BULLETIN ED2000

ENGINEERING DATA

A Fläkt Woods Company

American Fan Company

USEFUL ENGINEERING DATA

TERMS AND DEFINITIONS

AHP.–or Air Horsepower, is work done by the fan expressed as horsepower.

$$AHP = \frac{CFM \times TP}{6356}$$

BHP.–or Brake Horsepower, is the horsepower absorbed by the fan.

BTU.–or British Thermal Unit, is the amount of heat required to raise one pound of water from 63°F to 64°F.

CFM.–or Cubic Feet Per Minute, is the volume of air moved per minute.

EDR.–or Equivalent Direct Radiation, is the amount of heating surface which will give off 240 BTU. per hour.

FPM.–or Feet Per Minute, is the velocity of the airstream.

Final Temperature–is the temperature of air after passing over heating coils under specified conditions.

Free Delivery–is the condition under which a fan operates when no static pressure or resistance is present.

HP.–or Horsepower, is the actual rated output of the fan motor used.

ME.–or Mechanical Efficiency, is the ratio of horsepower absorbed (BHP) to horsepower delivered by the fan (AHP).

$$ME = \frac{AHP}{BHP}$$

Plenum Chamber–is an air compartment maintained under pressure to serve one or more distributing ducts.

RPM.–or Revolutions Per Minute, is the number of times the fan shaft revolves per minute.

Standard Air–is air which weighs .075 pounds per cubic foot, which is dry air at 70°F dry bulb with a barometric pressure of 29.92 inches of mercury.

SE.–or Static Efficiency, is expressed as

$$SE = \frac{CFM \times SP}{6356 \times BHP}$$

SP.–or Static Pressure, is a measure of the force exerted by the fan in moving air through any ventilating system.

TS.–or Tip-Speed, is the peripheral speed in feet per minute of a propeller tip at any specified RPM.

TE.–or Total Efficiency, may be expressed as

$$TE = \frac{CFM \times TP}{6356 \times BHP}$$

VP.–or Velocity Pressure, is equal to the kinetic energy per unit volume of the flowing air. It can be calculated from the formula

$$VP = \left[\frac{FPM}{4005}\right]^2$$

TP.–or Total Pressure, is the sum of the static pressure (SP), and the velocity pressure (VP) at any given point in a ventilating system.

FAN LAWS AND FORMULAE USED IN PERFORMANCE CALCULATIONS

Fan efficiencies remain constant for symmetrical design. When one or more conditions change, the other conditions vary according to certain fan laws for an established fan size, system of ductwork and air density.

When fan speed is varied:

1. Fan's air-delivery will vary directly as the RPM ratio.

$$CFM_2 = \left(\frac{RPM_2}{RPM_1}\right)(CFM_1)$$

2. Developed fan pressures will vary as the RPM ratio squared.

$$SP_2 = \left(\frac{RPM_2}{RPM_1}\right)^2(SP_1)$$

3. Horsepower absorbed by fan will vary as the RPM ratio cubed.

$$HP_2 = \left(\frac{RPM_2}{RPM_1}\right)^3(HP_1)$$

When fan pressure varies:

1. Fan's air delivery and RPM will vary as the square root of the pressure ratio.
2. Horsepower absorbed by fan will vary as the square root of the pressure ratio cubed.

When density of air varies:

1. For constant pressure-fan speed, air-delivery and horse power absorbed vary inversely as the square root of the density.
2. For constant air-delivery and fan speed-horsepower absorbed by fan and pressure developed vary directly as the air density.
3. For constant amount of air by weight-air-delivery, fan speed and developed pressure vary inversely as the density ratio.
4. For constant amount of air by weight-horsepower absorbed by fan varies inversely as the square of the density ratio.

TO CALCULATE VELOCITY:

Velocity = CFM ÷ Duct Area (in sq. ft.)

ALTERNATE METHOD:

$$Velocity = \frac{CFM \times 144}{\text{Duct Area (in sq. in.)}}$$

CFM = Velocity X duct area (in sq. ft.)

ALTERNATE METHOD:

$$CFM = \frac{\text{Velocity X duct area (in sq. in.)}}{144}$$

Tip Speed = Circumference X RPM

$$BHP = \frac{\text{Total Watts input X motor eff.}}{746}$$

EQUIVALENT PRESSURES
Advancing by Ounces per Square Inch

Oz. per Sq. In.	Lbs. per Sq. In.	In. of Water	Ft. of Water	In. of Mercury
.25	.0156	.4330	.0361	.0319
.50	.0312	.8660	.0772	.0638
.75	.0469	1.2990	.1083	.0957
1	.0625	1.7320	.1443	.1276
1.50	.0937	2.5980	.2165	.1913
2	.125	3.4640	.2887	.2551
3	.1875	5.1960	.4330	.3827
4	.25	6.9280	.5773	.5102
5	.3125	8.6600	.7217	.6378
6	.375	10.3921	.8660	.7653
7	.4375	12.1241	1.0103	.8929
8	.5	13.8561	1.5470	1.0204
9	.5625	15.5832	1.2990	1.1480
10	.625	17.3202	1.4433	1.2755
11	.6875	19.0520	1.5877	1.4030
12	.75	20.7842	1.7320	1.5306
13	.8125	22.5162	1.8764	1.6582
14	.875	24.2483	2.0207	1.7857
15	.9375	25.9803	2.1650	1.9133
16	1	27.7123	2.3094	2.0408
18	1.125	31.1763	2.5980	2.2959
20	1.25	34.6404	2.8867	2.5510
24	1.5	41.5684	3.4640	3.0612
28	1.75	48.4965	4.0414	3.5714
32	2.	55.4246	4.6187	4.0816

MOTOR FULL LOAD CURRENTS

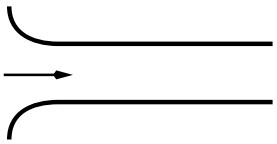
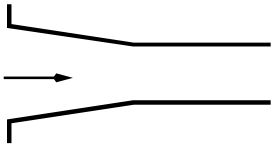
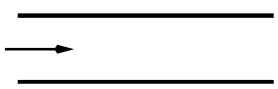
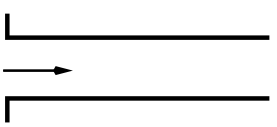
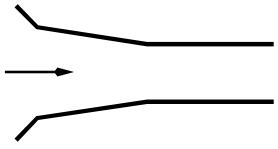
3 Phase A.C. Induction Type – Squirrel Cage and Wound Rotor					Single Phase		
HP	200V	230V	460V	575V	HP	115V	230V
½	2.3	2.	1	.8	⅙	4.4	2.2
¾	3.2	2.8	1.4	1.1	¼	5.8	2.9
1	4.15	3.6	1.8	1.4	⅓	7.2	3.6
1 ½	6	5.2	2.6	2.1	½	9.8	4.9
2	7.8	6.8	3.4	2.7	¾	13.8	6.9
3	11	9.6	4.8	3.9	1	16	8
5	17.5	15.2	7.6	6.1	1 ½	20	10
7 ½	25	22	11	9	2	24	12
10	32	28	14	11	3	34	17
15	48	42	21	17	5	56	28
20	62	54	27	22	7 ½	80	40
25	78	68	34	27	10	100	50
30	92	80	40	32			
40	120	104	52	41			
50	150	130	65	52			
60	177	154	77	62			
75	221	192	96	77			
100	285	248	124	99			
125	358	312	156	125			
150	415	360	180	144			
200	550	480	240	192			

VELOCITY PRESSURES FOR DIFFERENT VELOCITIES – STANDARD AIR

FROM: $V = 4005\sqrt{VP}$ V = VELOCITY FPM VP = VELOCITY PRESSURE, INCHES OF WATER

VP	V	VP	V	VP	V	VP	V	VP	V	VP	V
0.01	400	0.52	2888	1.03	4064	1.54	4970	2.05	5734	3.10	7051
0.02	566	0.53	2916	1.04	4084	1.55	4986	2.06	5748	3.20	7164
0.03	694	0.54	2943	1.05	4103	1.56	5002	2.07	5762	3.30	7275
0.04	801	0.55	2970	1.06	4123	1.57	5018	2.08	5776	3.40	7385
0.05	896	0.56	2997	1.07	4142	1.58	5034	2.09	5790	3.50	7492
0.06	981	0.57	3024	1.08	4162	1.59	5050	2.10	5804	3.60	7599
0.07	1060	0.58	3050	1.09	4181	1.60	5066	2.11	5817	3.70	7704
0.08	1133	0.59	3076	1.10	4200	1. 61	5082	2.12	5831	3.80	7807
0.09	1201	0.60	3102	1.11	4219	1.62	5098	2.13	5845	3.90	7909
0.10	1266	0.61	3127	1.12	4238	1.63	5114	2.14	5859	4.00	8010
0.11	1328	0.62	3153	1.13	4257	1.64	5129	2.15	5872	4.10	8109
0.12	1387	0.63	3179	1.14	4276	1.65	5144	2.16	5886	4.20	8208
0.13	1444	0.64	3204	1.15	4295	1.66	5160	2.17	5899	4.30	8305
0.14	1498	0.65	3229	1.16	4314	1.67	5175	2.18	5913	4.40	8401
0.15	1551	0.66	3254	1.17	4332	1.68	5191	2.19	5927	4.50	8496
0.16	1602	0.67	3279	1.18	4350	1.69	5206	2.20	5940	4.60	8590
0.17	1651	0.68	3303	1.19	4368	1.70	5222	2.21	5954	4.70	8683
0.18	1699	0.69	3327	1.20	4386	1.71	5237	2.22	5967	4.80	8774
0.19	1746	0.70	3351	1.21	4405	1.72	5253	2.23	5981	4.90	8865
0.20	1791	0.71	3375	1.22	4423	1.73	5268	2.24	5994	5,00	8955
0.21	1835	0.72	3398	1.23	4442	1.74	5283	2.25	6008	5.10	9044
0.22	1879	0.73	3422	1.24	4460	1.75	5298	2.26	6021	5.20	9133
0.23	1921	0.74	3445	1.25	4478	1.76	5313	2.27	6034	5.30	9220
0.24	1962	0.75	3468	1.26	4495	1.77	5328	2.28	6047	5.40	9307
0.25	2003	0.76	3491	1.27	4513	1.78	5343	2.29	6061	5.50	9392
0.26	2042	0.77	3514	1.28	4531	1.79	5359	2.30	6074	5.60	9477
0.27	2081	0.78	3537	1.29	4549	1.80	5374	2.31	6087	5.70	9562
0.28	2119	0.79	3560	1.30	4566	1.81	5388	2.32	6100	5.80	9645
0.29	2157	0.80	3582	1.31	4583	1.82	5403	2.33	6113	5.90	9728
0.30	2193	0.81	3604	1.32	4601	1.83	5418	2.34	6128	6.00	9810
0.31	2230	0.82	3625	1.33	4619	1.84	5433	2.35	6140	6.10	9891
0.32	2260	0.83	3657	1.34	4636	1.85	5447	2.36	6153	6.20	9972
0.33	2301	0.84	3669	1.35	4653	1.86	5462	2.37	6166	6.30	10052
0.34	2335	0.85	3690	1.36	4671	1.87	5477	2.38	6179	6.40	10132
0.35	2369	0.86	3709	1.37	4688	1.88	5491	2.39	6192	6.50	10210
0.36	2403	0.87	3729	1.38	4705	1.89	5506	2.40	6205	6.66	10289
0.37	2436	0.88	3758	1.39	4722	1.90	5521	2.41	6217	6.70	10366
0.38	2469	0.89	3779	1.40	4739	1.91	5535	2.42	6230	6.80	10444
0.39	2501	0.90	3800	1.41	4756	1.92	5550	2.43	6243	6.90	10520
0.40	2533	0.91	3821	1.42	4773	1.93	5564	2.44	6256	7.00	10596
0.41	2563	0.92	3842	1.43	4790	1.94	5579	2.45	6269	7.50	10968
0.42	2595	0.93	3863	1.44	4806	1.95	5593	2.46	6282	8.00	11328
0.43	2626	0.94	3884	1.45	4823	1.96	5608	2.47	6294	8.50	11676
0.44	2656	0.95	3904	1.46	4840	1.97	5623	2.48	6307	9.00	12015
0.45	2687	0.96	3924	1.47	4856	1.98	5637	2.49	6320	9.50	12344
0.46	2716	0.97	3945	1.48	4873	1.99	5651	2.50	6332	10.00	12665
0.47	2746	0.98	3965	1.49	4889	2.00	5664	2.60	6458	11.00	13283
0.48	2775	0.99	3985	1.50	4905	2.01	5678	2.70	6581	12.00	13874
0.49	2804	1.00	4005	1.51	4921	2.02	5692	2.80	6702	13.00	14440
0.50	2832	1.01	4025	1.52	4938	2.03	5706	2.90	6820	13.61	14775
0.51	2860	1.02	4045	1.53	4954	2.04	5720	3.00	6937	14.00	14986

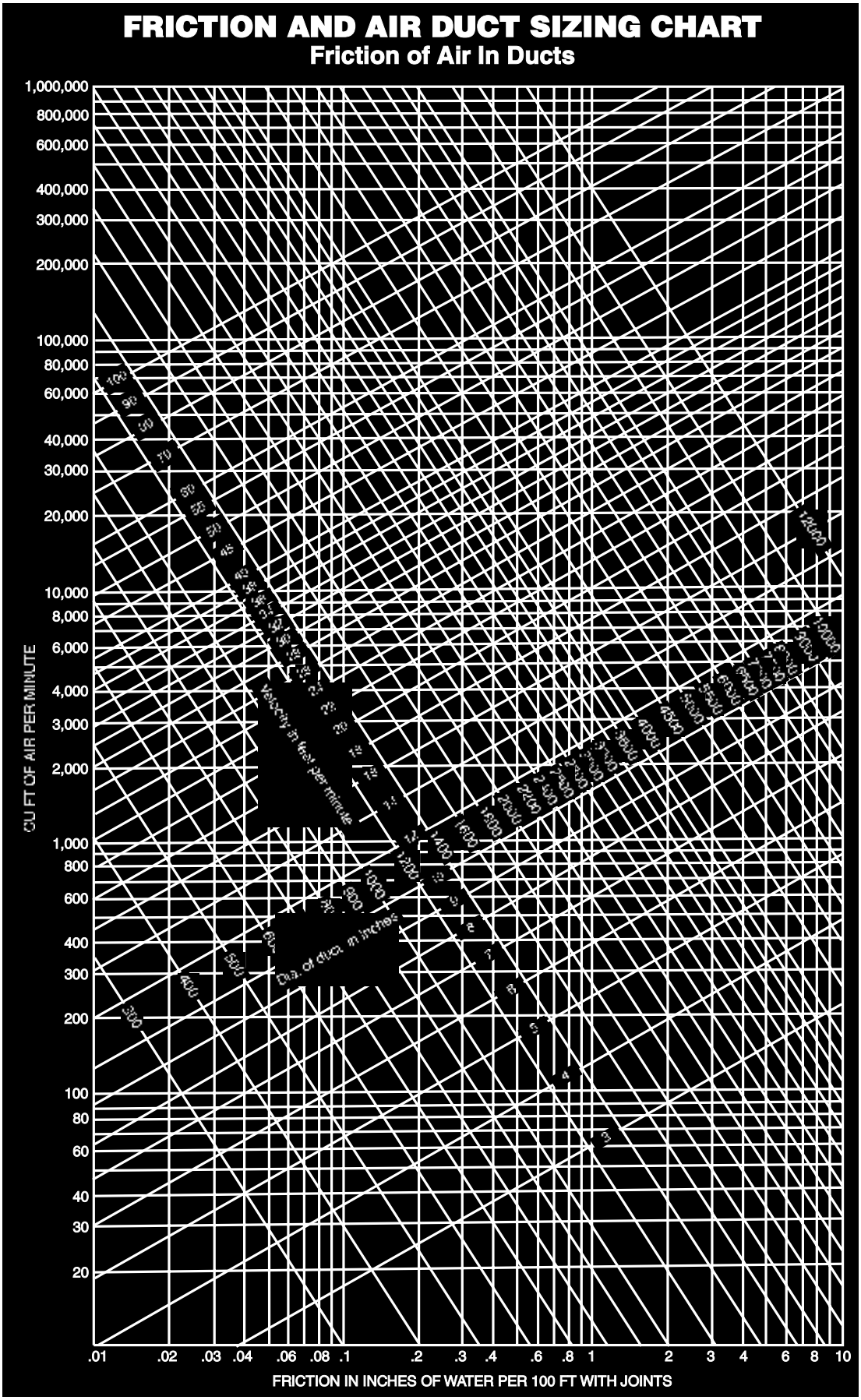
TYPICAL ENTRANCE LOSSES

TYPE OF ORIFICE	DESCRIPTION	LOSS*	TYPE OF ORIFICE	DESCRIPTION	LOSS*
	Smooth well rounded	5		Unflanged cone 15 per side	13
	Flanged cone 15° per side	7		Unflanged pipe	90
	Flanged pipe	50		Two-cone, 45 & 15° per side	6

*Loss is given in percent of velocity pressure (% VP)

FRICTION AND AIR DUCT SIZING CHART

Friction of Air In Ducts



Note: Refer to page 8 for equivalent resistance in feet of straight pipe for 90° elbows.

AREA AND CIRCUMFERENCE OF CIRCLES AND SIDES OF SQUARES OF EQUAL AREAS

Diam. in Inches	AREA		Circum-ference in Feet	One Side of a Square of Equal Area	Diam. in Inches	AREA		Circum-ference in Feet	One Side of a Square of Equal Area
	Square Inches	Square Feet				Square Inches	Square Feet		
1	.7854	.0054	.2618	.89	51	2043	14.19	13.35	45.20
2	3.142	.0218	.5236	1.77	52	2124	14.75	13.61	46.08
3	7.069	.0491	.7854	2.66	53	2206	15.32	13.88	46.97
4	12.57	.0873	1.047	3.54	54	2290	15.90	14.14	47.86
5	19.63	.1364	1.309	4.43	55	2376	16.50	14.40	48.74
6	28.27	.1964	1.571	5.32	56	2463	17.10	14.66	49.63
7	38.48	.2673	1.833	6.20	57	2552	17.72	14.92	50.51
8	50.27	.3491	2.094	7.09	58	2642	18.35	15.18	51.40
9	63.62	.4418	2.356	7.98	59	2734	18.99	15.45	52.29
10	78.54	.5454	2.618	8.86	60	2827	19.63	15.71	53.17
11	95.03	.6600	2.880	9.75	61	2922	20.29	15.97	54.06
12	113.1	.7854	3.142	10.63	62	3019	20.97	16.23	54.91
13	132.7	.9218	3.403	11.52	63	3117	21.65	16.49	55.83
14	153.9	1.069	3.665	12.40	64	3127	22.34	16.76	56.72
15	176.7	1.277	3.927	13.29	65	3318	23.04	17.02	57.60
16	201.0	1.396	4.189	14.18	66	3421	23.76	17.28	58.49
17	227.0	1.576	4.451	15.06	67	3526	24.48	17.54	59.38
18	254.7	1.767	4.712	15.95	68	3632	25.22	17.80	60.26
19	283.5	1.969	4.974	16.84	69	3739	25.97	18.06	61.15
20	314.2	2.182	5.236	17.72	70	3848	26.73	18.33	62.04
21	346.3	2.405	5.498	18.61	71	3959	27.49	18.59	62.92
22	380.1	2.640	5.760	19.49	72	4072	28.27	18.85	63.18
23	415.5	2.885	6.021	20.38	73	4185	29.07	19.11	64.99
24	452.4	3.142	6.283	21.27	74	4301	29.87	19.37	65.58
25	490.9	3.409	6.545	22.15	75	4418	30.68	19.63	66.40
26	530.9	3.687	6.807	23.04	76	4536	31.50	19.90	67.35
27	572.5	3.976	7.069	23.93	77	4657	32.34	20.16	68.48
28	615.7	4.276	7.330	24.81	78	4778	33.18	20.42	69.15
29	660.5	4.587	7.592	25.70	79	4902	34.04	20.68	70.03
30	706.8	4.909	7.854	26.59	80	5027	34.93	20.94	70.89
31	754.7	5.241	8.116	27.47	81	5153	35.78	21.21	71.80
32	804.2	5.585	8.378	28.36	82	5281	36.67	21.47	73.35
33	855.3	5.940	8.639	29.25	83	5411	37.57	21.73	73.55
34	907.9	6.305	8.901	30.13	84	5542	38.48	21.99	74.45
35	962.1	6.681	9.163	31.02	85	5675	39.41	22.25	75.48
36	1017.8	7.069	9.425	31.90	86	5809	40.34	22.51	76.22
37	1075.2	7.467	9.686	32.79	87	5945	41.28	22.78	77.10
38	1134.1	7.876	9.948	33.68	88	6082	42.24	23.04	77.99
39	1194.5	8.296	10.21	34.56	89	6221	43.20	23.30	78.87
40	1256.6	8.727	10.47	35.45	90	6363	44.18	23.56	79.76
41	1320.2	9.168	10.73	36.33	91	6504	45.17	23.82	80.65
42	1385.4	9.621	10.99	37.22	92	6648	46.16	24.09	81.54
43	1452.2	10.08	11.26	38.11	93	6793	47.17	24.35	82.42
44	1520.5	10.56	11.52	38.99	94	6940	48.19	24.61	83.31
45	1509.4	11.04	11.78	39.88	95	7088	49.22	24.87	84.19
46	1661.9	11.54	12.04	40.76	96	7238	50.27	25.13	85.08
47	1734.9	12.05	12.30	41.65	97	7390	51.32	25.39	85.96
48	1809.5	12.51	12.57	42.58	98	7543	52.38	25.66	86.85
49	1885.7	13.09	12.83	43.42	99	7698	53.46	25.92	87.74
50	1963.5	13.64	13.09	44.31	100	7855	54.54	26.18	88.63

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AIR VELOCITIES REQUIRED FOR EXHAUST HOODS

Application	Canopy Hoods	Open faced Booths	Slotted Hoods	Portable Hoods
Degreasing	150 FPM over face		2000 FPM through 2" slots	
Electroplating	150 FPM over face		2000 to 2500 FPM through 2" slots	
Foundry Shake-out		150 FPM over face		
Metal Spraying		150 to 200 FPM over face		
Pickling Metals	200 FPM over face		2000 FPM through slots	
Electric Welding		100 FPM over face		200 FPM over face
Spray Booths		150 FPM over face		
Laboratory	50 to 100 FPM over face			
Restaurant Range	100 to 150 FPM over face			
Steam-varnish Kettles	150 to 200 FPM over face			

VELOCITIES REQUIRED FOR CONVEYING MATERIALS

Material	Approx. weight per. cu. ft. lbs.	Average velocity to convey FPM	Suction to pick-up inches of Water
Ashes, Coal	30	5500	3
Beans	28	6000	4
Buffing		3700	2-1/2
Cement	100	7000	5
Cork	14	3000	1-1/2
Corn, cobs	25	5500	2-1/2
Corn, ear	56	6000	4-1/2
Corn, shelled	45	5500	3-1/2
Cotton, dry	5	3500	2
Grinding dust	30	4500	2
Lime, hydrated	30	5500	3
Malt	35	4800	3
Mineral wool	12	3500	2
Paper cuttings	20	5000	3
Rags, dry	30	4000	2-1/2
Sawdust, dry	12	3500	2-1/2
Shavings, light	9	3500	2-1/2
Shavings, heavy	24	4000	3
Wheat	46	6000	4
Wool, dry	5	3500	2

FRACTIONS, DECIMALS, MILLIMETERS

DECIMALS	MILLIMETERS	MILLIMETERS	DECIMALS	
1/64 .0156	0.3960	13.0969	.5156	33/64
1/32 .0313	0.7938	13.4938	.5313	17/32
3/64 .0469	1.1906	13.8906	.5469	35/64
1/16 .0625	1.5875	14.2875	.5625	9/16
5/64 .0781	1.9844	14.6844	.5781	37/64
3/32 .0938	2.3813	15.0813	.5938	19/32
7/64 .1094	2.7781	15.4781	.6094	39/64
1/8 .125	**3.1750**	**15.8750**	**.625**	**5/8**
9/64 .1406	3.5719	16.2719	.6406	41/64
5/32 .1563	3.9688	16.6688	.6563	21/32
11/64 .1719	4.3656	17.0656	.6719	43/64
3/16 .1875	4.7625	17.4625	.6875	11/16
13/64 .2031	5.1594	17.8594	.7031	45/64
7/32 .2188	5.5563	18.2563	.7188	23/32
15/64 .2344	5.9531	18.6531	.7344	47/64
1/4 .250	**6.3500**	**19.0500**	**.750**	**3/4**
17/64 .2656	6.7469	19.4469	.7656	49/64
9/32 .2813	7.1438	19.8438	.7813	25/32
19/64 .2969	7.5406	20.2406	.7969	51/64
5/16 .3125	7.9375	20.6375	.8125	13/16
21/64 .3281	8.3344	21.0344	.8281	53/64
11/32 .3438	8.7313	21.4313	.8438	27/32
23/64 .3594	9.1281	21.8281	.8594	55/64
3/8 .375	**9.5250**	**22.2250**	**.875**	**7/8**
25/64 .3906	9.9219	22.6219	.8906	57/64
13/32 .4063	10.3188	23.0188	.9063	29/32
27/64 .4219	10.7156	23.4156	.9219	59/64
7/16 .4375	11.1125	23.8125	.9375	15/16
29/64 .4531	11.5094	24.2094	.9531	61/64
15/32 .4688	11.9063	24.6063	.9688	31/32
31/64 .4844	12.3031	25.0031	.9844	63/64
1/2 .500	**12.7000**	**25.4000**	**1.000**	**1**

American Fan Company

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GENERAL VENTILATION DATA

AIR SPACE TO BE VENTILATED	NUMBER OF MINUTES PER AIR CHANGE
Auditorium	3 – 7
Bakery	1 – 3
Boiler Room	1 – 3
Cafeteria	3 – 5
Church	3 – 5
Club	4 – 6
Dormitory	5 – 7
Engine Room	2 – 4
Factory	4 – 8
Foundry	3 – 7
Garage	4 – 8
Kitchen	2 – 4
Laboratory	3 – 5
Laundry	1 – 3
Library	2 – 4
Locker Room	3 – 12
Mill	4 – 8
Office	5 – 10
Packing House	3 – 5
Plating Room	2 – 4
Printing Shop	4 – 8
Restaurant	4 – 8
Rest Room	4 – 8
Sales Room	4 – 8
School	4 – 10
Ship Hold	6 – 10
Store	4 – 8
Theatre	3 – 6
Toilet	3 – 5
Transformer Room	2 – 6
Warehouse	5 – 10

Formula to determine fan capacity:

$$\text{CFM Req.} = \frac{\text{Volume of space (WxLxH)}}{\text{No. of minutes per air change}}$$

WEIGHT OF MATERIALS IN POUNDS

MATERIAL	CU. IN.	CU. FT.
Aluminum	.095	165
Brass	.301	520
Iron	.260	450
Steel	.284	490
Concrete	.081	140
Pine	.017	30

SHEET METAL GAUGES AND WEIGHTS

Gauge or Thickness	Thickness in Inches	Pounds Per Square Ft.
3/8	.375	15.32
1/4	.25	10.21
7	.1793	7.50
8	.1644	6.875
10	.1345	5.625
11	.1196	5.00
12	.1046	4.375
14	.0747	3.125
16	.0598	2.50
18	.0478	2.00
20	.0359	1.50
22	.0299	1.25
24	.0239	1.00
26	.0179	.75
28	.0149	.625

CONVERSION FACTORS

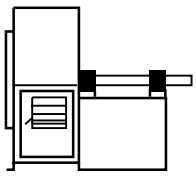
TO CONVERT	MULTIPLY BY	TO OBTAIN
centimeters	.3937	inches
cubic feet	.02832	cubic meters
cubic feet per minute	.000472	cubic meters per second
feet per minute	.00508	meters per second
feet per minute	.01136	miles per hour
inches	2.54	centimeters
inches water	248.4	pascal or N/M2
kilograms per cu. meter	.06243	pounds per cubic feet
kilowatts	56.92	Btu per minute
meters	3.281	feet
meters per second	196.8	feet per minute
miles per hour	88	feet per minute
pounds	.4536	kilograms
pounds per cubic feet	16.02	kilograms per cubic meter

°F:(9/5 °C) + 32° °C: 5/9 (°F -32°)

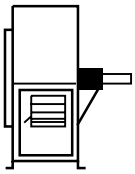
ARRANGEMENTS

SW - Single Width **DW** - Double Width

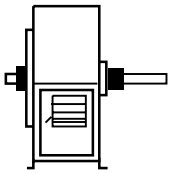
SI - Single Inlet **DI** - Double - Inlet



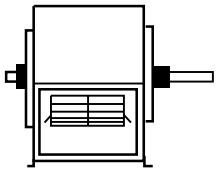
ARR. 1 SWSI For belt drive or direct connection. Impeller overhung.Two bearings on base.



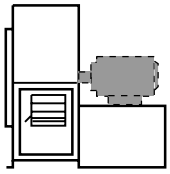
ARR. 2 SWSI For belt drive or direct connection. Impeller overhung. Bearings in bracket supported by fan housing.



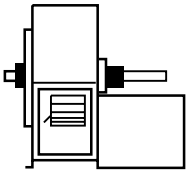
ARR. 3 SWSI For belt drive or direct connection. One bearing on each side and supported by fan housing.



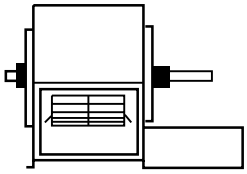
ARR. 3 DWDI For belt drive or direct connection. One bearing on each side and supported by fan housing.



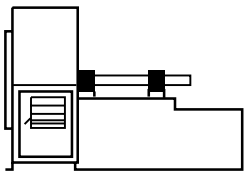
ARR. 4 SWSI For direct drive. Impeller overhung on prime mover-shaft. No bearings on fan. Prime mover base mounted or integrally-directly connected.



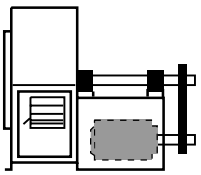
ARR. 7 SWSI For belt drive or direct connection. Arrangement 3 plus base for prime mover.



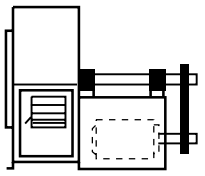
ARR. 7 DWDI For belt drive or direct connection. Arrangement 3 plus base for prime mover.



ARR. 8 SWSI For belt drive or direct connection. Arrangement 1 plus extended base for prime mover.

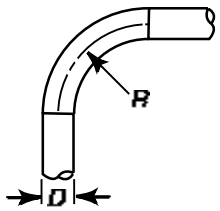


ARR. 9 SWSI For belt drive. Impeller overhung, two bearings, with prime mover outside base.



ARR. 10 SWSI For belt drive. Impeller overhung, two bearings with prime mover inside base.

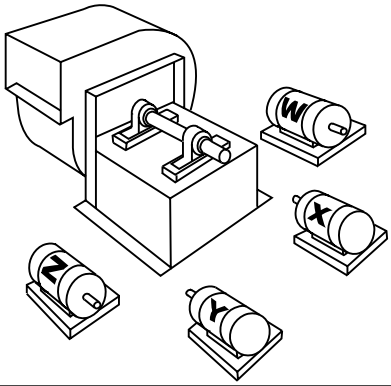
EQUIVALENT RESISTANCE IN FEET OF STRAIGHT PIPE



For
60° elbows — 0.67 x loss for 90°
45° elbows — 0.5 x loss for 90°
30° elbows — 0.33 x loss for 90°

Pipe D	90° Elbow * Centerline Radius		
	1.5 D	2.0 D	2.5 D
3"	5	3	3
4'	6	4	4
5"	9	6	5
6"	12	7	6
7"	13	9	7
8"	15	10	8
10"	20	14	11
12"	25	17	14
14"	30	21	17
16"	36	24	20
18"	41	28	23
20"	46	32	26
24"	57	40	32
30"	74	51	41
36"	93	64	52
40"	105	72	59
48"	130	89	73

MOTOR POSITIONS FOR CENTRIFUGAL FANS



Location of the motor is determined by facing the drive side of the fan and designating the motor positions by letters **W, X, Y, Z** as the case may be.

CALCULATION OF WR^2 (OR WK^2)

$$WR^2 = \left(\text{Weight of Rotating Object in Lbs.}\right) \times \left(\text{Radius of Gyration in Ft.}\right)^2$$

WR^2 is expressed in Lbs. – $Ft.^2$

Radius of Gyration = .68 to .75 times the wheel radius

For belt driven units WR^2 may be expressed as equivalent WR^2 on the motor shaft as follows:

$$\left(\text{Equivalent } WR^2 \text{ at Motor Shaft}\right) = WR^2 \left(\frac{\text{Fan RPM}}{\text{Motor RPM}}\right)^2$$

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American Fan Company

EP/3M/9/2040

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