0,117	0,0003
140	0,120	0,0003
142	0,124	0,0003
144	0,127	0,0003
146	0,131	0,0003
148	0,135	0,0004
150	0,138	0,0004
152	0,142	0,0004
154	0,146	0,0004
156	0,150	0,0005
158	0,153	0,0005
160	0,157	0,0005
162	0,161	0,0005
164	0,165	0,0006
166	0,169	0,0006
168	0,173	0,0006
170	0,178	0,0006
172	0,182	0,0007
174	0,186	0,0007
176	0,190	0,0007
178	0,195	0,0008
180	0,199	0,0008
182	0,204	0,0008
184	0,208	0,0009
186	0,213	0,0009
188	0,217	0,0010
190	0,222	0,0010
192	0,227	0,0010
194	0,231	0,0011
196	0,236	0,0011
198	0,241	0,0012
200	0,246	0,0012
202	0,251	0,0013
204	0,256	0,0013
206	0,261	0,0014
208	0,266	0,0014
210	0,271	0,0015
212	0,276	0,0016
214	0,281	0,0016
216	0,287	0,0017
218	0,292	0,0017
220	0,297	0,0018
222	0,303	0,0019
224	0,308	0,0019
226	0,314	0,0020
228	0,319	0,0021
230	0,325	0,0022
232	0,331	0,0022
234	0,337	0,0023
236	0,342	0,0024
238	0,348	0,0025
240	0,354	0,0026

Airflex® Mass and Inertia for Steel Cylinders

Diameter (mm)	Mass (kg)	Inertia (kg · m ^{2})
242	0,360	0,0026
244	0,366	0,0027
246	0,372	0,0028
248	0,378	0,0029
250	0,384	0,0030
252	0,390	0,0031
254	0,396	0,0032
256	0,403	0,0033
258	0,409	0,0034
260	0,415	0,0035
262	0,422	0,0036
264	0,428	0,0037
266	0,435	0,0038
268	0,441	0,0040
270	0,448	0,0041
272	0,455	0,0042
274	0,461	0,0043
276	0,468	0,0045
278	0,475	0,0046
280	0,482	0,0047
282	0,489	0,0049
284	0,496	0,0050
286	0,503	0,0051
288	0,510	0,0053
290	0,517	0,0054
292	0,524	0,0056
294	0,531	0,0057
296	0,538	0,0059
298	0,546	0,0061
300	0,553	0,0062
302	0,561	0,0064
304	0,568	0,0066
306	0,575	0,0067
308	0,583	0,0069
310	0,591	0,0071
312	0,598	0,0073
314	0,606	0,0075
316	0,614	0,0077
318	0,621	0,0079
320	0,629	0,0081
322	0,637	0,0083
324	0,645	0,0085
326	0,653	0,0087
328	0,661	0,0089
330	0,669	0,0091
332	0,677	0,0093
334	0,686	0,0096
336	0,694	0,0098
338	0,702	0,0100
340	0,710	0,0103
342	0,719	0,0105
344	0,727	0,0108
346	0,736	0,0110
348	0,744	0,0113
350	0,753	0,0115
352	0,761	0,0118
354	0,770	0,0121
356	0,779	0,0123
358	0,788	0,0126
360	0,796	0,0129
362	0,805	0,0132
364	0,814	0,0135
366	0,823	0,0138
368	0,832	0,0141
370	0,841	0,0144
372	0,850	0,0147
374	0,860	0,0150
376	0,869	0,0154
378	0,878	0,0157
380	0,887	0,0160
382	0,897	0,0164
384	0,906	0,0167
386	0,916	0,0171
388	0,925	0,0174
390	0,935	0,0178
392	0,944	0,0182
394	0,954	0,0185
396	0,964	0,0189
398	0,974	0,0193
400	0,983	0,0197
402	0,993	0,0201
404	1,003	0,0205
406	1,013	0,0209
408	1,023	0,0213
410	1,033	0,0217
412	1,043	0,0222
414	1,053	0,0226
416	1,064	0,0230
418	1,074	0,0235
420	1,084	0,0239
422	1,094	0,0244
424	1,105	0,0248
426	1,115	0,0253
428	1,126	0,0258
430	1,136	0,0263
432	1,147	0,0268
434	1,158	0,0273
436	1,168	0,0278
438	1,179	0,0283
440	1,190	0,0288
442	1,201	0,0293
444	1,212	0,0299
446	1,222	0,0304
448	1,233	0,0310
450	1,245	0,0315
452	1,256	0,0321
454	1,267	0,0327
456	1,278	0,0332
458	1,289	0,0338
460	1,300	0,0344
462	1,312	0,0350
464	1,323	0,0356
466	1,335	0,0363
468	1,346	0,0369
470	1,358	0,0375
472	1,369	0,0382
474	1,381	0,0388
476	1,392	0,0395
478	1,404	0,0401
480	1,416	0,0408
482	1,428	0,0415
484	1,440	0,0422
486	1,452	0,0429
488	1,464	0,0436
490	1,476	0,0443
492	1,488	0,0450
494	1,500	0,0458
496	1,512	0,0465
498	1,524	0,0473
500	1,536	0,0480
502	1,549	0,0488
504	1,561	0,0496
506	1,574	0,0504
508	1,586	0,0512
510	1,598	0,0520
512	1,611	0,0528
514	1,624	0,0537
516	1,636	0,0545
518	1,649	0,0553
520	1,662	0,0562
522	1,675	0,0571
524	1,687	0,0580
526	1,700	0,0588
528	1,713	0,0597
530	1,726	0,0607
532	1,739	0,0616
534	1,752	0,0625
536	1,766	0,0635
538	1,779	0,0644
540	1,792	0,0654
542	1,805	0,0663
544	1,819	0,0673
546	1,832	0,0683
548	1,846	0,0693
550	1,859	0,0703
552	1,873	0,0714
554	1,886	0,0724
556	1,900	0,0735
558	1,914	0,0745

Airflex® Mass and Inertia for Steel Cylinders

Diameter (mm)	Mass (kg)	Inertia (kg · m²)
560	1,927	0,0756
562	1,941	0,0767
564	1,955	0,0778
566	1,969	0,0789
568	1,983	0,0800
570	1,997	0,0811
572	2,011	0,0823
574	2,025	0,0835
576	2,039	0,0846
578	2,053	0,0858
580	2,067	0,0870
582	2,082	0,0882
584	2,096	0,0894
586	2,110	0,0907
588	2,125	0,0919
590	2,139	0,0932
592	2,154	0,0944
594	2,168	0,0957
596	2,183	0,0970
598	2,198	0,0983
600	2,212	0,0996
602	2,227	0,1010
604	2,242	0,1023
606	2,257	0,1037
608	2,272	0,1051
610	2,287	0,1064
612	2,302	0,1078
614	2,317	0,1093
616	2,332	0,1107
618	2,347	0,1121
620	2,362	0,1136
622	2,378	0,1151
624	2,393	0,1166
626	2,408	0,1181
628	2,424	0,1196
630	2,439	0,1211
632	2,455	0,1226
634	2,470	0,1242
636	2,486	0,1258
638	2,502	0,1274
640	2,517	0,1290
642	2,533	0,1306
644	2,549	0,1322
646	2,565	0,1339
648	2,581	0,1355
650	2,597	0,1372
652	2,613	0,1389
654	2,629	0,1406
656	2,645	0,1424
658	2,661	0,1441
660	2,677	0,1459
662	2,693	0,1476
664	2,710	0,1494
666	2,726	0,1512
668	2,742	0,1531
670	2,759	0,1549
672	2,775	0,1568
674	2,792	0,1586
676	2,808	0,1605
678	2,825	0,1624
680	2,842	0,1644
682	2,859	0,1663
684	2,875	0,1683
686	2,892	0,1702
688	2,909	0,1722
690	2,926	0,1743
692	2,943	0,1763
694	2,960	0,1783
696	2,977	0,1804
698	2,994	0,1825
700	3,011	0,1846
702	3,029	0,1867
704	3,046	0,1888
706	3,063	0,1910
708	3,081	0,1932
710	3,098	0,1954
712	3,116	0,1976
714	3,133	0,1998
716	3,151	0,2020
718	3,168	0,2043
720	3,186	0,2066
722	3,204	0,2089
724	3,221	0,2112
726	3,239	0,2136
728	3,257	0,2159
730	3,275	0,2183
732	3,293	0,2207
734	3,311	0,2231
736	3,329	0,2256
738	3,347	0,2280
740	3,365	0,2305
742	3,384	0,2330
744	3,402	0,2355
746	3,420	0,2381
748	3,439	0,2407
750	3,457	0,2432
752	3,475	0,2458
754	3,494	0,2485
756	3,512	0,2511
758	3,531	0,2538
760	3,550	0,2565
762	3,568	0,2592
764	3,587	0,2619
766	3,606	0,2647
768	3,625	0,2674
770	3,644	0,2702
772	3,663	0,2731
774	3,682	0,2759
776	3,701	0,2788
778	3,720	0,2816
780	3,739	0,2846
782	3,758	0,2875
784	3,777	0,2904
786	3,797	0,2934
788	3,816	0,2964
790	3,836	0,2994
792	3,855	0,3025
794	3,874	0,3055
796	3,894	0,3086
798	3,914	0,3117
800	3,933	0,3149
802	3,953	0,3180
804	3,973	0,3212
806	3,992	0,3244
808	4,012	0,3277
810	4,032	0,3309
812	4,052	0,3342
814	4,072	0,3375
816	4,092	0,3408
818	4,112	0,3442
820	4,132	0,3476
822	4,153	0,3510
824	4,173	0,3544
826	4,193	0,3579
828	4,213	0,3613
830	4,234	0,3648
832	4,254	0,3684
834	4,275	0,3719
836	4,295	0,3755
838	4,316	0,3791
840	4,336	0,3827
842	4,357	0,3864
844	4,378	0,3901
846	4,399	0,3938
848	4,419	0,3975
850	4,440	0,4013
852	4,461	0,4051
854	4,482	0,4089
856	4,503	0,4127
858	4,524	0,4166
860	4,545	0,4205
862	4,567	0,4244
864	4,588	0,4284
866	4,609	0,4324
868	4,630	0,4364
870	4,652	0,4404
872	4,673	0,4445
874	4,695	0,4486
876	4,716	0,4527

Airflex® Mass and Inertia for Steel Cylinders

Diameter (mm)	Mass (kg)	Inertia (kg×m ^{2})
878	4,738	0,4568
880	4,759	0,4610
882	4,781	0,4652
884	4,803	0,4695
886	4,824	0,4737
888	4,846	0,4780
890	4,868	0,4823
892	4,890	0,4867
894	4,912	0,4911
896	4,934	0,4955
898	4,956	0,4999
900	4,978	0,5044
902	5,000	0,5089
904	5,022	0,5134
906	5,045	0,5180
908	5,067	0,5226
910	5,089	0,5272
912	5,112	0,5318
914	5,134	0,5365
916	5,157	0,5412
918	5,179	0,5460
920	5,202	0,5507
922	5,224	0,5555
924	5,247	0,5604
926	5,270	0,5652
928	5,293	0,5701
930	5,315	0,5751
932	5,338	0,5800
934	5,361	0,5850
936	5,384	0,5900
938	5,407	0,5951
940	5,430	0,6002
942	5,453	0,6053
944	5,477	0,6105
946	5,500	0,6157
948	5,523	0,6209
950	5,546	0,6262
952	5,570	0,6314
954	5,593	0,6368
956	5,617	0,6421
958	5,640	0,6475
960	5,664	0,6529
962	5,688	0,6584
964	5,711	0,6639
966	5,735	0,6694
968	5,759	0,6750
970	5,782	0,6806
972	5,806	0,6862
974	5,830	0,6919
976	5,854	0,6976
978	5,878	0,7033
980	5,902	0,7091
982	5,926	0,7149
984	5,951	0,7207
986	5,975	0,7266
988	5,999	0,7325
990	6,023	0,7385
992	6,048	0,7444
994	6,072	0,7505
996	6,097	0,7565
998	6,121	0,7626
1000	6,146	0,7688
1002	6,170	0,7749
1004	6,195	0,7811
1006	6,220	0,7874
1008	6,244	0,7936
1010	6,269	0,8000
1012	6,294	0,8063
1014	6,319	0,8127
1016	6,344	0,8191
1018	6,369	0,8256
1020	6,394	0,8321
1022	6,419	0,8387
1024	6,444	0,8452
1026	6,469	0,8519
1028	6,495	0,8585
1030	6,520	0,8652
1032	6,545	0,8720
1034	6,571	0,8788
1036	6,596	0,8856
1038	6,622	0,8924
1040	6,647	0,8993
1042	6,673	0,9063
1044	6,698	0,9132
1046	6,724	0,9203
1048	6,750	0,9273
1050	6,776	0,9344
1052	6,801	0,9416
1054	6,827	0,9487
1056	6,853	0,9560
1058	6,879	0,9632
1060	6,905	0,9705
1062	6,931	0,9779
1064	6,958	0,9853
1066	6,984	0,9927
1068	7,010	1,0002
1070	7,036	1,0077
1072	7,063	1,0152
1074	7,089	1,0228
1076	7,115	1,0305
1078	7,142	1,0382
1080	7,168	1,0459
1082	7,195	1,0536
1084	7,222	1,0615
1086	7,248	1,0693
1088	7,275	1,0772
1090	7,302	1,0852
1092	7,329	1,0931
1094	7,355	1,1012
1096	7,382	1,1092
1098	7,409	1,1174
1100	7,436	1,1255
1102	7,463	1,1337
1104	7,490	1,1420
1106	7,518	1,1503
1108	7,545	1,1586
1110	7,572	1,1670
1112	7,599	1,1755
1114	7,627	1,1839
1116	7,654	1,1925
1118	7,682	1,2010
1120	7,709	1,2096
1122	7,737	1,2183
1124	7,764	1,2270
1126	7,792	1,2358
1128	7,820	1,2446
1130	7,847	1,2534
1132	7,875	1,2623
1134	7,903	1,2713
1136	7,931	1,2803
1138	7,959	1,2893
1140	7,987	1,2984
1142	8,015	1,3075
1144	8,043	1,3167
1146	8,071	1,3259
1148	8,099	1,3352
1150	8,128	1,3445
1152	8,156	1,3539
1154	8,184	1,3634
1156	8,213	1,3728
1158	8,241	1,3824
1160	8,270	1,3919
1162	8,298	1,4016
1164	8,327	1,4112
1166	8,355	1,4210
1168	8,384	1,4307
1170	8,413	1,4406
1172	8,442	1,4504
1174	8,470	1,4604
1176	8,499	1,4703
1178	8,528	1,4804
1180	8,557	1,4904
1182	8,586	1,5006
1184	8,615	1,5107
1186	8,645	1,5210
1188	8,674	1,5313
1190	8,703	1,5416
1192	8,732	1,5520
1194	8,762	1,5624

Airflex® Mass and Inertia for Steel Cylinders

Diameter (mm)	Mass (kg)	Inertia (kg · m²)
1196	8,791	1,5729
1198	8,820	1,5835
1200	8,850	1,5941
1202	8,879	1,6047
1204	8,909	1,6154
1206	8,939	1,6262
1208	8,968	1,6370
1210	8,998	1,6479
1212	9,028	1,6588
1214	9,058	1,6698
1216	9,087	1,6808
1218	9,117	1,6919
1220	9,147	1,7030
1222	9,177	1,7142
1224	9,207	1,7255
1226	9,237	1,7368
1228	9,268	1,7481
1230	9,298	1,7596
1232	9,328	1,7710
1234	9,358	1,7826
1236	9,389	1,7942
1238	9,419	1,8058
1240	9,450	1,8175
1242	9,480	1,8292
1244	9,511	1,8411
1246	9,541	1,8529
1248	9,572	1,8648
1250	9,603	1,8768
1252	9,633	1,8889
1254	9,664	1,9010
1256	9,695	1,9131
1258	9,726	1,9253
1260	9,757	1,9376
1262	9,788	1,9499
1264	9,819	1,9623
1266	9,850	1,9748
1268	9,881	1,9873
1270	9,912	1,9999
1272	9,944	2,0125
1274	9,975	2,0252
1276	10,01	2,0379
1278	10,04	2,0507
1280	10,07	2,0636
1282	10,10	2,0765
1284	10,13	2,0895
1286	10,16	2,1026
1288	10,20	2,1157
1290	10,23	2,1288
1292	10,26	2,1421
1294	10,29	2,1554
1296	10,32	2,1687
1298	10,35	2,1821
1300	10,39	2,1956
1305	10,47	2,2296
1310	10,55	2,2640
1315	10,63	2,2987
1320	10,71	2,3339
1325	10,79	2,3695
1330	10,87	2,4054
1335	10,95	2,4418
1340	11,04	2,4786
1345	11,12	2,5158
1350	11,20	2,5534
1355	11,28	2,5914
1360	11,37	2,6299
1365	11,45	2,6688
1370	11,53	2,7081
1375	11,62	2,7479
1380	11,70	2,7881
1385	11,79	2,8287
1390	11,87	2,8698
1395	11,96	2,9113
1400	12,05	2,9532
1405	12,13	2,9956
1410	12,22	3,0385
1415	12,31	3,0818
1420	12,39	3,1256
1425	12,48	3,1699
1430	12,57	3,2146
1435	12,66	3,2598
1440	12,74	3,3055
1445	12,83	3,3516
1450	12,92	3,3983
1455	13,01	3,4454
1460	13,10	3,4930
1465	13,19	3,5411
1470	13,28	3,5897
1475	13,37	3,6388
1480	13,46	3,6883
1485	13,55	3,7384
1490	13,64	3,7890
1495	13,74	3,8402
1500	13,83	3,8918
1505	13,92	3,9439
1510	14,01	3,9966
1515	14,11	4,0498
1520	14,20	4,1035
1525	14,29	4,1578
1530	14,39	4,2126
1535	14,48	4,2679
1540	14,58	4,3238
1545	14,67	4,3803
1550	14,77	4,4372
1555	14,86	4,4948
1560	14,96	4,5529
1565	15,05	4,6115
1570	15,15	4,6707
1575	15,25	4,7305
1580	15,34	4,7909
1585	15,44	4,8518
1590	15,54	4,9133
1595	15,63	4,9754
1600	15,73	5,0381
1605	15,83	5,1014
1610	15,93	5,1652
1615	16,03	5,2297
1620	16,13	5,2947
1625	16,23	5,3604
1630	16,33	5,4267
1635	16,43	5,4936
1640	16,53	5,5611
1645	16,63	5,6292
1650	16,73	5,6980
1655	16,83	5,7674
1660	16,94	5,8374
1665	17,04	5,9080
1670	17,14	5,9793
1675	17,24	6,0512
1680	17,35	6,1238
1685	17,45	6,1970
1690	17,55	6,2709
1695	17,66	6,3455
1700	17,76	6,4207
1705	17,87	6,4965
1710	17,97	6,5731
1715	18,08	6,6503
1720	18,18	6,7282
1725	18,29	6,8068
1730	18,39	6,8860
1735	18,50	6,9660
1740	18,61	7,0466
1745	18,71	7,1280
1750	18,82	7,2100
1755	18,93	7,2928
1760	19,04	7,3763
1765	19,15	7,4604
1770	19,25	7,5453
1775	19,36	7,6309
1780	19,47	7,7173
1785	19,58	7,8044
1790	19,69	7,8922
1795	19,80	7,9807
1800	19,91	8,0700
1805	20,02	8,1601
1810	20,13	8,2509
1815	20,25	8,3424
1820	20,36	8,4347
1825	20,47	8,5278
1830	20,58	8,6216

Airflex® Mass and Inertia for Steel Cylinders

Diameter (mm)	Mass (kg)	Inertia (kg · m²)
1835	20,69	8,7162
1840	20,81	8,8116
1845	20,92	8,9078
1850	21,03	9,0048
1855	21,15	9,1025
1860	21,26	9,2010
1865	21,38	9,3004
1870	21,49	9,4005
1875	21,61	9,5015
1880	21,72	9,6032
1885	21,84	9,7058
1890	21,95	9,8092
1895	22,07	9,9134
1900	22,19	10,018
1905	22,30	10,124
1910	22,42	10,231
1915	22,54	10,339
1920	22,66	10,447
1925	22,77	10,556
1930	22,89	10,666
1935	23,01	10,777
1940	23,13	10,889
1945	23,25	11,002
1950	23,37	11,115
1955	23,49	11,230
1960	23,61	11,345
1965	23,73	11,461
1970	23,85	11,578
1975	23,97	11,696
1980	24,09	11,815
1985	24,22	11,935
1990	24,34	12,056
1995	24,46	12,177
2000	24,58	12,300
2005	24,71	12,423
2010	24,83	12,548
2015	24,95	12,673
2020	25,08	12,799
2025	25,20	12,927
2030	25,33	13,055
2035	25,45	13,184
2040	25,58	13,314
2045	25,70	13,445
2050	25,83	13,577
2055	25,95	13,710
2060	26,08	13,844
2065	26,21	13,979
2070	26,33	14,115
2075	26,46	14,251
2080	26,59	14,389
2085	26,72	14,528
2090	26,85	14,668
2095	26,97	14,809
2100	27,10	14,951
2105	27,23	15,094
2110	27,36	15,238
2115	27,49	15,382
2120	27,62	15,528
2125	27,75	15,675
2130	27,88	15,824
2135	28,01	15,973
2140	28,14	16,123
2145	28,28	16,274
2150	28,41	16,426
2155	28,54	16,580
2160	28,67	16,734
2165	28,81	16,889
2170	28,94	17,046
2175	29,07	17,204
2180	29,21	17,362
2185	29,34	17,522
2190	29,48	17,683
2195	29,61	17,845
2200	29,75	18,008
2205	29,88	18,173
2210	30,02	18,338
2215	30,15	18,505
2220	30,29	18,672
2225	30,43	18,841
2230	30,56	19,011
2235	30,70	19,182
2240	30,84	19,354
2245	30,97	19,528
2250	31,11	19,702
2255	31,25	19,878
2260	31,39	20,055
2265	31,53	20,233
2270	31,67	20,412
2275	31,81	20,593
2280	31,95	20,774
2285	32,09	20,957
2290	32,23	21,141
2295	32,37	21,326
2300	32,51	21,513
2305	32,65	21,700
2310	32,79	21,889
2315	32,94	22,079
2320	33,08	22,271
2325	33,22	22,463
2330	33,36	22,657
2335	33,51	22,852
2340	33,65	23,049
2345	33,80	23,246
2350	33,94	23,445
2355	34,08	23,646
2360	34,23	23,847
2365	34,37	24,050
2370	34,52	24,254
2375	34,67	24,459
2380	34,81	24,666
2385	34,96	24,874
2390	35,10	25,083
2395	35,25	25,293
2400	35,40	25,505
2405	35,55	25,718
2410	35,69	25,933
2415	35,84	26,149
2420	35,99	26,366
2425	36,14	26,585
2430	36,29	26,805
2435	36,44	27,026
2440	36,59	27,249
2445	36,74	27,473
2450	36,89	27,698
2455	37,04	27,925
2460	37,19	28,153
2465	37,34	28,383
2470	37,49	28,614
2475	37,65	28,846
2480	37,80	29,080
2485	37,95	29,315
2490	38,10	29,552
2495	38,26	29,790
2500	38,41	30,029
2505	38,56	30,270
2510	38,72	30,513
2515	38,87	30,757
2520	39,03	31,002
2525	39,18	31,249
2530	39,34	31,497
2535	39,49	31,747
2540	39,65	31,998
2545	39,81	32,250
2550	39,96	32,505
2555	40,12	32,760
2560	40,28	33,018
2565	40,43	33,276
2570	40,59	33,536
2575	40,75	33,798
2580	40,91	34,062
2585	41,07	34,326
2590	41,23	34,593
2595	41,39	34,861
2600	41,54	35,130
2605	41,70	35,401
2610	41,87	35,674
2615	42,03	35,948
2620	42,19	36,223
2625	42,35	36,501

Airflex® Mass and Inertia for Steel Cylinders

Diameter (mm)	Mass (kg)	Inertia (kg · m ^{2})
2630	42,51	36,780
2635	42,67	37,060
2640	42,83	37,342
2645	43,00	37,626
2650	43,16	37,911
2655	43,32	38,198
2660	43,48	38,487
2665	43,65	38,777
2670	43,81	39,069
2675	43,98	39,362
2680	44,14	39,657
2685	44,31	39,954
2690	44,47	40,253
2695	44,64	40,553
2700	44,80	40,855
2705	44,97	41,158
2710	45,13	41,463
2715	45,30	41,770
2720	45,47	42,079
2725	45,64	42,389
2730	45,80	42,701
2735	45,97	43,014
2740	46,14	43,330
2745	46,31	43,647
2750	46,48	43,966
2755	46,65	44,287
2760	46,82	44,609
2765	46,99	44,933
2770	47,16	45,259
2775	47,33	45,587
2780	47,50	45,916
2785	47,67	46,247
2790	47,84	46,580
2795	48,01	46,915
2800	48,18	47,252
2805	48,35	47,590
2810	48,53	47,930
2815	48,70	48,272
2820	48,87	48,616
2825	49,05	48,962
2830	49,22	49,310
2835	49,39	49,659
2840	49,57	50,010
2845	49,74	50,363
2850	49,92	50,718
2855	50,09	51,075
2860	50,27	51,434
2865	50,45	51,794
2870	50,62	52,157
2875	50,80	52,521
2880	50,97	52,888
2885	51,15	53,256
2890	51,33	53,626

Diameter (mm)	Mass (kg)	Inertia (kg · m ^{2})
2895	51,51	53,998
2900	51,69	54,372
2905	51,86	54,748
2910	52,04	55,126
2915	52,22	55,506
2920	52,40	55,888
2925	52,58	56,272
2930	52,76	56,657
2935	52,94	57,045
2940	53,12	57,435
2945	53,30	57,826
2950	53,48	58,220
2955	53,66	58,616
2960	53,85	59,014
2965	54,03	59,413
2970	54,21	59,815
2975	54,39	60,219
2980	54,58	60,625
2985	54,76	61,033
2990	54,94	61,443
2995	55,13	61,855
3000	55,31	62,269

Airflex® Formulas for Geometric
Solids Radius of Gyration

The formulas on the following pages permit weight and Wk^2 or mass and inertia calculations of complex parts by dividing them into common geometric components.

Subscript $_{gg}$ indicates an axis which passed through the center of gravity of the geometric solid. Subscript $_{xx}$ indicates any other parallel axis of rotation.

The sum of the component's weight or mass results in the total weight or mass of the complex part.

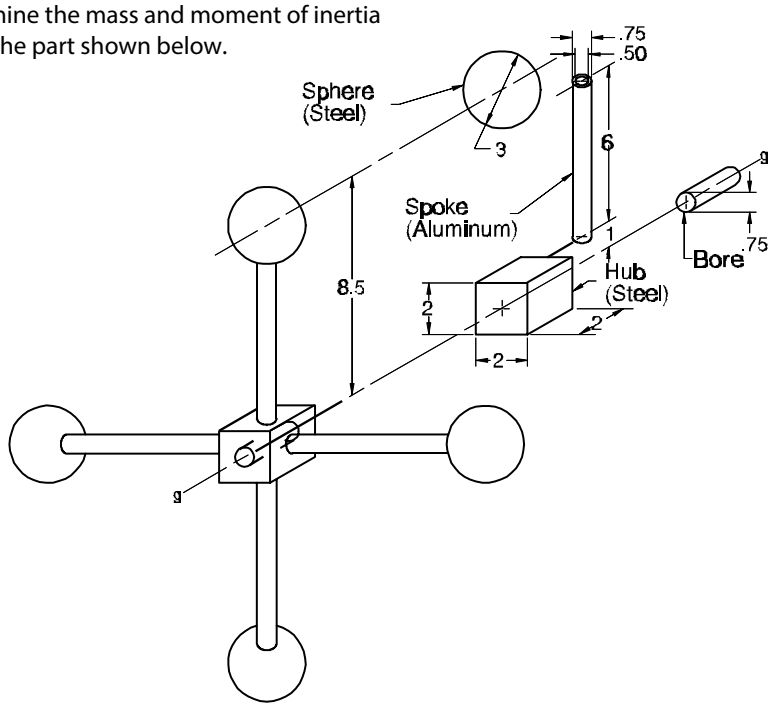
The product of the weight and radius of gyration squared results in the Wk^2 of the component. The sum of all the component Wk^2's referred to the axis of rotation results in the Wk^2 of the complex part.

The product of the mass and radius of gyration squared results in the moment of inertia of component.

MATERIAL	p (lb / in ^{3})	p (kg / m ^{3})
Aluminum	0.098	2710
Bronze	0.317	8765
Cast Iron	0.262	7244
Copper	0.315	8710
Lead	0.410	11337
Steel	0.283	7825

EXAMPLE:

Using the geometrical solid formulas de - termine the mass and moment of inertia for the part shown below.



Component	Weight Calculation	Weight (lb)
Hub	$\rho \cdot H \cdot T \cdot L = .283 \cdot 2 \cdot 2 \cdot 2$	= 2. 3
Bore	$-\frac{\rho \cdot \pi \cdot D^2 \cdot L}{4} - \frac{.283 \cdot \pi \cdot .75^2 \cdot 2}{4}$	= -. 3
Spoke	$4 \cdot \left[\frac{\pi}{4} \cdot \rho \cdot L \cdot (D^2 - d^2) \right] = \pi \cdot .098 \cdot 6 \cdot (.75^2 - .5^2)$	= .6
Spheres	$4 \cdot \left[\frac{\pi \cdot \rho \cdot D^3}{6} \right] = \frac{4 \cdot \pi \cdot .283 \cdot 3^3}{6}$	= 16. 0
	Total weight	= 18.6 lb
	Mass = .58 slug	(8.4 kg)

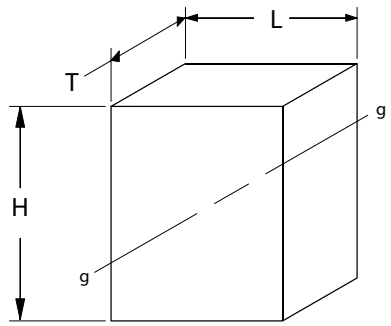
Component	Radius of Gyration Calculation	k ^{2} (in ^{2})
Hub	$\frac{H^2 + L^2}{12} = \frac{2^2 + 2^2}{12}$	= .6 7
Bore	$\frac{D^2}{8} = \frac{.75^2}{8}$	= .0 7
Spoke	$\frac{D^2 + d^2}{16} + \frac{L^2}{12} + r^2 = \frac{.75^2 + .5^2}{16} + \frac{6^2}{12} + (3+1)^2$	= 19.0 5
Sphere	$\frac{D^2}{10} + y^2 = \frac{3^2}{10} + 8.5^2$	= 73.1 5

Component	Wk ^{2} Calculations	Wk ^{2} (lb×in ^{2})
Hub	2.3 · .67	= 1.54
Bore	– .3 · .07	= -.02
Spoke	.6 · 19.05	= 11.4 3
Sphere	16.0 · 73.1 5	= 1170.4 0
	Wk^2	= 1183 lb · in^2
	$J = \frac{Wk^2}{g} = \frac{8.22}{32.2} = .26$ lb · ft · se c^2 (.35 kg · m^2)	= 8.22 lb · ft^2

Airflex® Formulas for Geometric Solids
Radius of Gyration

Rectangular Prism

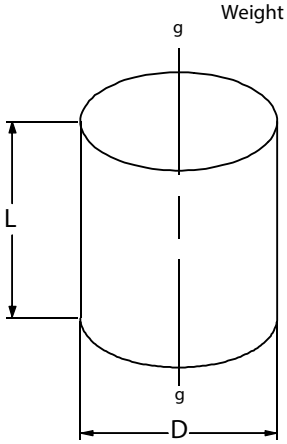
Weight = ρ H T L



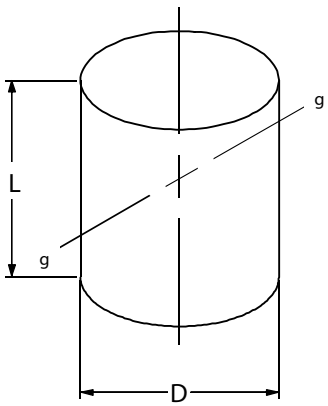
$$k_{gg}^2 = \frac{H^2 + L^2}{12}$$

Solid Cylinders

$$\text{Weight} = \frac{\rho \pi D^2 L}{4}$$

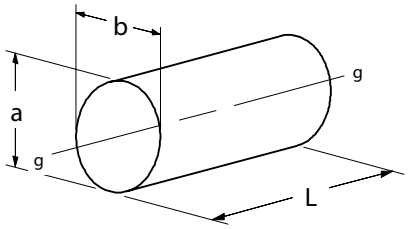


$$k_{gg}^2 = \frac{D^2}{8}$$



$$k_{gg}^2 = \frac{L^2}{12} + \frac{D^2}{16}$$

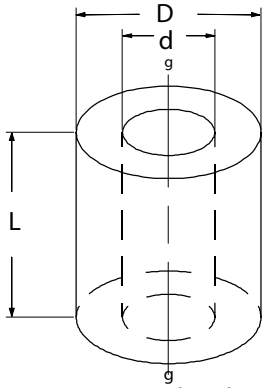
Ellipsoidal Cylinders



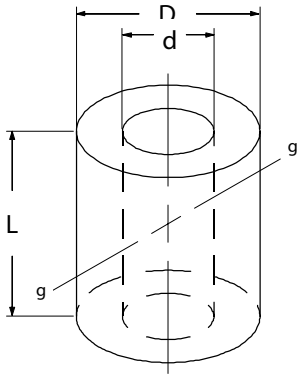
$$k_{gg}^2 = \frac{a^2 + b^2}{16}$$

Hollow Cylinders

$$\text{Weigh t} = \frac{\pi}{4} \rho L (D^2 - d^2)$$

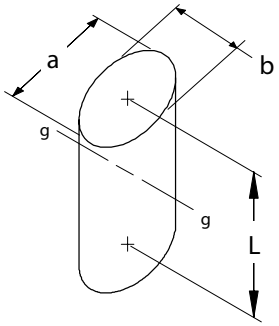


$$k_{gg}^2 = \frac{D^2 + d^2}{8}$$

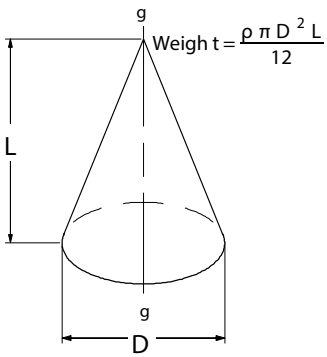


$$k_{gg}^2 = \frac{D^2 + d^2}{16} + \frac{L^2}{12}$$

Cone s

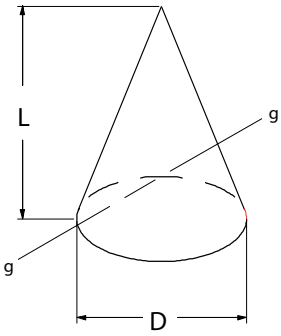


$$k_{gg}^2 = \frac{\pi a^2}{64} + \frac{L^2}{12}$$



$$\text{Weigh t} = \frac{\rho \pi D^2 L}{12}$$

$$k_{gg}^2 = \frac{3D^2}{40}$$

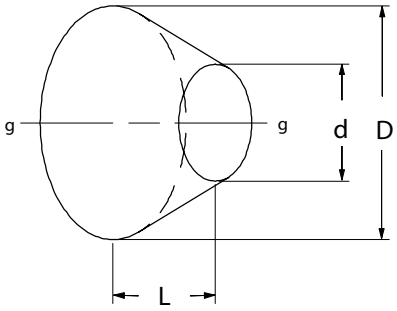


$$k_{gg}^2 = \frac{3D^2 + 3L^2}{80}$$

Airflex® Formulas for Geometric Solids
Radius of Gyration

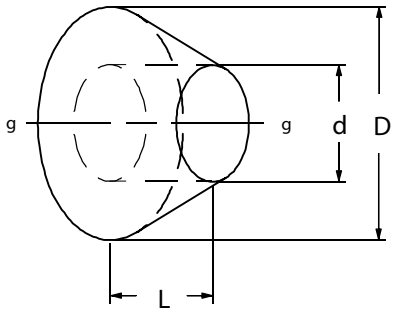
Frustrums of Cones

$$\text{Weight} = \frac{\rho \pi L}{12} \frac{(D^3 - d^3)}{(D - d)}$$



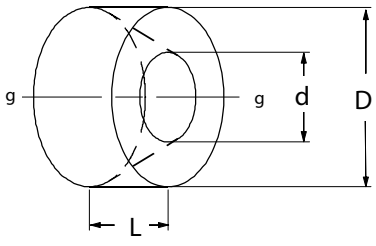
$$k^2_{gg} = \frac{3(D^5 - d^5)}{40(D^3 - d^3)}$$

$$\text{Weight} = \frac{\rho \pi L}{4}\left[\frac{(D^3 - d^3)}{3(D - d)} - d^2\right]$$



$$k^2_{gg} = \frac{3}{40}\left[\frac{D^5 - 5Dd^4 + 4d^5}{D^3 - 3Dd^2 + 2d^3}\right]$$

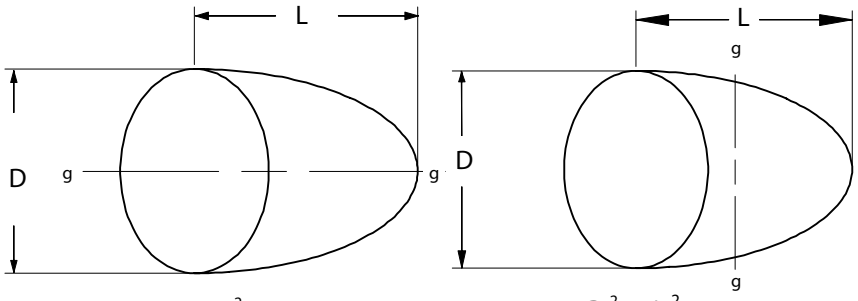
$$\text{Weight} = \frac{\rho \pi L}{4}\left[D^2 - \frac{(D^3 - d^3)}{3(D - d)}\right]$$



$$k^2_{gg} = \frac{3}{40}\left[\frac{4D^5 - 5D^4d + d^5}{2D^3 - 3D^2d + d^3}\right]$$

Paraboloid

$$\text{Weight} = \frac{\rho \pi L D^2}{8}$$

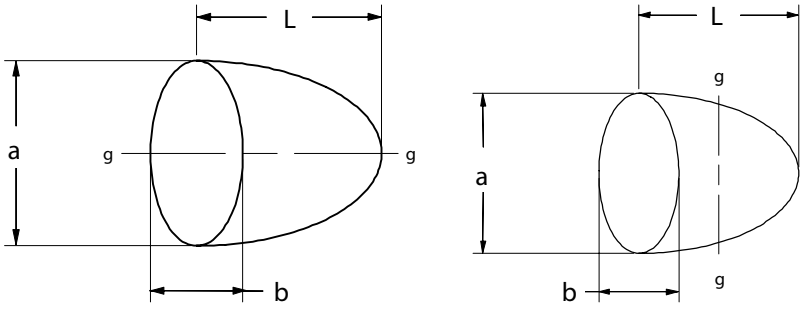


$$k^2_{gg} = \frac{D^2}{12}$$

$$k^2_{gg} = \frac{3D^2 + 4L^2}{72}$$

Elliptic Paraboloids

$$\text{Weigh t} = \frac{\rho \pi a b L}{8}$$

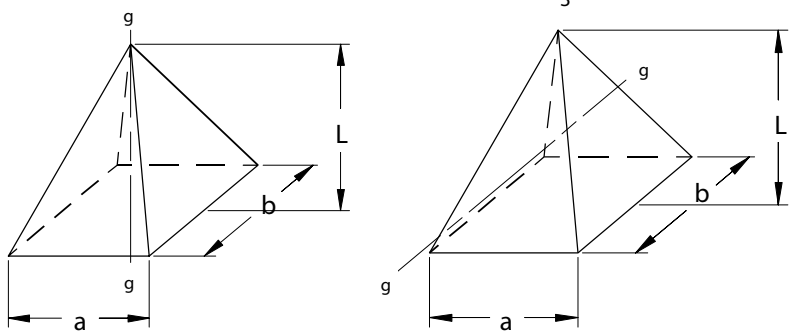


$$k^2_{gg} = \frac{a^2 + b^2}{24}$$

$$k^2_{gg} = \frac{3b^2 + 4L^2}{72}$$

Rectangular Pyramids

$$\text{Weigh t} = \frac{a\,b\,L}{3}\rho$$



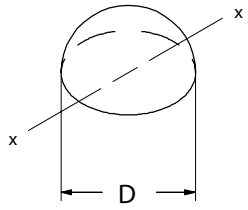
$$k^2_{gg} = \frac{a^2 + b^2}{20}$$

$$k^2_{gg} = \frac{4a^2 + 3L^2}{80}$$

Airflex® Formulas for Geometric Solids
Radius of Gyration

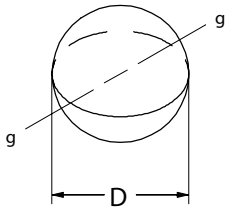
Spheres

Weight $= \frac{\rho \pi D^3}{12}$



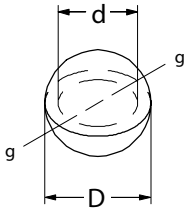
$k^2_{xx} = \frac{D^2}{10}$

Weight $= \frac{\rho \pi D^3}{6}$



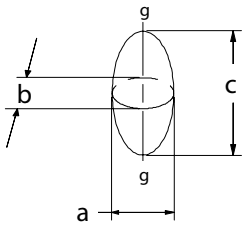
$k^2_{gg} = \frac{D^2}{10}$

Weight $= \frac{\rho \pi}{6}(D^3 - d^3)$



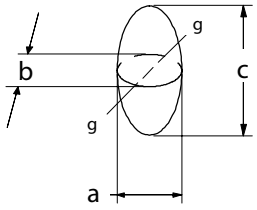
$k^2_{gg} = \frac{D^5 - d^5}{10(D^3 - d^3)}$

Ellipsoids

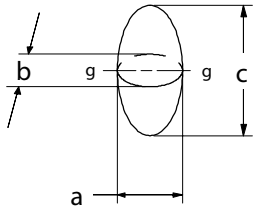


$k^2_{gg} = \frac{a^2 + b^2}{20}$

Weight $= \frac{\rho \pi a b c}{6}$



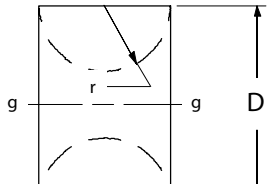
$k^2_{gg} = \frac{a^2 + c^2}{20}$



$k^2_{gg} = \frac{b^2 + c^2}{20}$

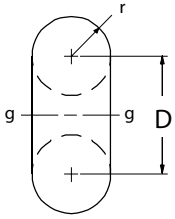
Torus

Weight $= \frac{1}{6}\rho \pi r^2 [3 \pi D - 8r]$



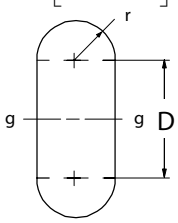
$k^2_{gg} = \frac{15 \pi D^3 - 120 D^2 r + 45 \pi r^2 D - 64 r^3}{60 \pi D - 160 r}$

Weight $= \rho \pi D r^2$



$k^2_{gg} = \frac{D^2 + 3r^2}{4}$

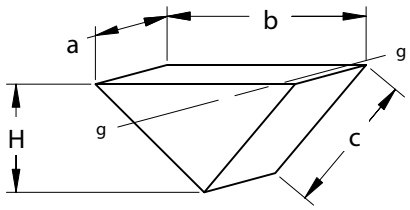
Weight $= 2 \pi \rho r^2 \left[\frac{\pi D}{4} + \frac{2r}{3}\right]$



$k^2_{gg} = \frac{1}{2}\left[\frac{1.5 \pi D^3 + 12 D^2 r + 4.5 \pi D r^2 + 6.4 r^3}{3 \pi D + 8 r}\right]$

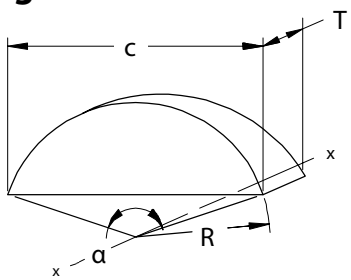
Isosceles Triangular Prism

Weight $= \frac{a b H}{2} \rho$



$k^2_{gg} = \frac{c^2}{2} - \frac{b^2}{12} - \frac{4H^2}{9}$

Circular Segment



$W \cdot k^2_{xx} = \rho T \left[\frac{R^4 \alpha}{229.2} - \frac{1}{6}\left(3R^2 - \frac{c^2}{2}\right)\frac{c}{2}\sqrt{R^2 - \frac{c^2}{4}}\right]$

Airflex® Motor Armature Wk²

APPROXIMATE Wk2 (lb ×ft ²) OF
NEMA DESIGN B
TOTALLY ENCLOSED FAN-COOLED
MOTORS

(Exact values should be obtained from manufacturer)

HP	SYNC RPM	Frame	Wk ² (lb · ft ²)
	1800	182T	0.2
3	1200	213T	0.7
	900	213T	0.9
	3600	184T	0.2
5	1800	184T	0.3
	1200	215T	0.8
	900	254T	2.0
	3600	213T	0.3
7.5	1800	213T	0.7
	1200	254T	2.0
	900	256T	3.0
	3600	215T	0.4
10	1800	215T	0.9
	1200	256T	3.0
	900	284T	3.5
	3600	254T	0.7
15	1800	254T	1.5
	1200	284T	3.5
	900	286T	4.5
	3600	256T	0.8
20	1800	256T	2.0
	1200	286T	4.5
	900	324T	7.5
	3600	284TS	2.0
25	1800	284T	3.5
	1200	324T	8.0
	900	326T	8.0
	3600	286TS	2.0
30	1800	286T	4.5
	1200	326T	9.0
	900	364T	12.0

HP	SYNC RPM	Frame	Wk ² (lb · ft ²)
	3600	324S	3.5
40	1800	324T	7.5
	1200	264T	13.0
	900	365T	14.0
	3600	326TS	4.0
50	1800	326T	9.5
	1200	365T	14.5
	900	404T	30.0
	3600	364TS	8.0
60	1800	364T	12.0
	1200	404T	27.0
	900	405T	30.0
	3600	365TS	9.0
75	1800	365T	15.0
	1200	405T	33.0
	900	444T	49.0
	3600	405TS	14.0
100	1800	405T	32.0
	1200	444T	50.0
	900	445T	54.0
	3600	444TS	27.0
125	1800	444T	44.0
	1200	445T	55.0
	900	447T	58.0
	3600	445TS	32.0
150	1800	445T	54.0
	1200	449T	64.0
	900	449T	65.0
	3600	449TS	40.0
200	1800	449T	77.0
	1200	449T	73.0
250	3600	449TS	47.0
	1800	449TS	77.0

Airflex® Wk^2 for Standard Sheaves

APPROXIMATE Wk^2 ($lb \cdot ft^2$) OF SHEAVES

(Exact values should be obtained from manufacturer)

3V

Sheave O.D.	Number of Grooves							
	1	**2**	**3**	**4**	**5**	**6**	**8**	**10**
2.65	.004	.006	.008	.009				
2.80	.005	.007	.010	.012				
3.00	.007	.010	.012	.014				
3.15	.008	.013	.016	.018				
3.35	.010	.012	.016	.019				
3.65	.013	.019	.024	.030				
4.12	.020	.029	.038	.047				
4.50	.030	.040	.05	.07				
4.75	.033	.05	.07	.08	.10	.13	.17	.20
5.00	.040	.06	.08	.10	.12	.15	.19	.23
5.30	.05	.08	.10	.13	.14	.17	.22	.26
5.60	.06	.09	.12	.14	.18	.20	.26	.30
6.00	.08	.12	.15	.19	.22	.26	.34	.41
6.50	.09	.13	.18	.22	.26	.30	.30	.47
6.90	.12	.18	.24	.29	.35	.40	.52	.60
8.00	.21	.30	.40	.5	.6	.7	.9	1.1
10.60	.60	.80	1.1	1.3	1.6	1.8	2.4	2.9
14.00	1.6	2.0	2.6	3.3	3.9	4.6	5.9	7.2
19.00	4.2	5.2	7.0	8.8	11	12	15	19
25.00		13	17	22	27	31	40	49
33.50			49	61	74	99	117	136

5V

Sheave O.D.	Number of Grooves					
	3	**4**	**5**	**6**	**8**	**10**
7.10	.5	.6	.7	.8	1.1	
7.50	.6	.7	.8	.9	1.3	
8.00	.7	.8	1.0	1.2	1.5	1.9
8.50	.9	1.1	1.3	1.6	2.0	2.4
9.00	1.0	1.3	1.6	1.9	2.4	2.9
9.25	1.1	1.4	1.7	2.0	2.7	3.2
9.75	1.4	1.7	2.1	2.5	3.2	3.9
10.30	1.6	2.0	2.5	2.9	3.8	4.6
10.90	1.9	2.5	3.0	3.5	4.5	5.5
11.80	2.6	3.3	4.0	4.7	6.2	7.5
12.50	3.1	4.0	4.9	5.7	7.2	8.8
13.20	3.9	4.9	5.9	7.0	9.1	11
14.00	4.7	5.9	7.1	8.3	11	13
15.00	5.9	7.4	9.0	11	14	17
16.00	7.3	9.2	11	13	17	21
21.20	19	24	30	35	44	54
28.00	47	61	73	86	112	138
37.50	125	161	194	229	297	367
50.00	326	417	508	596	775	955

8V

Sheave O.D.	Number of Grooves							
	4	**5**	**6**	**8**	**10**	**12**	**14**	**16**
12.5	8.2	9.8	12	15	20	23	27	32
13.2	8.7	11	12	16	21	25	29	34
14.0	10	13	15	20	27	30	35	42
15.0	13	16	19	25	32	38	44	52
16.0	16	11	24	32	41	49	57	67
17.0	21	26	31	40	51	61	71	83
18.0	26	31	37	48	61	72	85	100
19.0	30	36	33	56	73	87	100	117
20.0	35	43	51	66	85	102	118	138
21.2	43	52	65	84	104	123	143	169
22.4	54	69	81	105	130	155	179	227
30.0	143	176	206	270	355	423	492	577
40.0	381	460	539	717	885	1109	1288	1512
53.0	962	1170	1380	1807	2240	2650	3084	3605
71.0	2719	3321	3990	5220	6450	7679	8890	10440
95.0	6990	9308	10990	14960	18500	22640	26330	31910

Airflex® Wk^2 for Standard Sheaves

APPROXIMATE Wk^2 ($lb \cdot ft^2$) OF SHEAVES

(Exact values should be obtained from manufacturer)

A Groove Sheave P.D.	Number of Grooves				A Groove Sheave P.D.	Number of Groove	s		
	1	**2**	**3**	**4**		**1**	**2**	**3**	**4**
3.0	010	.011	.016	.021	5.6	.06	.10	.14	.18
3.2	010	.014	.020	.026	5.8	.06	.11	.15	.20
3.4	010	.018	.025	.033	6.0	.07	.12	.18	.23
3.6	013	.022	.031	.040	6.2	.08	.14	.20	.26
3.8	015	.026	.038	.05	6.4	.09	.15	.20	.29
4.0	018	.031	.05	.06	7.0	.12	.20	.28	.38
4.2	022	.037	.05	.07	8.2	.19	.34	.48	.62
4.4	025	.044	.06	.08	9.0	.27	.46	.66	.85
4.6	030	.05	.07	.09	11	.45	.78	1.1	1.4
4.8	034	.06	.08	.11	12	.66	1.1	1.6	2.1
5.0	039	.07	.10	.12	15	1.3	2.3	3.2	4.2
5.2	044	.08	.11	.14	18	2.4	4.1	5.9	7.6
5.4	05	.09	.12	.16	22	4.6	8.1	12	15

C Groove Sheave P.D.	Number of Grooves										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**
7.0	.32	.49	.7	.8	1.0	1.2					
7.5	.41	.6	.9	1.1	1.3	1.5					
8.0	.5	.8	1.1	1.3	1.6	1.9	2.2	2.4	2.7	3.0	
8.5	.6	1.0	1.3	1.7	2.0	2.4	2.7	3.1	3.4	3.7	
9.0	.7	1.1	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.9
9.2	.8	1.3	1.7	2.2	2.6	3.0	3.5	4.0	4.4	4.8	5.3
9.4	.9	1.4	1.9	2.4	2.9	3.4	3.8	4.3	4.8	5.3	6.4
9.5	.9	1.4	1.9	2.4	2.9	3.5	4.0	4.5	5.0	5.5	6.1
9.6	.9	1.4	1.9	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.5
9.8	1.0	1.6	2.1	2.7	3.2	3.8	4.4	4.9	5.0	6.0	6.7
10.0	1.0	1.6	2.2	2.8	3.4	4.0	4.5	5.1	5.7	6.3	7.0
10.2	1.1	1.7	2.4	3.0	3.6	4.2	4.9	5.5	6.1	6.7	7.5
10.5	1.2	1.9	2.6	3.3	4.0	4.7	5.4	6.1	6.8	7.5	8.3
10.6	1.3	2.0	2.8	3.5	4.3	5.0	5.8	6.5	7.2	8.0	8.9
11.0	1.5	2.3	3.1	3.9	4.8	5.6	6.4	7.3	8.1	8.9	9.9
12.0	1.9	3.0	4.1	5.2	6.3	7.4	8.5	9.5	11	12	14
13.0	2.5	3.9	5.4	6.8	8.2	9.7	11	13	14	15	18
14.0	3.2	5.0	7.1	8.7	11	12	14	16	18	20	23
16.0	5.0	7.7	11	13	16	19	22	25	27	31	36
18.0	6.4	9.9	14	17	21	24	28	31	35	39	46
20.0	10	16	21	27	32	38	44	49	55	60	72
24.0	15	24	33	40	49	57	66	74	83	91	108
27.0		41	56	71	87	102	117	132	147		
30.0		59	81	102	115	147	169	191	213	235	278
36.0			126	159	193	227	260	293	327	362	428
44.0			246	313	378	446	512	478	646	712	845
50.0			371	473	573	673	773	876	974	1076	1278

B Groove Sheave P.D.	Number of Grooves									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
3.4	.012	.025	.033	.042	.051	.059				
3.6	.015	.031	.042	.053	.064	.075				
3.8	.019	.038	.051	.065	.078	.094				
4.0	.023	.045	.062	.078	.095	.11				
4.2	.030	.061	.083	.11	.13	.15				
4.4	.032	.065	.089	.11	.14	.16				
4.6	.040	.076	.10	.13	.16	.19				
4.8	.043	.087	.12	.15	.18	.22				
5.0	.051	.10	.14	.18	.21	.25				
5.2	.058	.12	.16	.20	.25	.29				
5.4	.066	.13	.18	.23	.28	.33	.38	.43	.48	.5
5.6	.073	.15	.20	.25	.31	.36	.41	.47	.5	.6
5.8	.084	.17	.23	.29	.35	.42	.48	.5	.6	.7
6.0	.094	.19	.26	.33	.40	.47	.5	.6	.7	.7
6.2	.10	.20	.28	.35	.43	.5	.6	.6	.8	.8
6.4	.12	.24	.32	.41	.5	.6	.7	.8	.8	.9
6.6	.13	.26	.35	.45	.6	.6	.7	.8	.9	1.0
6.8	.14	.29	.40	.5	.6	.7	.8	.9	1.0	1.2
7.0	.20	.32	.44	.6	.7	.8	.9	1.1	1.2	1.3
7.4	.24	.38	.5	.7	.8	1.0	1.1	1.2	1.4	1.5
8.0	.31	.49	.7	.9	1.0	1.2	1.4	1.6	1.8	2.0
8.6	.39	.6	.9	1.1	1.3	1.6	1.8	2.0	2.3	2.5
9.4	.5	.8	1.1	1.4	1.8	2.1	2.4	2.7	3.0	3.3
11.0	.9	1.4	2.0	2.5	3.1	3.6	4.2	4.7	5.2	5.3
12.4	1.3	2.1	2.8	3.6	4.4	5.2	5.9	6.8	7.5	8.3
13.6	1.7	2.7	3.7	4.7	5.8	6.8	7.8	8.8	9.8	11
15.4	2.5	4.0	5.6	7.1	8.6	10	12	13	15	16
16.0	2.9	4.7	6.5	8.3	10	12	14	16	17	19
18.4	4.3	7.0	9.7	12	15	18	19	23	26	29
20.0	5.5	8.9	12	16	19	22	26	29	32	36
25.0		18	24	31	38	44	51	58	65	72
30.0		39	54	69	84	99	114	129	144	159
38.0		72	100	129	155	183	211	239	267	295

D Groove Sheave P.D.	Number of Grooves								
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**
12.0	7.0	8.8	11	13	15	17	18	21	24
13.0	9.0	12	14	17	19	22	24	27	32
13.5	10	13	16	19	22	25	28	31	37
14.0	11	15	18	21	25	28	31	34	41
14.5	13	17	21	24	28	32	36	39	47
15.0	15	19	23	28	32	36	41	45	54
15.5	16	21	26	31	35	40	45	49	59
16.0	18	23	28	34	39	44	49	54	65
18.0	25	32	40	47	54	62	69	75	90
20.0	31	49	59	71	81	93	104	115	136
22.0	52	68	83	98	113	129	134	159	189
27.0	110	143	176	209	241	274	307	339	404
33.0	180	233	286	338	391	445	497	550	654
40.0	302	391	477	565	655	744	830	915	1090
44.0				748	864	984	1100	1210	1445
48.0		738	908	1071	1240	1412	1577	1745	2080
58.0		1460	1792	2120	2455	2790	3120	3445	4120

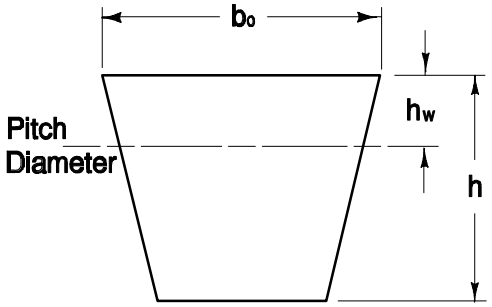
Airflex® V-Belt Dimensions

Reference RMA/MPTA IP-20, IP-22, IP26
Dimensions in inches

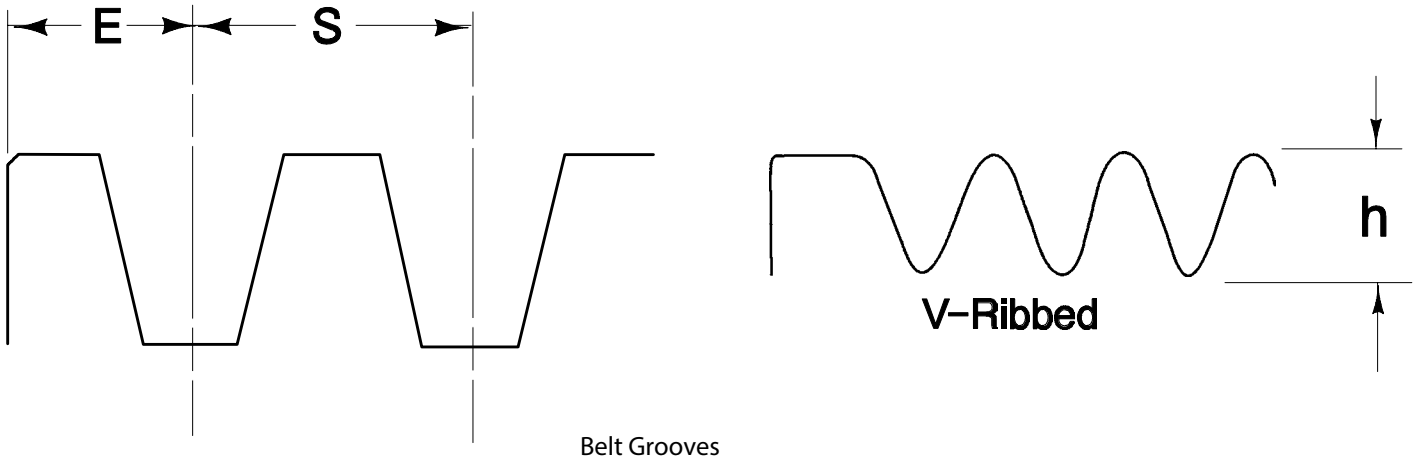
Belt Size	b_o	h	h_w	E	S
2L	0.25	0.16			
3L	0.38	0.22			
4L	0.50	0.31			
5L	0.66	0.38			
A	0.50	0.31	0.13	0.38	0.63
B	0.66	0.41	0.18	0.50	0.75
C	0.88	0.53	0.20	0.69	1.00
D	1.25	0.75	0.30	0.88	1.44
E	1.50	0.91	0.40	1.13	1.75
3V	0.38	0.31	0.025	0.34	0.41
5V	0.63	0.53	0.05	0.50	0.69
8V	1.00	0.88	0.10	0.75	1.13
V-Ribbed L		0.20	OD=PD	0.38	0.19
V-Ribbed M		0.40	OD=PD	0.50	0.37

Reference ISO Standards R52, R253, R434, R608
Dimensions in millimeters

Belt Size	b_o	h	h_w
Y	6	3	1,3
Z	10	6	2,5
A	13	8	3,3
B	17	11	4,2
C	22	14	5,7
D	32	20	8,1
E	40	25	12



Belt Cross Section



Belt Grooves

Airflex® Torque vs. Shaft Stress

Shaft Diameter (in.)	Torque (lb • in) which will produce torsional stress of:	
	8,000 psi	**10,000 psi**
1.000	1,570	1,960
1.125	2,240	2,790
1.250	3,070	3,830
1.375	4,080	5,100
1.500	5,300	6,630
1.625	6,740	8,420
1.750	8,420	10,520
1.875	10,350	12,940
2.000	12,550	15,690
2.125	15,070	18,840
2.250	17,890	22,370
2.375	21,040	26,300
2.500	24,540	30,680
2.625	28,410	35,510
2.750	32,670	40,830
2.875	37,330	46,660
3.000	42,420	53,020
3.125	47,940	59,920
3.250	53,920	67,400
3.375	60,390	75,480
3.500	67,340	84,180
3.625	74,820	93,530
3.750	82,830	103,500
3.875	91,400	114,200
4.000	100,500	125,700
4.250	120,600	150,700
4.500	143,100	178,900
4.750	168,800	210,400
5.000	196,400	245,400
5.250	227,300	284,100
5.500	261,300	326,700
5.750	298,600	373,300
6.000	339,300	424,100
6.250	383,800	479,700
6.500	431,400	539,200
6.750	483,100	603,900
7.000	538,800	673,500
7.250	597,800	747,200
7.500	661,800	827,200
7.750	730,200	912,700
8.000	803,100	1,004,000
8.250	880,800	1,101,000
8.500	963,300	1,204,000
8.750	1,051,000	1,314,000
9.000	1,144,000	1,429,000
9.250	1,241,000	1,552,000
9.500	1,345,000	1,681,100
9.750	1,456,000	1,820,000
10.000	1,571,000	1,964,000

Shaft Diameter (in.)	Torque (lb • in) which will produce torsional stress of:	
	8,000 psi	**10,000 psi**
10.250	1,692,000	2,114,000
10.500	1,818,000	2,260,000
10.750	1,951,000	2,439,000
11.000	2,091,000	2,613,000
11.250	2,237,000	2,796,000
11.500	2,389,000	2,986,000
11.750	2,548,000	3,185,000
12.000	2,714,000	3,393,000
12.250	2,888,000	3,609,000
12.500	3,069,000	3,836,000
12.750	3,256,000	4,070,000
13.000	3,451,000	4,314,000
13.250	3,653,000	4,566,000
13.500	3,865,000	4,831,000
13.750	4,083,000	5,104,000
14.000	4,310,000	5,388,000
14.250	4,545,000	5,681,000
14.500	4,789,000	5,986,000
14.750	5,041,000	6,301,000
15.000	5,301,000	6,627,000
15.250	5,571,000	6,964,000
15.500	5,849,000	7,312,000
15.750	6,137,000	7,671,000
16.000	6,434,000	8,042,000
16.250	6,740,000	8,425,000
16.500	7,056,000	8,820,000
16.750	7,382,000	9,227,000
17.000	7,717,000	9,647,000
17.250	8,063,000	10,080,000
17.500	8,419,000	10,520,000
17.750	8,784,000	10,980,000
18.000	9,161,000	11,450,000
18.250	9,548,000	11,940,000
18.500	9,946,000	12,430,000
18.750	10,350,000	12,940,000
19.000	10,770,000	13,470,000
19.250	11,210,000	14,010,000
19.500	11,650,000	14,560,000
19.750	12,100,000	15,130,000
20.000	12,570,000	15,710,000
20.250	13,040,000	16,300,000
20.500	13,530,000	16,920,000
20.750	14,030,000	17,540,000
21.000	14,550,000	18,180,000
21.250	15,070,000	18,840,000
21.500	15,610,000	19,510,000
21.750	16,160,000	20,200,000

Torque which will produce a torsional stress of 60 MN/m^2

Shaft Diameter (mm)	**Torque (N•m)**
30	300
32	400
35	500
38	600
40	800
42	900
45	1,100
48	1,300
50	1,500
55	2,000
60	2,500
65	3,200
70	4,000
75	5,000
80	6,000
85	7,200
90	8,600
95	10,100
100	11,800
110	15,700
120	20,400
130	25,900
140	32,300
150	39,800
160	48,300

Torque which will produce a torsional stress of 60 MN/m^2

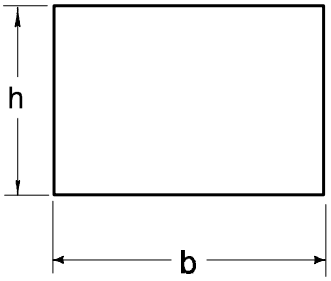
Shaft Diameter (mm)	**Torque (N•m)**
170	57,900
180	68,700
190	80,800
200	94,200
220	125,400
240	162,900
250	184,100
260	207,100
280	258,600
300	318,100
320	386,000
340	463,000
360	549,700
380	646,400
400	754,000
420	872,800
440	1,003,500
450	1,073,500
460	1,146,700
480	1,302,900
500	1,472,600
530	1150000
560	1360000

Airflex® Shaft Key Standards

Reference ANSI B17.1
Dimensions in inches

Shaft Diameter

Over	To	Square Key b=h	Rectangular Key bxh
0.438	0.563	0.125	0.125 x 0.094
0.563	0.875	0.188	0.188 x 0.125
0.875	1.250	0.250	0.250 x 0.188
1.250	1.375	0.313	0.313 x 0.250
1.375	1.750	0.375	0.375 x 0.250
1.750	2.250	0.500	0.500 x 0.375
2.250	2.750	0.625	0.625 x 0.438
2.750	3.250	0.750	0.750 x 0.500
3.250	3.750	0.875	0.875 x 0.625
3.750	4.500	1.000	1.000 x 0.750
4.500	5.500	1.250	1.250 x 0.875
5.500	6.500	1.500	1.500 x 1.000
6.500	7.500	-	1.750 x 1.500
7.500	9.000	-	2.000 x 1.375
9.000	11.000	-	2.500 x 1.625



h = key height
b = key width

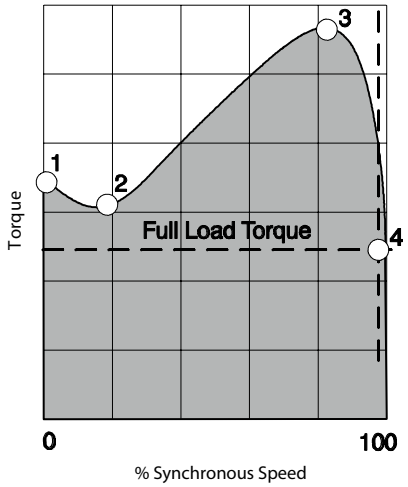
Reference ISO 773
Dimensions in millimeters

Shaft Diameter

Over	To	Key bxh
6	8	2 x 2
8	10	3 x 3
10	12	4 x 4
12	17	5 x 5
17	22	6 x 6
22	30	8 x 7
30	38	10 x 8
38	44	12 x 8
44	50	14 x 9
50	58	16 x 10
58	65	18 x 11
65	75	20 x 12
75	85	22 x 14
85	95	25 x 14
95	110	28 x 16
110	130	32 x 18
130	150	36 x 20
150	170	40 x 22
170	200	45 x 25
200	230	50 x 28
230	260	56 x 32
260	290	63 x 32
290	330	70 x 36

Airflex® Motor Torque-Speed Characteristics

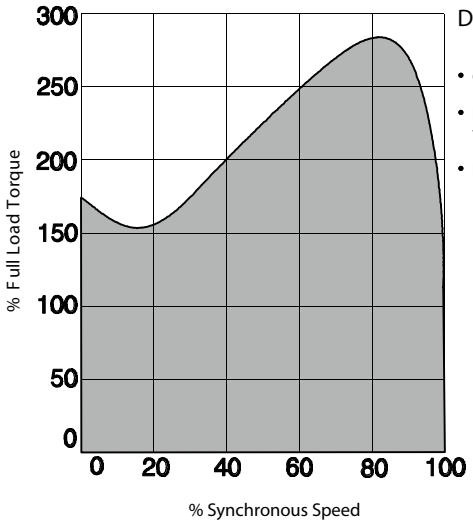
A typical torque - speed characteristic curve for a general-pur - pose, squirrel-cage induction motor is at the right. It illustrates how motor torque varies as speed increases to synchronous speed.



Four important characteristic points are:

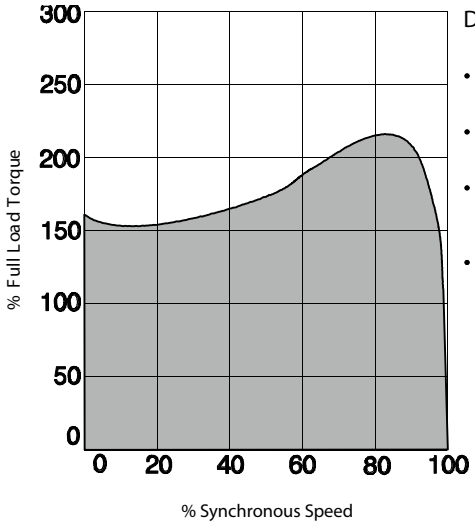
1. STARTING TORQUE
2. PULL-UP TORQUE - the minimum torque developed dur - ing the acceleration period from zero speed to the speed at which breakdown torque occurs.
3. BREAKDOWN TORQUE - maximum torque developed without a sharp drop in speed.
4. FULL-LOAD TORQUE - the torque developed at full load speed.

Most motor requirements can be obtained through the use of one of the squirrel-cage polyphase induction motor NEMA classes described below:



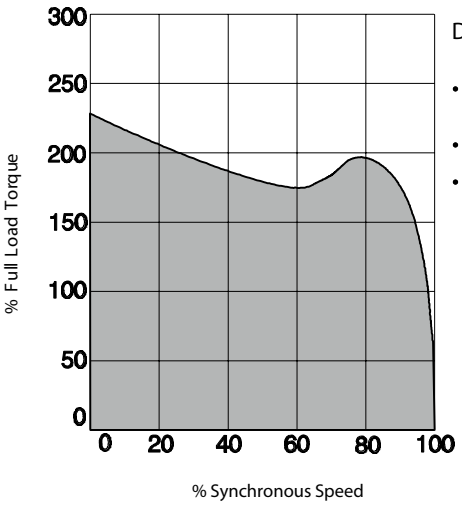
DESIGN A

- General purpose
- Normal starting torque
- Low slip



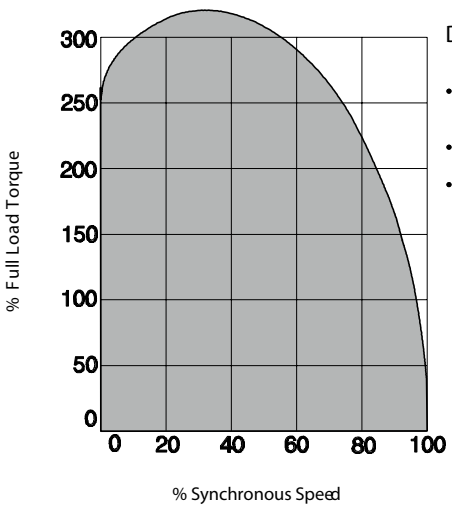
DESIGN B

- Standard general purpose
- Normal starting torque
- Lower pull-up torque than De sign A
- Low slip



DESIGN C

- High starting torque
- Low slip
- Used in applica- tions requiring high starting torqueand nor- mal running torque.



DESIGN D

- Very highstarting torque
- Highslip
- Used in applica- tions where wide fluctuating load are encountered.

Airflex® Electric Motor Frames

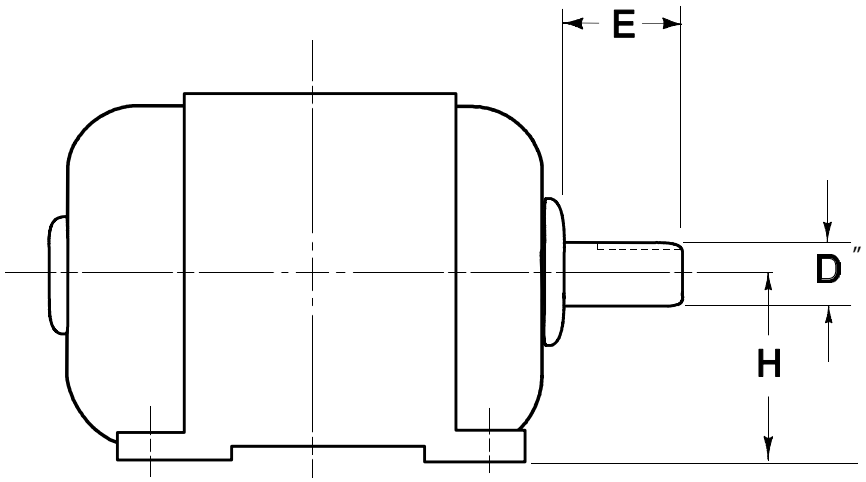
NEMA Frame Designations
for Polyphase, Squirrel-cage, Designs A & B Motors

HP	OpenType				Totally enclosed fan cooled			
	3600 rpm	**1800 rpm**	**1200 rpm**	**900 rpm**	**3600 rpm**	**1800 rpm**	**1200 rpm**	**900 rpm**
0.5				143T-				143T
0.75			143T	145T			143T	145T
1		143T	145T	182T		143T	145T	182T
1.5	143T	145T	182T	184T	143T	145T	182T	184T
2	145T	145T	184T	213T	145T	145T	184T	213T
3	145T	182T	213T	215T	182T	182T	213T	215T
5	182T	184T	215T	254T	184T	184T	215T	254T
7.5	184T	213T	254T	256T	213T	213T	254T	256T
10	213T	215T	256T	284T	215T	215T	256T	284T
15	215T	254T	284T	286T	254T	254T	284T	286T
20	254T	256T	286T	324T	256T	256T	286T	324T
25	256T	284T	324T	326T	284TS	284T	324T	326T
30	284TS	286T	326T	364T	286TS	286T	326T	364T
40	286TS	324T	364T	365T	324TS	324T	364T	365T
50	324TS	326T	365T	404T	326TS	326T	365T	404T
60	326TS	364TS	404T	405T	364TS	364TS	404T	405T
75	364TS	365TS	405T	444T	365TS	365TS	405T	444T
100	365TS	404TS	444T	445T	405TS	405TS	444T	445T
125	404TS	405TS	445T		444TS	444TS	445T	
150	405TS	444TS			445TS	445TS		
200	444TS	445TS						
250	445TS							

Reference IEC 72 Standard Frame Designations

kW	Totally enclosed fan-cooled			
	3000 rpm	**1500 rpm**	**1000 rpm**	**750 rpm**
0,37	71	71	80	
0,55	71	80	80	
0,75	80	80	90S	100L
1,1	80	90S	90L	100L
1,5	90S	90L	100L	112M
2,2	90L	100L	112M	132S
3	100L	100L	132S	132M
4	112M	112M	132M	160M
5,5	132S	132S	132M	160M
7,5	132S	132M	160M	160L
11	160M	160M	160L	180L
15	160M	160L	180L	200L
18,5	160L	180M	200L	225S
22	180M	180L	200L	225M
30	200L	200L	225M	250M
37	200L	225S	250M	280S
45	225M	225M	280S	280M
55	250M	250M	280M	315S
75	280S	280S	315S	315M
90	280M	280M	315M	
110	315S	315S		

Airflex® Motor Frame Dimensions



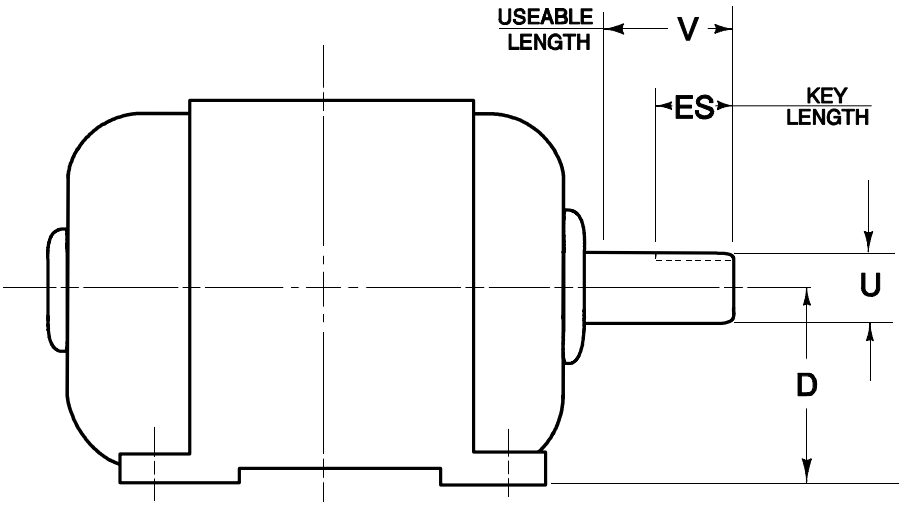
Reference IEC 72 Standard

Frame	DxE	H	Key width x height
71	14 x 30	71	5 x 5
80	19 x 40	80	6 x 6
90S	24 x 50	90	8 x 7
90L	24 x 50	90	8 x 7
100L	28 x 60	100	8 x 7
112M	28 x 60	112	8 x 7
132S	38 x 80	132	10 x 8
132M	38 x 80	132	10 x 8
160M	42 x 110	160	12 x 8
160L	42 x 110	160	12 x 8
180M	48 x 110	180	14 x 9
180L	48 x 110	180	14 x 9
200L	55 x 110	200	16 x 10

Frame	DxE		Frame	DxE	
	3,000 rpm	**1500 rpm and slower**		**3,000 rpm**	**1500 rpm and slower**
225S	55 x 110	60 x 140	225	16 x 10	18 x 11
225M	55 x 110	60 x 140	225	16 x 10	18 x 11
250M	60 x 140	65 x 140	250	18 x 11	18 x 11
280S	65 x 140	75 x 140	280	18 x 11	20 x 12
280M	65 x 140	75 x 140	280	18 x 11	20 x 12
315S	65 x 140	80 x 170	315	18 x 11	22 x 14
315M	65 x 140	80 x 170	315	18 x 11	22 x 14

Notes:
" Shaft tolerance:
for diameters to 48 and inclusive k6.
Other diameters m6.

Airflex® Motor Frame Dimensions



Reference NEMA

Frame No,	D	U	"	V	ES	Square Key
143T	3.50	0.875		2.00	1.41	0.19
145T	3.50	0.875		2.00	1.41	0.19
182T	4.50	1.125		2.50	1.78	0.25
184T	4.50	1.125		2.50	1.78	0.25
213T	5.25	1.375		3.12	2.41	0.31
215T	5.25	1.375		3.12	2.41	0.31
254T	6.25	1.625		3.75	2.91	0.38
256T	6.25	1.625		3.75	2.91	0.38
284T	7.00	1.875		4.38	3.28	0.50
284TS	7.00	1.625		3.00	1.91	0.38
286T	7.00	1.875		4.38	3.28	0.50
286TS	7.00	1.625		3.00	1.91	0.38
324T	8.00	2.125		5.00	3.91	0.50
324TS	8.00	1.875		3.50	2.03	0.50
326T	8.00	2.125		5.00	3.91	0.50
326TS	8.00	1.875		3.50	2.03	0.50
364T	9.00	2.375		5.62	4.28	0.62
364TS	9.00	1.875		3.50	2.03	0.50
365T	9.00	2.375		5.62	4.28	0.62
365TS	9.00	1.875		3.50	2.03	0.50
404T	10.00	2.875		7.00	5.65	0.75
404TS	10.00	2.125		4.00	2.78	0.50
405T	10.00	2.875		7.00	5.65	0.75
405TS	10.00	2.125		4.00	2.78	0.50
444T	11.00	3.375		8.25	6.91	0.88
444TS	11.00	2.375		4.50	3.03	0.62
445T	11.00	3.375		8.25	6.91	0.88
445TS	11.00	2.375		4.50	3.03	0.62

Notes:
" Shaft tolerances:
for diameters to 1.500 inclusive +0.000/-0.0005
other diameters, use +0.000/-0.001

Airflex® Air Compressor Requirements

General

The following information is to be used as a guide only for preliminary sizing of a compressor. The final compressor size should be determined by the compressor manufacturer.

For determining required compressor capacity for each clutch or brake:

$$Q = \frac{1.5 \cdot p_o \cdot (V_c + V_p) \cdot C}{P_a \cdot 1728}$$

Q = Capacity in cubic feet of free air per minute (CFM).

p_o = Operating pressure in pounds per square inch absolute gage +14.7.

V_c = Cavity volume of element at contact in cubic inches.

V_p = Volume of connecting piping from clutch element to operating valve in cubic inches.

C = Number of engagements per minute.

p_a = Atmospheric pressure (14.7 psi).

1.5 = Factor for wear, decrease of efficiency of compressor and possible leakage in piping.

$1\ ft^3 = 1728\ in^3$

A 24CB500 clutch and brake is used in a drive. The drive is cycled 10 times per minute. Operating air pressure is 75 psi. There is approximately six feet of 1/2 inch piping from valves to elements. Determine compressor capacity and horse - power.

$$Q = \frac{1.5 \cdot p_o \cdot (V_c + V_p) \cdot C}{P_a \cdot 1728}$$

$p_o = 75 + 14.7 = 89.7$ psi

Vc = 2 elements • 200 in^3 / element = 400 in^3

Pipe area • length = 0.304 in^2 • 6 ft • 12 in/ft = 22 in^3

C = 10 cycles/min

$$Q = \frac{1.5 \cdot 89.7 \cdot (400 + 2\,2) \cdot 10}{14.7 \cdot 1728} = 22.4\ CFM$$

Horsepower Requirement

Horsepower required for single-stage air cooled compressors can be determined from the charts on the next page. Since there is an area where both a single-stage and two-stage unit will satisfy capacity and pressure, use a single-stage unit for 100 psi pressure in sizes up to 1.5 HP. For anything above these limits, use a two-stage unit.

Other Considerations

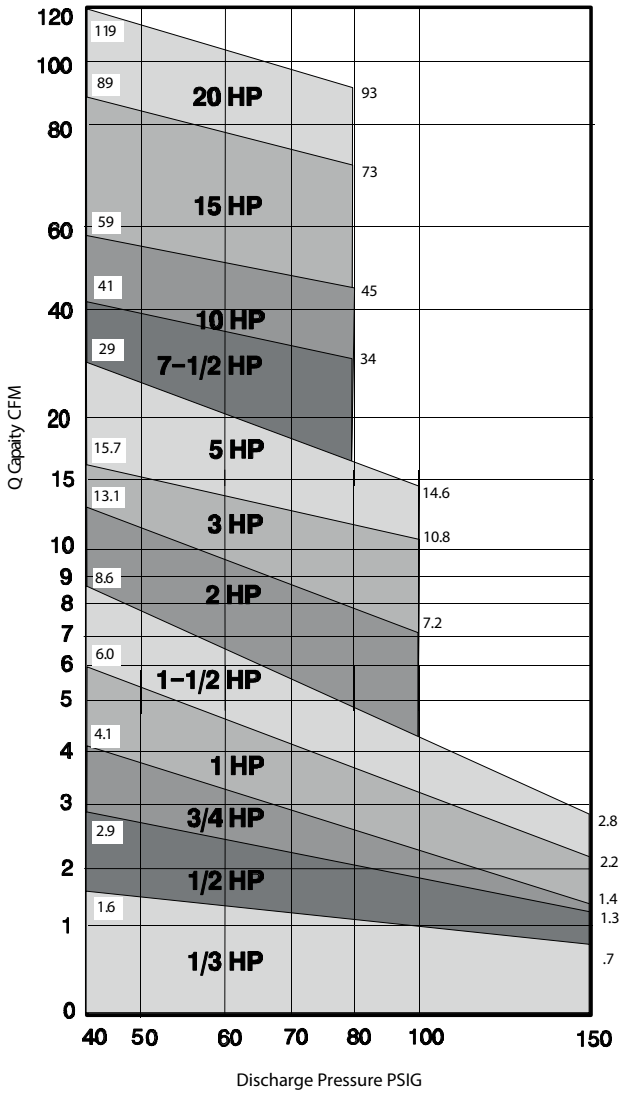
0.33 TO 1.5 HP compressor - select a unit with 200 percent of calculated average CFM.

2 to 5 HP compressor - select a unit with 175 percent of calculated average CFM.

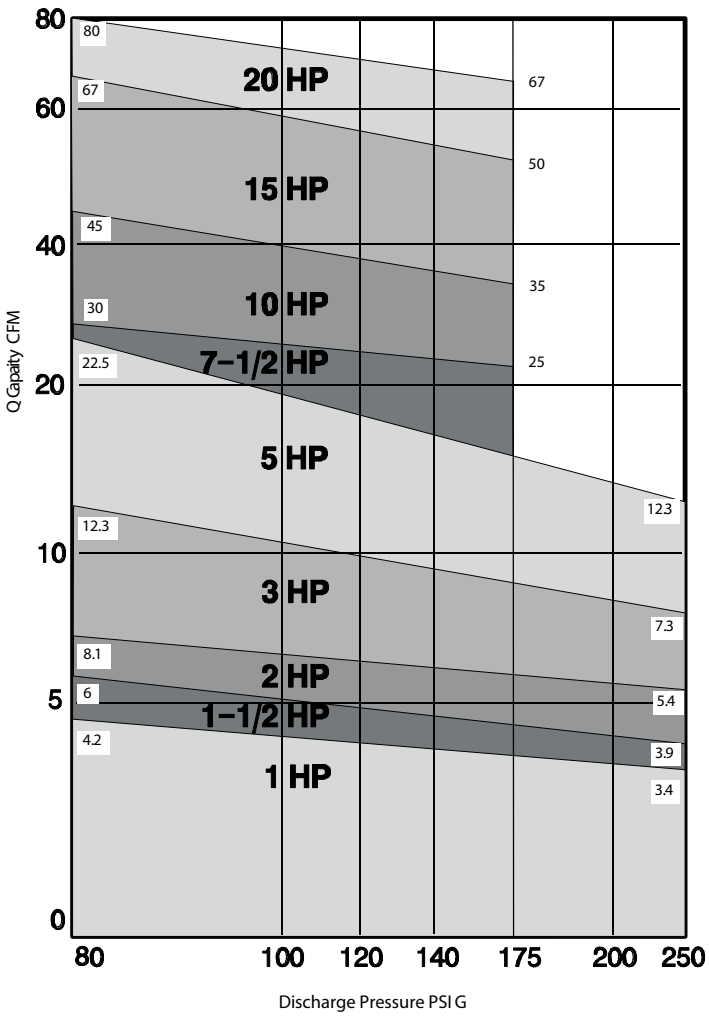
7.5 to 20 HP compressor - select a unit with 150 percent of calculated average CFM.

Airflex® Air Compressor Requirements

Single-stage selection chart



Two-stage selection chart

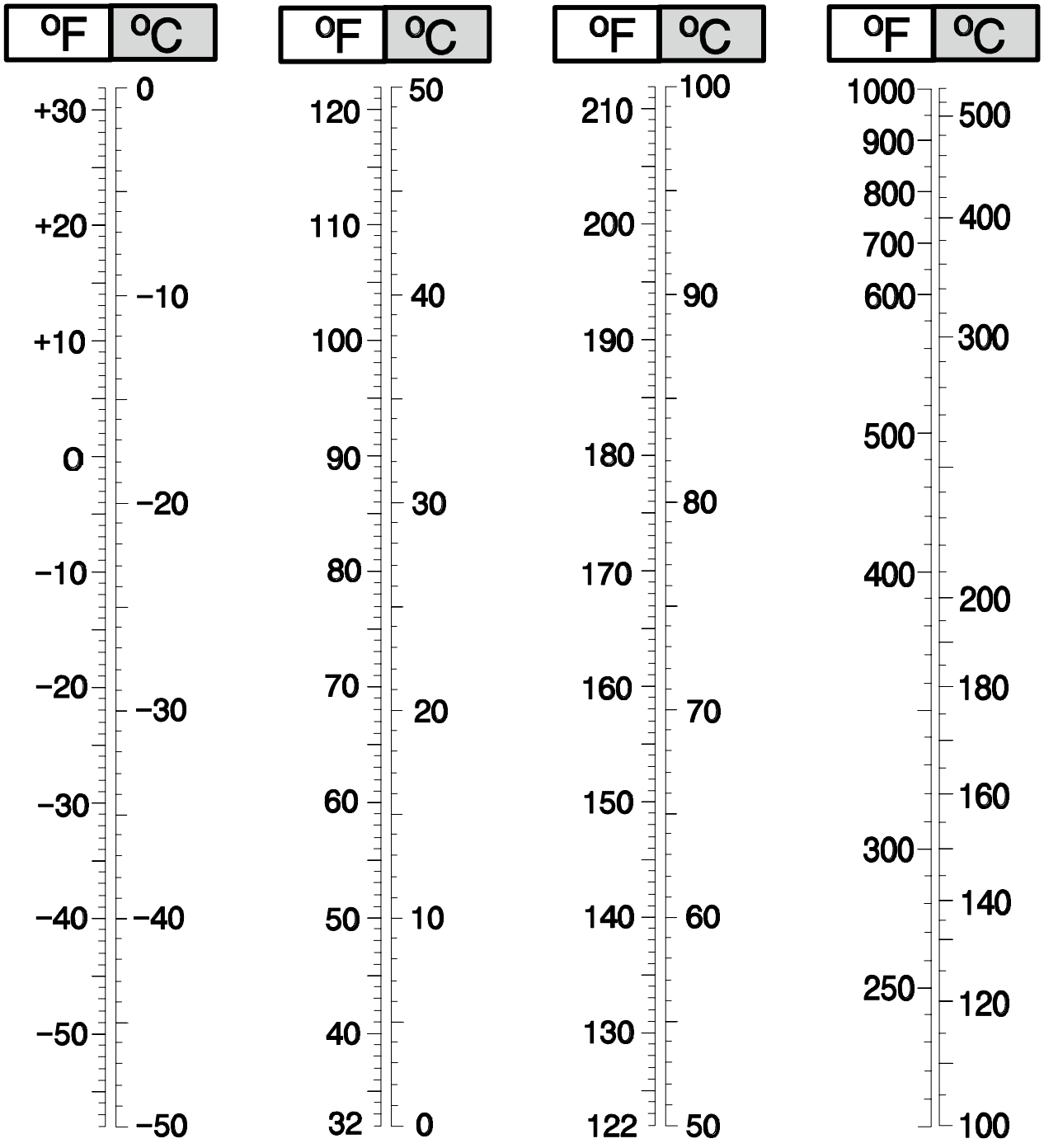


Charts courtesy of Worthington Compressors, Inc.

American National Standard Seamless Wrought Steel Pipe (Schedule 40) Data (Reference ANSI B36.10)

Size	Threads per inch	Outside Diameter (in)	Inside Diameter (in)	Flow Area (in ^{2})
1/8	27	0.405	0.269	0.057
1/4	18	0.540	0.364	0.104
3/8	18	0.675	0.493	0.191
1/2	14	0.840	0.622	0.304
3/4	14	1.050	0.824	0.533
1	11 1/2	1.315	1.049	0.864
1	11 1/2	1.660	1.380	1.495
1	11 1/2	1.900	1.610	2.036
2	11 1/2	2.375	2.067	3.355
2 1/2	8	2.875	2.469	4.788

Airflex® Temperature Comparison



Airflex® Steel Wire and Sheet Gage Numbers

Steel Wire Gage (U.S.)

Gage No.	Diameter in inches
7/0	0.4900
6/0	0.4015
5/0	0.4305
4/0	0.3938
3/0	0.3625
2/0	0.3310
1/0	0.3065
1	0.2830
2	0.2625
3	0.2437
4	0.2253
5	0.2070
6	0.1920
7	0.1770
8	0.1620
9	0.1483
10	0.1350
11	0.1205
12	0.1055
13	0.0915
14	0.0800
15	0.0720
16	0.0625
17	0.0540
18	0.0475
19	0.0410
20	0.0348
21	0.0317
22	0.0286
23	0.0258
24	0.0230
25	0.0204
26	0.0181
27	0.0173
28	0.0162
29	0.0150

Manufacturers' Standard Gage for Sheet Steel

Gage No.	Thickness in inches
3	0.2391
4	0.2242
5	0.2092
6	0.1943
7	0.1793
8	0.1644
9	0.1495
10	0.1345
11	0.1196
12	0.1046
13	0.0897
14	0.0747
15	0.0673
16	0.0598
17	0.0538
18	0.0478
19	0.0418
20	0.0359
21	0.0329
22	0.0299
23	0.0269
24	0.0239
25	0.0209
26	0.0179
27	0.0164
28	0.0149
29	0.0135
30	0.0120
31	0.0105
32	0.0097
33	0.0090
34	0.0082
35	0.0075
36	0.0067
37	0.0064
38	0.0060

Airflex 2-Year Warranty

Danfoss Airflex products proudly carry a two year warranty on all components. This leading warranty is a testament to the high quality of Airflex Industrial Clutches and Brakes. Danfoss Airflex quality has been proven with over 70 years of field experi - ence, across multiple markets and countless applications. This warranty serves to provide even further confidence and value in the Airflex brand.

Danfoss, warrants to
the original purchaser that products sold shall be free from defects in material and workmanship for 2 years from date of manufacture. If buyer claims that a product violates such war - ranty, Danfoss, upon notice promptly given, will either examine the product at buyer's site, or issue shipping instructions for return to Danfoss at buyer's expense, transportation charges prepaid.

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