

821, 831, 92 Series, 98VOH, H and V Series Drop Chart, Use with size selection charts

Instructions for use of Drop Chart

The drop of the air stream is determined by using the throw and velocity of the register selected. On the drop chart, lay a straight edge connecting these values. The total drop of the air stream will be the sum of the drop due to temperature (D_t) and the drop due to spread (D_s).

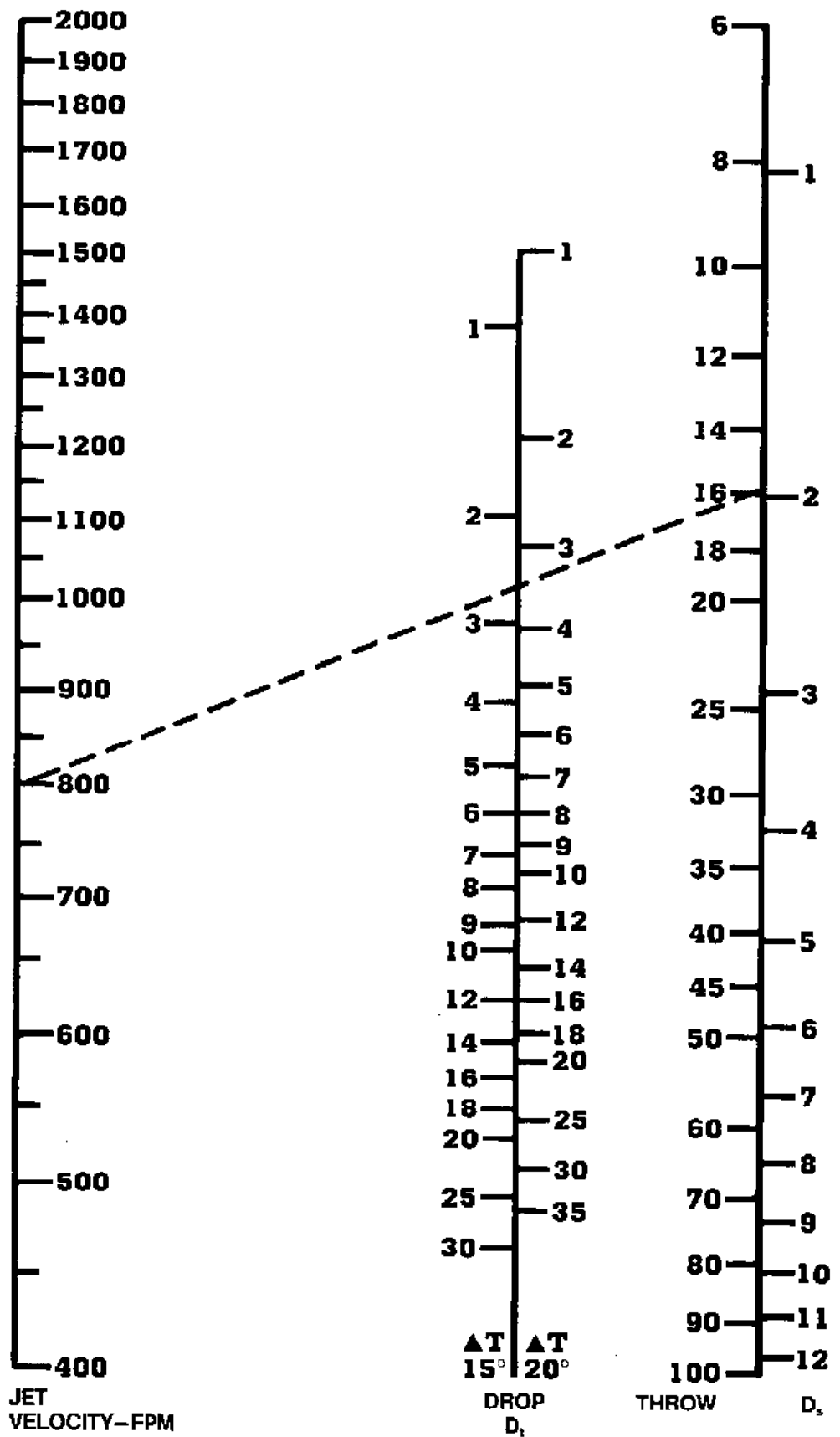
Example: The drop for a 92 Series register "C" deflection 16x5 size has an 800 fpm velocity and a 16 foot throw. Connect these two points on the chart and read the drops as follows:

$$D_t = 2.7' \quad D_s = 2'$$

$$D_{\text{total}} = 2.7 + 2 = 4.7'$$

D_t = Drop along line of throw due to temperature difference.

D_s = Drop resulting from vertical spread.



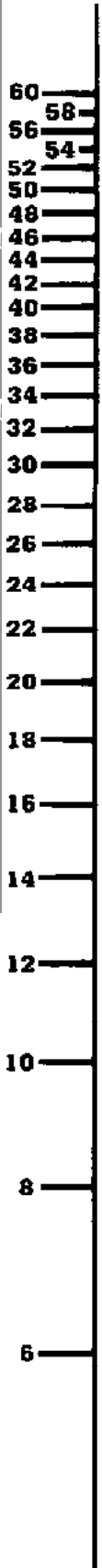
92 Series, H and V Series Alternate Sizing Graph

Grille Width
in Inches

Turning
Line

Grille Height
in Inches

Engineering Data



Method of Determining Alternate Grille Sizes

Extensive tests indicate that by varying dimensions of a grille there is no appreciable effect on the air throw, provided the same area is maintained. To change the dimensions of a grille, place a straight edge across the width and height scales on dimensions as selected from charts. Place a pointer at the crossing point on the turning line and rotate the straight edge around this point until it crosses width and height scale at dimensions desired.

NOTE: Grille sizes determined from this chart are the nominal or duct dimensions.

General Conclusions on Air Distribution

1. The throw from a straight flow grille varies with the square root of the daylight area of the grille and with the face velocity.
2. The ratio of the width to the height (aspect ratio) of a grille has no appreciable effect on the distance of air throw.
3. If the air streams from a grille are converged, it results only in cutting down the effective area of the grille.
4. Breaking the air stream up into jets has no effect on either the rate of mixing or the flow.
5. Fanning out the air stream shortens the throw. The amount depends on the degree of deflection.
6. The drop, for a given throw, of an air stream below room temperature varies about inversely as the face velocity and directly as the temperature differential.
7. For any given velocity neither the aspect ratio of the grille, breaking the air stream up into jets, nor impinging the air streams together equally have any effect on the drop of the air stream.

Basic formulae determined through elaborate test work and used in the compilation of the charts contained herein are:

$$(1) \quad T = \frac{Kt \times CFM}{\sqrt{A} \times Vt}$$

$$(2) \quad CFM = V \times Ak$$

$$(3) \quad CFM = An \times Vn$$

Where: T = Throw (feet)
 Kt = Throw factor determined by test
 CFM = Air flow rate (cubic feet per minute)
 A = Core Area, sq. ft.
 Vt = Terminal Velocity
 Vk = Face Velocity (Feet per minute)
 Ak = Effective area
 Where: Vn = Neck Velocity in feet per minute
 An = Neck area in square feet

For further definition see the glossary pg. 121

Listed Size	6	8	10	12
An (Round)	.20	.35	.55	.79
An (Square)	.25	.44	.69	1.00

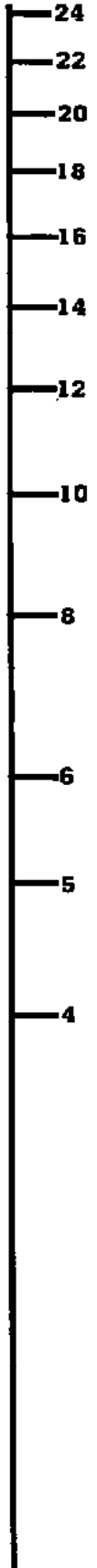
Listed Size	14	16	18	20
An (Round)	1.10	1.40	1.80	2.20
An (Square)	1.40	1.80	2.30	2.80

Air Velocity (FPM) and Velocity Pressure (Pv, inches water column) relationships:

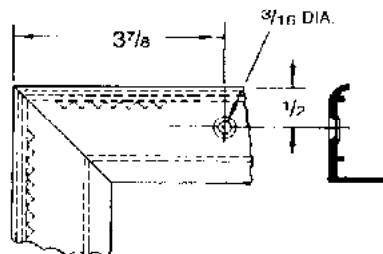
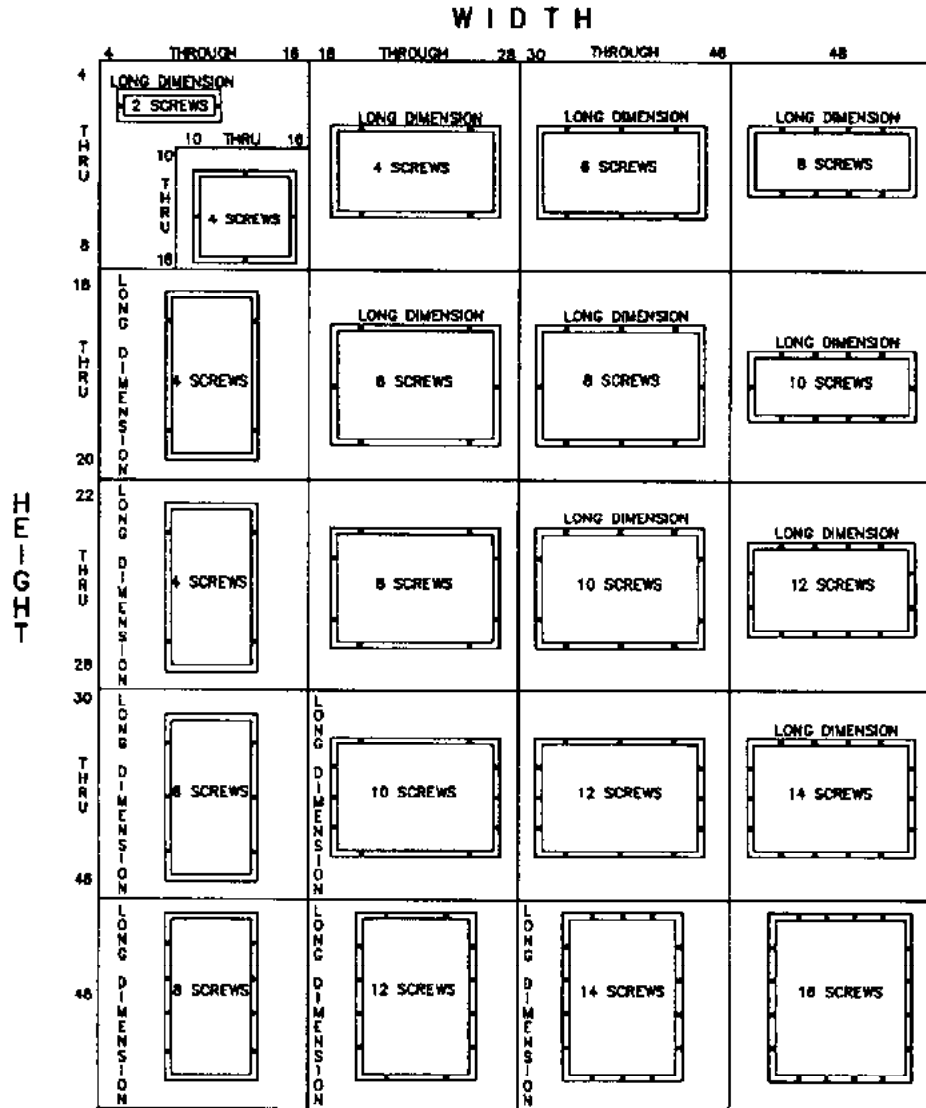
$$Vel = 4005 \sqrt{Pv}$$

$$Pv = \left(\frac{Vel}{4005} \right)^2$$

$$CFM = \frac{BTUH}{\Delta T \times 1.085}$$



Screw Hole Chart for Extruded Aluminum Line V Series, H Series, C Series, RH Series



H and V Series (Page 12-16)

Deflection A

Face Velocity	400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss	.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4 CFM	60	80	95	110	125	140	155	170	185	205	220	250	280	310
Ak. 156 Throw	6.5	8.0	10.0	12.0	13.0	15.0	16.0	18.0	19.0	22.0	23.0	26.0	29.0	33.0
10 x 4 CFM	80	100	120	140	160	180	200	220	240	260	275	315	355	395
Ak. 198 Throw	7.5	9.5	12.0	13.0	15.0	17.0	19.0	20.0	22.0	24.0	26.0	29.0	33.0	37.0
12 x 4 CFM	95	120	145	170	190	215	240	265	290	310	335	385	430	480
Ak. 240 Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	25.0	26.0	28.0	33.0	36.0	41.0
14 x 4 CFM	115	140	170	195	225	255	280	310	340	365	395	450	510	565
Ak. 282 Throw	9.0	11.0	13.0	15.0	18.0	20.0	22.0	24.0	27.0	29.0	31.0	35.0	40.0	44.0
12 x 5 CFM	125	155	185	215	250	280	310	340	370	405	435	495	560	620
Ak. 310 Throw	9.0	12.0	14.0	16.0	19.0	21.0	23.0	25.0	28.0	30.0	32.0	37.0	42.0	46.0
10 x 6 CFM	125	155	190	220	250	280	315	345	375	405	440	500	565	625
Ak. 313 Throw	9.0	12.0	14.0	16.0	19.0	21.0	23.0	26.0	28.0	30.0	33.0	37.0	42.0	46.0
14 x 5 CFM	145	180	220	255	290	330	365	400	435	475	510	580	655	730
Ak. 364 Throw	10.0	12.0	15.0	18.0	20.0	23.0	25.0	28.0	30.0	33.0	35.0	40.0	45.0	50.0
12 x 6 CFM	150	190	225	265	305	340	380	415	455	495	530	605	680	760
Ak. 379 Throw	10.0	13.0	15.0	18.0	21.0	23.0	26.0	28.0	31.0	33.0	36.0	41.0	46.0	51.0
16 x 5 CFM	165	210	250	295	335	375	420	460	500	545	585	670	750	835
Ak. 418 Throw	11.0	13.0	16.0	19.0	22.0	24.0	27.0	30.0	32.0	35.0	38.0	43.0	48.0	54.0
14 x 6 CFM	180	225	270	310	355	400	445	490	535	580	625	715	805	890
Ak. 446 Throw	11.0	14.0	17.0	19.0	22.0	25.0	28.0	30.0	33.0	36.0	39.0	44.0	50.0	55.0
16 x 6 CFM	205	255	305	360	410	460	510	565	615	665	715	820	920	1025
Ak. 512 Throw	11.0	14.0	17.0	20.0	22.0	25.0	28.0	31.0	34.0	36.0	39.0	45.0	50.0	56.0
20 x 5 CFM	210	265	315	370	420	475	525	580	630	685	735	840	945	1050
Ak. 526 Throw	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	48.0	54.0	60.0
24 x 5 CFM	255	315	380	445	505	570	635	695	760	825	890	1015	1140	1270
Ak. 634 Throw	13.0	16.0	20.0	23.0	26.0	30.0	33.0	36.0	40.0	43.0	46.0	53.0	59.0	66.0
20 x 6 CFM	260	325	385	450	515	580	645	710	775	840	905	1030	1160	1290
Ak. 645 Throw	13.0	17.0	20.0	23.0	27.0	30.0	33.0	37.0	40.0	43.0	47.0	53.0	60.0	67.0
24 x 6 CFM	310	390	465	545	620	700	775	855	930	1010	1090	1245	1400	1555
Ak. 777 Throw	15.0	18.0	22.0	26.0	29.0	33.0	37.0	40.0	44.0	48.0	51.0	59.0	66.0	73.0
20 x 8 CFM	355	440	530	615	705	795	880	970	1060	1145	1235	1410	1590	1765
Ak. 882 Throw	16.0	19.0	23.0	27.0	31.0	35.0	39.0	43.0	47.0	51.0	55.0	62.0	70.0	78.0
30 x 6 CFM	390	490	585	685	780	880	975	1075	1170	1270	1365	1560	1755	1950
Ak. 976 Throw	16.0	21.0	25.0	29.0	33.0	37.0	41.0	45.0	49.0	53.0	57.0	66.0	74.0	82.0
24 x 8 CFM	425	530	635	740	850	955	1060	1165	1270	1380	1485	1695	1910	2120
Ak. 1060 Throw	17.0	21.0	23.0	30.0	34.0	38.0	43.0	47.0	51.0	56.0	60.0	68.0	77.0	85.0
30 x 8 CFM	535	670	805	940	1070	1205	1340	1475	1610	1740	1875	2145	2410	2680
Ak. 1340 Throw	19.0	24.0	29.0	34.0	38.0	43.0	48.0	53.0	58.0	62.0	67.0	77.0	87.0	96.0
24 x 10 CFM	540	675	810	945	1080	1215	1350	1485	1620	1755	1890	2160	2430	2700
Ak. 1350 Throw	19.0	24.0	29.0	34.0	39.0	43.0	48.0	53.0	58.0	63.0	68.0	77.0	87.0	97.0
36 x 8 CFM	645	805	965	1125	1290	1450	1610	1770	1930	2095	2255	2575	2900	3220
Ak. 1610 Throw	21.0	26.0	32.0	37.0	42.0	47.0	52.0	58.0	63.0	68.0	73.0	84.0	94.0	105.0
24 x 12 CFM	655	820	985	1150	1310	1475	1640	1805	1970	2130	2295	2625	2950	3280
Ak. 1640 Throw	21.0	27.0	32.0	37.0	43.0	48.0	53.0	59.0	64.0	69.0	75.0	85.0	96.0	107.0
30 x 10 CFM	675	845	1015	1185	1350	1520	1690	1860	2030	2195	2365	2705	3040	3380
Ak. 1690 Throw	21.0	27.0	32.0	38.0	43.0	48.0	54.0	59.0	65.0	70.0	75.0	86.0	97.0	108.0
36 x 10 CFM	815	1020	1225	1430	1630	1835	2040	2245	2450	2650	2855	3265	3670	4080
Ak. 2040 Throw	24.0	30.0	36.0	42.0	47.0	53.0	59.0	65.0	71.0	77.0	83.0	95.0	107.0	119.0
30 x 12 CFM	820	1025	1230	1435	1640	1845	2050	2255	2460	2665	2870	3280	3690	4100
Ak. 2050 Throw	24.0	30.0	36.0	42.0	48.0	54.0	59.0	65.0	71.0	77.0	83.0	95.0	107.0	119.0
36 x 12 CFM	990	1235	1480	1730	1975	2225	2470	2715	2965	3210	3460	3950	4450	4940
Ak. 2470 Throw	26.0	33.0	39.0	46.0	52.0	59.0	65.0	72.0	78.0	85.0	91.0	104.0	114.0	130.0

For sizes not listed and sizing tips see page 76

Terminal Velocity of 75 FPM

Deflection C

Face Velocity	400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss	.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4 CFM	55	70	85	100	115	125	140	155	170	185	195	225	255	280
Ak. 141 Throw	5.0	6.5	7.5	9.0	10.0	11.0	13.0	14.0	15.0	17.0	18.0	20.0	23.0	25.0
10 x 4 CFM	70	90	105	125	140	160	180	195	215	230	250	285	320	355
Ak. 178 Throw	5.5	7.0	8.5	10.0	11.0	13.0	14.0	16.0	17.0	18.0	20.0	23.0	26.0	29.0
12 x 4 CFM	85	110	130	150	175	195	215	240	260	280	300	345	390	430
Ak. 216 Throw	6.0	8.0	9.5	11.0	13.0	14.0	16.0	18.0	19.0	20.0	22.0	25.0	28.0	31.0
14 x 4 CFM	100	125	150	180	205	230	255	280	305	330	355	405	455	510
Ak. 254 Throw	7.0	8.5	10.0	12.0	14.0	16.0	17.0	19.0	21.0	22.0	24.0	27.0	31.0	34.0
12 x 5 CFM	110	140	165	195	225	250	280	305	335	365	390	445	500	560
Ak. 279 Throw	7.0	9.0	11.0	13.0	14.0	16.0	18.0	20.0	22.0	23.0	25.0	29.0	32.0	36.0
10 x 6 CFM	115	140	170	195	225	255	280	310	340	365	395	450	510	565
Ak. 282 Throw	7.5	9.0	11.0	12.0	14.0	16.0	18.0	20.0	22.0	23.0	25.0	29.0	32.0	36.0
14 x 5 CFM	130	165	195	230	260	295	330	360	395	425	460	525	590	655
Ak. 328 Throw	7.5	10.0	12.0	14.0	15.0	17.0	20.0	21.0	23.0	25.0	27.0	31.0	35.0	39.0
12 x 6 CFM	135	170	205	240	275	310	340	375	410	445	480	545	615	685
Ak. 342 Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	32.0	36.0	40.0
16 x 5 CFM	150	190	225	265	300	340	375	415	450	490	525	605	680	755
Ak. 377 Throw	8.5	11.0	12.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	29.0	34.0	38.0	41.0
14 x 6 CFM	165	205	245	290	330	370	410	455	495	535	575	660	740	825
Ak. 412 Throw	9.0	11.0	13.0	16.0	18.0	20.0	22.0	24.0	27.0	28.0	31.0	35.0	40.0	44.0
16 x 6 CFM	185	230	275	325	370	415	460	510	555	600	645	740	830	925
Ak. 462 Throw	9.0	11.0												

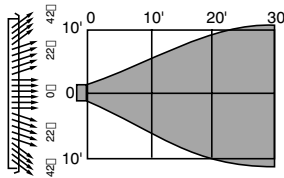
H and V Series (Page 12-16)

Deflection E

Face Velocity	400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss	.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4 CFM	45	60	70	85	95	105	120	130	140	155	165	190	210	235
Ak .127 Throw	2.5	3.5	4.0	5.0	5.5	6.0	6.5	7.5	8.0	8.5	9.5	11.0	12.0	13.0
10 x 4 CFM	60	75	90	105	120	135	150	165	180	195	210	240	270	300
Ak .162 Throw	3.0	3.5	4.5	5.0	6.0	6.5	7.5	8.0	9.0	9.5	10.0	12.0	13.0	15.0
12 x 4 CFM	80	100	120	140	160	175	195	215	235	255	275	315	355	395
Ak .197 Throw	4.5	6.0	7.5	8.5	10.0	11.0	12.0	13.0	14.0	16.0	17.0	19.0	22.0	24.0
14 x 4 CFM	90	115	140	160	185	210	230	255	275	300	325	370	415	460
Ak .231 Throw	5.0	6.5	8.0	9.0	11.0	12.0	13.0	14.0	16.0	17.0	18.0	21.0	23.0	26.0
12 x 5 CFM	100	125	150	180	205	230	255	280	305	330	355	405	455	510
Ak .254 Throw	5.5	6.5	8.0	9.5	12.0	12.0	14.0	15.0	16.0	18.0	19.0	22.0	25.0	27.0
10 x 6 CFM	105	130	155	180	205	230	255	285	310	335	360	410	465	515
Ak .257 Throw	5.5	7.5	8.5	9.5	11.0	12.0	14.0	15.0	17.0	18.0	19.0	22.0	25.0	28.0
14 x 5 CFM	120	150	180	210	240	270	300	330	360	385	415	475	535	595
Ak .291 Throw	6.0	7.5	9.0	10.0	12.0	13.0	15.0	16.0	18.0	19.0	21.0	24.0	27.0	30.0
12 x 6 CFM	125	155	185	220	250	280	310	340	375	405	435	500	560	620
Ak .311 Throw	6.0	7.5	9.0	11.0	12.0	14.0	15.0	17.0	18.0	20.0	21.0	24.0	28.0	30.0
16 x 5 CFM	135	170	205	240	275	310	345	375	410	445	480	550	615	685
Ak .343 Throw	6.5	8.0	9.5	11.0	13.0	14.0	16.0	17.0	19.0	21.0	22.0	26.0	29.0	32.0
14 x 6 CFM	145	185	220	255	290	330	365	400	440	475	510	585	655	730
Ak .365 Throw	6.5	8.5	10.0	11.0	13.0	15.0	16.0	18.0	20.0	21.0	23.0	26.0	29.0	33.0
16 x 6 CFM	170	215	240	300	345	390	430	475	545	560	605	690	775	860
Ak .431 Throw	7.0	9.0	11.0	12.0	14.0	16.0	18.0	20.0	21.0	23.0	25.0	28.0	32.0	36.0
20 x 5 CFM	190	235	280	330	375	425	470	515	565	610	660	750	845	940
Ak .470 Throw	7.5	9.5	11.0	13.0	15.0	17.0	19.0	20.0	22.0	24.0	26.0	30.0	33.0	37.0
24 x 5 CFM	210	260	310	365	415	470	520	570	625	675	730	830	935	1040
Ak .520 Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	21.0	24.0	25.0	27.0	31.0	35.0	39.0
20 x 6 CFM	210	265	315	370	420	475	530	580	635	685	740	845	950	1055
Ak .528 Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	32.0	35.0	39.0
24 x 6 CFM	255	320	380	445	510	575	635	700	765	830	890	1020	1145	1275
Ak .637 Throw	8.5	11.0	13.0	15.0	17.0	20.0	22.0	24.0	26.0	28.0	30.0	35.0	39.0	43.0
20 x 8 CFM	290	360	435	505	580	650	725	795	870	940	1010	1155	1300	1445
Ak .723 Throw	9.0	12.0	14.0	16.0	19.0	21.0	23.0	25.0	28.0	30.0	32.0	37.0	42.0	46.0
30 x 6 CFM	320	400	480	560	640	720	800	880	960	1040	1120	1280	1440	1600
Ak .800 Throw	10.0	12.0	15.0	17.0	19.0	22.0	24.0	27.0	29.0	32.0	34.0	39.0	44.0	49.0
24 x 8 CFM	350	435	525	610	700	785	870	960	1045	1135	1220	1400	1570	1745
Ak .872 Throw	10.0	13.0	15.0	18.0	20.0	23.0	25.0	28.0	30.0	33.0	36.0	41.0	48.0	51.0
30 x 8 CFM	435	545	655	765	870	980	1090	1200	1310	1415	1525	1745	1960	2180
Ak .1090 Throw	11.0	14.0	17.0	20.0	23.0	25.0	28.0	31.0	34.0	37.0	40.0	45.0	51.0	57.0
24 x 10 CFM	445	555	665	775	890	1000	1110	1220	1330	1445	1555	1775	2000	2220
Ak .1110 Throw	11.0	14.0	17.0	20.0	23.0	26.0	29.0	31.0	34.0	37.0	40.0	46.0	52.0	57.0
36 x 8 CFM	530	660	790	925	1055	1190	1320	1450	1585	1715	1850	2110	2375	2640
Ak .1320 Throw	14.0	17.0	21.0	24.0	27.0	31.0	34.0	38.0	41.0	45.0	48.0	55.0	62.0	69.0
24 x 12 CFM	535	670	805	940	1070	1205	1340	1475	1610	1740	1875	2145	2410	2680
Ak .1340 Throw	13.0	16.0	19.0	22.0	25.0	28.0	31.0	35.0	38.0	41.0	44.0	50.0	57.0	63.0
30 x 10 CFM	555	695	835	975	1110	1250	1390	1530	1670	1805	1945	2225	2500	2780
Ak .1390 Throw	13.0	16.0	19.0	22.0	26.0	29.0	32.0	38.0	38.0	42.0	45.0	51.0	58.0	64.0
36 x 10 CFM	670	835	1000	1170	1335	1505	1670	1835	2005	2170	2340	2670	3005	3340
Ak .1670 Throw	14.0	18.0	21.0	25.0	28.0	32.0	35.0	39.0	42.0	46.0	49.0	56.0	63.0	70.0
30 x 12 CFM	670	840	1010	1175	1345	1510	1680	1850	2015	2185	2350	2690	3025	3360
Ak .1680 Throw	14.0	16.0	21.0	25.0	28.0	32.0	35.0	39.0	42.0	46.0	49.0	56.0	63.0	70.0
36 x 12 CFM	810	1015	1220	1420	1625	1825	2030	2235	2435	2640	2840	3250	3655	4060
Ak .2030 Throw	15.0	19.0	23.0	27.0	31.0	35.0	39.0	43.0	46.0	50.0	54.0	62.0	70.0	78.0

For sizes not listed and sizing tips see page 76

Terminal Velocity of 75 FPM



Deflection G

Face Velocity	400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss	.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4 CFM	45	60	70	85	95	105	120	130	140	155	165	190	210	235
Ak .118 Throw	2.5	3.5	4.0	5.0	5.5	6.0	6.5	7.5	8.0	8.5	9.5	11.0	12.0	13.0
10 x 4 CFM	60	75	90	105	120	135	150	165	180	195	210	240	270	300
Ak .149 Throw	3.0	3.5	4.5	5.0	6.0	6.5	7.5	8.0	9.0	9.5	10.0	12.0	13.0	15.0
12 x 4 CFM	70	90	110	125	145	165	180	200	215	235	255	290	325	360
Ak .181 Throw	3.0	4.0	5.0	5.5	6.5	7.5	8.0	9.0	10.0	11.0	12.0	13.0	15.0	16.0
14 x 4 CFM	85	105	125	150	170	190	210	235	255	275	300	340	380	425
Ak .212 Throw	3.5	4.5	5.0	6.5	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	16.0	18.0
12 x 5 CFM	95	115	140	165	185	210	235	255	280	305	325	375	420	465
Ak .233 Throw	4.0	4.5	5.5	6.5	7.5	8.5	9.5	10.0	11.0	12.0	13.0	15.0	17.0	19.0
10 x 6 CFM	95	120	140	165	190	210	235	260	285	305	330	380	425	470
Ak .236 Throw	4.0	5.0	5.5	6.5	7.5	8.5	9.5	10.0	11.0	12.0	13.0	15.0	17.0	19.0
14 x 5 CFM	110	135	165	190	220	245	275	300	330	355	385	440	495	550
Ak .274 Throw	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	16.0	18.0	20.0
12 x 6 CFM	115	145	170	200	230	255	285	315	345	370	400	460	515	570
Ak .286 Throw	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	17.0	19.0	21.0
16 x 5 CFM	125	160	190	220	250	285	315	345	380	410	440	505	565	630
Ak .315 Throw	4.5	5.5	6.5	7.5	8.5	10.0	11.0	12.0	13.0	14.0	15.0	17.0	19.0	22.0
14 x 6 CFM	135	170	200	235	270	300	335	370	405	435	470	540	605	670
Ak .336 Throw	4.5	5.5	6.5	8.0	9.0	10.0	11.0	12.0	13.0	13.0	16.0	18.0	20.0	22.0
16 x 6 CFM	155	195	230	270	310	345	385	425	465	500	540	620	695	770
Ak .386 Throw	4.5	5.5	6.5	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	20.0	23.0
20 x														