

# Engineering Data



## Using the Engineering Data

For most of the models & sizes we've done the calculations for you.  
CFM = volume of air flow in cubic feet per minute

421

Face Velocity		300	400	500	600	700	800
Pressure Loss		.006	.010	.016	.022	.031	.040
4x10 Ak .170	CFM	50	70	85	100	120	135
	Spread	4.5	5.0	6.5	7.5	9.0	10.0
	Throw	4.0	6.0	8.0	10.0	11.0	12.5

Terminal velocity of 50 fpm

821-defl A

Face Velocity		400	500	600	700	800
Pressure Loss		.010	.016	.022	.031	.040
24 x 8 Ak 1.045	CFM	420	525	625	730	835
	Throw	17.0	21.0	25.0	29.0	33.0

Terminal velocity is 75 fpm

Face Velocity = speed of air at the face of diffuser in feet per minute (FPM)

Ak = net area in square feet. This is the lab measured area across the face when air is mechanically forced through the opening.

Free Area (if given) = daylight area (in<sup>2</sup>) of blade openings. Free area is typically only required on natural / gravity movement of air, non-mechanically forced, as in free area needed for combustion air requirements on heating equipment. Use the Ak value (\*144 to get to in<sup>2</sup>) if the free area has not been calculated, but is needed for a given size/model grille requiring free area for combustion.

Equation of Airflow: CFM = Ak (ft<sup>2</sup>) x Face Velocity (fpm)  
Example from 421 table above: 100 = .17 x 600 \_ numbers are often rounded

## Sizing a Supply

Determine the amount of CFM (air volume) needed for each supply outlet. This should be done by room heating and cooling load requirements from various design manuals (ACCA Man J, ASHRAE Fundamentals Hndbk) and then followed by the duct design and layout.

Face Velocity - H&C recommends sizing a supply outlet in the range of 500 to 800 fpm face velocity (700 being a common target). The upper end of this range will create better mixing of room air and longer throws, which is what the typical forced air system is intended to do. However, the Pressure resistance and Noise must be taken into consideration depending upon the application. In some instances, greater face velocity is allowed because the pressure and noise can be accommodated.

Pressure Loss (inches of w.c.) – the selection of the face velocity must consider the associated pressure loss that deals with each relative model. An increase in face velocity creates more pressure resistance against the blower's delivery of air volume. The velocity ranges given previously will, in most cases, have minor effect on the blower's overall performance given the entire duct system losses that it will encounter.

Noise – an increase in face velocity will create more noise. The tables below show NC design guidelines and also face velocity ranges if NC values have not been tabulated.

Application	Recommended Face Velocities
Broadcasting Studios	<500 FPM
Residences	500 to 750 FPM
Apartments	500 to 750 FPM
Churches	500 to 750 FPM
Hotel Guestrooms	500 to 750 FPM
Legitimate Theaters	500 to 1000 FPM
Private Offices, acoustically treated	500 to 1000 FPM
Private Offices, not treated	1000 to 1250 FPM
Motion Picture Theaters	1000 to 1250 FPM
General Offices	1250 to 1500 FPM
Stores, upper floors	1500 FPM
Stores, main floors	1500 FPM
Industrial Buildings	1500 to 2000 FPM

	Communication Environment	Typical Occupancy
< NC 25	Extremely quiet environment; suppressed speech is quite audible; suitable for acute pickup of all sounds.	Broadcasting studios, concert halls, music rooms.
NC 30	Very quiet office; suitable for large conferences; telephone use satisfactory.	Residences, theaters, libraries, executive offices, directors rooms.
NC 35	Quiet office; satisfactory for conference at a 15-foot table; normal voice 10 to 30 feet; telephone use satisfactory.	Private offices, schools, hotel guestrooms, courtrooms, churches, hospital rooms.
NC 40	Satisfactory for conferences at a 6- to 8-foot table; normal voice 6 to 12 feet; telephone use satisfactory.	General office, labs, dining rooms.
NC 45	Satisfactory for conferences at a 4- to 5-foot table; normal voice 3 to 6 feet; raised voice 6 to 12 feet; telephone use occasionally difficult.	Retail stores, cafeterias, lobby areas, large drafting and engineering offices, reception areas.
> NC 50	Unsatisfactory for conference of more than two or three persons; normal voice 1 to 2 feet; raised voice 3 to 6 feet; telephone use slightly difficult.	Computer rooms, stenographic pools, print machine rooms, process areas.

## Sizing a Return

Air volume going back to the air handler (fan) must equal what is supplied from the air handler. Therefore the total CFM capacity of the return grilles must equal or exceed the total CFM capacity of all the supply diffusers.

Keeping face velocity low

- Returns should be at 400-600 fpm maximum
- Filter Returns should be at 450 fpm maximum
- \*ACCA recommends 300 max for filter grilles and 500 max for non-filter grilles.
- The rule of thumb is 2 cfm per square inch of filter size. See table below.
- Low velocity reduces noise, especially on stamped face grilles (672/673); fixed-bar grilles can handle more velocity without noise (94A/96AFB/RH45/RHF45/RCB).
- A single point return cannot be oversized like a supply. The system will not be affected adversely, only improved. \*This does not apply to multiple return locations where balancing is more critical to pull in relevant amounts from each room.
- Static pressure is also reduced. Pressure works against & reduces blower delivery volume (cfm)
- Noise is not expected from a return.

### Location

Filter Size	Area (in <sup>2</sup> )	Ton (cfm)	Filter Size	Area (in <sup>2</sup> )	Ton (cfm)		
12	12	144	n/a	20	20	400	2 (800)
12	20	240	1 (400)	20	25	500	2.5 (1000)
12	24	288	1.5 (600)	20	30	600	3 (1200)
12	30	360	1.5 (600)	20	36	720	3 (1200)
14	14	196	1 (400)	24	24	576	3 (1200)
14	20	280	1.5 (600)	24	30	720	3 (1200)
14	24	336	1.5 (600)	24	36	864	4 (1600)
14	30	420	2 (800)	25	25	625	3 (1200)
16	20	320	1.5 (600)	30	30	900	4 (1600)
16	24	384	2 (800)	30	36	1080	5 (2000)

- Returns should be put in stagnant air locations that need to be reconditioned.
  - High for cooling mode (hot air rises)
  - Low for heating mode (cold air falls)
  - Both modes, choose a primary season
- Returns should not be near a supply register's throw range. If at all possible place the return at an opposite corner of the room.

### Room Air Movement

- Returns do NOT have much effect on a room's air movement, regardless of face velocity. They only grab air about a duct diameter away from the face. Most of the room air movement is done by the supplies.

## Unlisted Sizes—Engineering Data

When a size is not listed there are a couple ways to do an engineered estimate. Airflow principles permit you to utilize existing sizes to determine sizes not shown.

**Method 1:** Use nearest nominal size table entry. If a 14x14 is not given, but a 20x10 is, since these two sizes have an approximate equal core area (196 and 200) the table entry for a 20x10 can be used to approximate what the 14x14 grille would perform to.

**Method 2:** A more exact method would be to do interpolation process between two listed sizes. If 14x14 is not given, but 18x10 and 20x10 are, then this equation will get more exact 14x14 data.  $Y = Y1$

*Recommended Noise Criteria and Face Velocity Ranges are on page 6*

+  $\left[ \frac{(X - X1) * (Y2 - Y1)}{(X2 - X1)} \right]$  where:

Y = unknown CFM or throw that is being computed for 14x14

Y1 = CFM or throw of listed 18x10 (for ex 600 cfm)

Y2 = CFM or throw of listed 20x10 (for ex 640 cfm)

X = 196 in<sup>2</sup> (nominal area of 14x14)

X1 = 180 in<sup>2</sup> (nominal area of 18x10)

X2 = 200 in<sup>2</sup> (nominal area of 20x10)

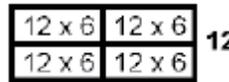
Using equation above computes  $Y = 600 + \left[ \frac{(196 - 180) * (640 - 600)}{(200 - 180)} \right] =$

$600 + \left[ \frac{16 * 40}{20} \right] = 600 + 32 = 632$  cfm for Y

**Method 3:** Sizes beyond the table (smaller or larger) can have their CFM or Throw determined by using listed sizes by the following:

CFM for larger sizes:

If **24** looking for 24x6 or 24x12 cfm that is not listed, using the listed 12x6 cfm and doubling it or quadrupling it will give the answer for the 24x6 and 24x12, respectively.



CFM for smaller sizes:

If looking for a 6x6 cfm that is not listed, using the listed 12x6 cfm and halving it will give the answer for a 6x6.

Throw:

Double the size and CFM, multiply the throw by 1.5

Quadruple the size and CFM, multiply the throw by 2

Half the size and CFM, multiply the throw by .67

One quarter the size and CFM, multiply the throw by .5

\*Pressure loss, face velocity and noise criteria will all remain the same relative to the listed size used to determine the larger or smaller sizes not shown.

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### 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	65	80	100	110	130	145	160	175	190	210	225	255	290	320
Ak .160 Throw	6.5	8.0	10.0	11.0	13.0	15.0	16.0	18.0	19.0	21.0	23.0	26.0	29.0	32.0
10 x 4 CFM	80	100	120	140	160	180	200	220	240	265	285	325	365	405
Ak .202 Throw	7.0	9.0	11.0	13.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	29.0	33.0	36.0
12 x 4 CFM	100	120	145	170	195	220	245	270	295	315	340	390	440	490
Ak .244 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
14 x 4 CFM	115	145	170	200	230	255	285	315	345	370	400	460	515	570
Ak .286 Throw	8.5	11.0	13.0	15.0	17.0	19.0	22.0	24.0	26.0	28.0	30.0	35.0	39.0	43.0
12 x 5 CFM	125	155	190	220	250	280	310	345	375	405	435	500	560	625
Ak .312 Throw	9.0	11.0	14.0	16.0	18.0	20.0	22.0	25.0	27.0	29.0	31.0	36.0	41.0	45.0
10 x 6 CFM	125	155	190	220	250	285	315	345	375	410	440	500	565	630
Ak .314 Throw	9.0	11.0	14.0	16.0	18.0	21.0	23.0	25.0	27.0	30.0	32.0	36.0	41.0	45.0
14 x 5 CFM	145	185	220	255	295	330	365	405	440	475	510	585	660	730
Ak .366 Throw	10.0	12.0	15.0	17.0	20.0	22.0	24.0	27.0	29.0	32.0	34.0	39.0	44.0	49.0
12 x 6 CFM	150	190	225	265	305	340	380	415	455	495	535	605	680	760
Ak .379 Throw	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	30.0	33.0	35.0	40.0	45.0	50.0
16 x 5 CFM	170	210	250	295	335	380	420	460	505	545	585	670	755	840
Ak .419 Throw	11.0	13.0	16.0	18.0	21.0	24.0	26.0	29.0	32.0	34.0	37.0	42.0	47.0	53.0
14 x 6 CFM	180	220	265	310	355	400	445	490	535	575	620	710	800	890
Ak .444 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	49.0	54.0
16 x 6 CFM	205	255	305	355	410	460	510	560	610	665	715	815	920	1020
Ak .510 Throw	12.0	15.0	17.0	20.0	23.0	26.0	29.0	32.0	35.0	38.0	41.0	47.0	53.0	58.0
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	23.0	27.0	29.0	32.0	35.0	38.0	41.0	47.0	53.0	58.0
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	19.0	23.0	26.0	29.0	32.0	35.0	39.0	42.0	45.0	52.0	58.0	65.0
20 x 6 CFM	255	320	385	445	510	575	640	705	770	830	895	1015	1140	1270
Ak .640 Throw	13.0	16.0	19.0	23.0	26.0	29.0	32.0	36.0	39.0	42.0	45.0	52.0	58.0	65.0
24 x 6 CFM	310	385	465	540	615	695	770	850	925	1000	1080	1235	1390	1540
Ak .771 Throw	14.0	18.0	21.0	25.0	28.0	32.0	35.0	39.0	43.0	46.0	50.0	57.0	64.0	71.0
20 x 8 CFM	345	435	520	610	695	780	870	955	1040	1130	1215	1390	1560	1735
Ak .868 Throw	15.0	19.0	23.0	26.0	30.0	34.0	38.0	41.0	45.0	49.0	53.0	60.0	68.0	75.0
30 x 6 CFM	385	485	580	675	775	870	965	1065	1160	1255	1355	1545	1740	1935
Ak .967 Throw	16.0	20.0	24.0	28.0	32.0	36.0	40.0	44.0	48.0	51.0	56.0	63.0	71.0	79.0
24 x 8 CFM	420	525	625	730	835	940	1045	1150	1255	1360	1465	1670	1880	2090
Ak 1.045 Throw	17.0	21.0	25.0	29.0	33.0	37.0	41.0	46.0	50.0	54.0	58.0	66.0	74.0	83.0
30 x 8 CFM	525	655	785	915	1050	1180	1310	1440	1570	1705	1835	2095	2360	2620
Ak 1.310 Throw	19.0	23.0	28.0	32.0	37.0	42.0	46.0	51.0	56.0	60.0	65.0	74.0	84.0	93.0
24 x 10 CFM	530	660	790	925	1055	1185	1320	1450	1585	1715	1845	2110	2375	2640
Ak 1.319 Throw	19.0	23.0	28.0	33.0	37.0	42.0	46.0	51.0	56.0	60.0	65.0	74.0	84.0	93.0
36 x 8 CFM	630	790	945	1105	1260	1420	1575	1735	1890	2050	2205	2520	2835	3150
Ak 1.576 Throw	20.0	25.0	30.0	36.0	41.0	46.0	51.0	56.0	61.0	66.0	71.0	81.0	91.0	101.0
24 x 12 CFM	635	795	955	1115	1275	1435	1595	1755	1910	2070	2230	2550	2865	3185
Ak 1.593 Throw	20.0	25.0	31.0	36.0	41.0	47.0	51.0	56.0	61.0	66.0	71.0	82.0	92.0	102.0
30 x 10 CFM	660	825	990	1160	1325	1490	1655	1820	1985	2150	2315	2645	2975	3310
Ak 1.654 Throw	21.0	26.0	31.0	37.0	42.0	47.0	52.0	57.0	63.0	68.0	73.0	83.0	94.0	104.0
36 x 10 CFM	795	995	1195	1390	1590	1790	1990	2190	2385	2585	2785	3180	3580	3980
Ak 1.989 Throw	23.0	29.0	34.0	40.0	46.0	51.0	57.0	63.0	68.0	74.0	80.0	91.0	103.0	114.0
30 x 12 CFM	800	1000	1200	1400	1600	1800	2000	2200	2395	2595	2795	3195	3595	3995
Ak 1.997 Throw	23.0	29.0	34.0	40.0	45.0	51.0	57.0	63.0	68.0	74.0	80.0	91.0	103.0	114.0
36 x 12 CFM	960	1200	1440	1680	1920	2160	2400	2640	2880	3120	3365	3845	4325	4805
Ak 2.402 Throw	25.0	31.0	38.0	44.0	50.0	56.0	63.0	69.0	75.0	81.0	88.0	100.0	113.0	125.0

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	110	125	140	155	170	180	195	225	250	280
Ak .140 Throw	5.0	6.0	7.5	8.5	9.5	11.0	12.0	14.0	15.0	16.0	17.0	20.0	22.0	24.0
10 x 4 CFM	70	90	105	125	140	160	180	195	215	230	250	285	320	355
Ak .178 Throw	5.0	7.0	8.0	9.5	11.0	12.0	14.0	15.0	17.0	18.0	19.0	22.0	25.0	28.0
12 x 4 CFM	85	110	130	150	170	195	215	235	260	280	300	345	385	430
Ak .215 Throw	6.0	8.0	9.0	11.0	12.0	14.0	15.0	17.0	18.0	20.0	21.0	24.0	27.0	30.0
14 x 4 CFM	100	125	150	175	200	225	250	275	300	330	355	405	455	505
Ak .252 Throw	6.5	8.0	10.0	11.0	13.0	14.0	16.0	18.0	20.0	22.0	23.0	26.0	30.0	33.0
12 x 5 CFM	110	135	165	190	220	245	275	300	330	360	385	440	495	550
Ak .274 Throw	7.0	8.5	10.0	12.0	14.0	15.0	17.0	19.0	21.0	22.0	24.0	28.0	31.0	34.0
10 x 6 CFM	110	140	165	195	220	245	275	305	330	360	385	440	495	550
Ak .276 Throw	7.0	8.5	10.0	12.0	14.0	15.0	17.0	19.0	21.0	22.0	24.0	27.0	31.0	34.0
14 x 5 CFM	130	160	195	225	255	290	320	355	385	415	450	515	580	645
Ak .321 Throw	7.5	9.0	11.0	13.0	15.0	17.0	18.0	21.0	22.0	24.0	26.0	30.0	34.0	37.0
12 x 6 CFM	135	165	200	235	265	300	335	365	400	435	465	535	600	665
Ak .333 Throw	7.5	9.5	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	26.0	30.0	34.0	38.0
16 x 5 CFM	150	185	220	260	295	330	370	405	445	480	515	590	665	740
Ak .369 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
14 x 6 CFM	155	195	235	275	315	350	390	430	470	510	545	625	705	780
Ak .391 Throw	8.0	10.0	12.0	14.0	17.0	18.0	20.0	23.0	25.0	27.0	29.0	33.0	37.0	41.0
16 x 6 CFM	180	225	270	315	360	405	450	495	540	580	625	715	805	895
Ak .448 Throw	9.0	11.0	13.0	15.0	18.0	20.0	22.0	24.0	26.0	28.0	31.0	35.0	39.0	44

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### 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	50	60	75	85	100	110	125	135	150	160	175	200	225	250
Ak. 124 Throw	3.5	4.5	5.5	6.0	7.5	8.0	9.0	10.0	11.0	12.0	13.0	15.0	16.0	18.0
10 x 4 CFM	65	80	95	110	125	140	155	175	190	205	220	250	285	315
Ak. 157 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	19.0	20.0
12 x 4 CFM	75	95	115	135	155	170	190	210	230	245	265	305	340	380
Ak. 190 Throw	4.5	5.5	7.0	8.0	9.0	10.0	11.0	12.0	14.0	15.0	16.0	18.0	20.0	22.0
14 x 4 CFM	90	110	135	155	180	200	220	245	265	290	310	355	400	445
Ak. 222 Throw	5.0	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
12 x 6 CFM	95	120	145	170	195	220	240	265	290	315	340	385	435	485
Ak. 242 Throw	5.0	6.5	7.5	9.0	10.0	12.0	13.0	14.0	15.0	17.0	18.0	20.0	23.0	25.0
10 x 6 CFM	100	120	145	170	195	220	245	270	295	315	340	390	440	490
Ak. 244 Throw	5.0	6.5	7.5	9.0	10.0	11.0	13.0	14.0	15.0	16.0	18.0	20.0	23.0	26.0
14 x 5 CFM	115	140	170	200	225	255	285	310	340	370	400	455	510	570
Ak. 284 Throw	5.5	7.0	8.0	9.5	11.0	12.0	14.0	15.0	16.0	18.0	19.0	22.0	25.0	28.0
12 x 6 CFM	120	145	175	205	235	265	295	325	355	380	410	470	530	590
Ak. 294 Throw	5.5	7.0	8.5	9.5	11.0	13.0	14.0	15.0	17.0	18.0	19.0	22.0	25.0	28.0
16 x 5 CFM	130	165	195	230	260	295	325	360	390	425	455	520	585	650
Ak. 325 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	26.0	29.0
14 x 6 CFM	140	175	205	240	275	310	345	380	415	450	485	560	620	690
Ak. 345 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	27.0	30.0
16 x 6 CFM	160	200	240	275	315	355	395	435	475	515	555	635	715	790
Ak. 396 Throw	6.5	8.0	10.0	11.0	13.0	15.0	16.0	18.0	19.0	21.0	23.0	26.0	29.0	32.0
20 x 5 CFM	165	205	245	285	325	365	410	450	490	530	570	655	735	815
Ak. 408 Throw	6.5	8.5	10.0	11.0	13.0	15.0	17.0	18.0	20.0	21.0	23.0	26.0	30.0	33.0
24 x 5 CFM	195	245	295	345	395	445	490	540	590	640	690	785	885	965
Ak. 492 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
20 x 6 CFM	200	250	300	350	400	445	495	545	595	645	695	795	895	995
Ak. 497 Throw	7.5	9.0	11.0	13.0	15.0	16.0	18.0	20.0	22.0	24.0	25.0	29.0	33.0	36.0
24 x 6 CFM	240	300	360	420	480	540	600	660	720	775	835	955	1075	1195
Ak. 598 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
20 x 8 CFM	270	335	405	470	540	605	675	740	810	875	940	1075	1210	1345
Ak. 673 Throw	8.5	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	30.0	34.0	38.0	42.0
30 x 6 CFM	300	375	450	525	600	675	750	825	900	975	1050	1200	1350	1500
Ak. 750 Throw	9.0	11.0	13.0	16.0	18.0	20.0	22.0	25.0	27.0	29.0	31.0	36.0	40.0	45.0
24 x 8 CFM	325	405	485	570	650	730	810	890	975	1055	1135	1300	1460	1620
Ak. 811 Throw	9.5	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 8 CFM	405	510	610	710	815	915	1015	1120	1220	1320	1425	1625	1830	2035
Ak. 1.017 Throw	11.0	13.0	16.0	18.0	21.0	23.0	26.0	29.0	31.0	34.0	36.0	42.0	47.0	52.0
24 x 10 CFM	410	510	615	715	820	920	1025	1125	1230	1330	1430	1635	1840	2045
Ak. 1.023 Throw	10.0	13.0	16.0	18.0	21.0	23.0	26.0	29.0	31.0	34.0	36.0	42.0	47.0	52.0
36 x 8 CFM	490	610	735	855	980	1100	1220	1345	1465	1590	1710	1955	2200	2445
Ak. 1.222 Throw	11.0	14.0	17.0	20.0	23.0	26.0	28.0	31.0	34.0	37.0	40.0	46.0	51.0	57.0
24 x 12 CFM	495	620	740	865	990	1110	1235	1360	1485	1605	1730	1975	2225	2470
Ak. 1.236 Throw	11.0	14.0	17.0	20.0	23.0	26.0	29.0	32.0	34.0	37.0	40.0	46.0	52.0	57.0
30 x 10 CFM	515	640	770	900	1025	1155	1285	1410	1540	1670	1795	2055	2310	2565
Ak. 1.283 Throw	12.0	15.0	17.0	20.0	23.0	26.0	29.0	32.0	35.0	38.0	42.0	46.0	52.0	58.0
36 x 10 CFM	615	770	925	1080	1235	1390	1545	1700	1850	2005	2160	2470	2775	3085
Ak. 1.543 Throw	13.0	16.0	19.0	22.0	26.0	29.0	32.0	35.0	38.0	42.0	45.0	51.0	57.0	64.0
30 x 12 CFM	620	775	930	1085	1240	1395	1550	1705	1860	2015	2170	2480	2790	3100
Ak. 1.550 Throw	13.0	16.0	19.0	22.0	26.0	29.0	32.0	35.0	39.0	42.0	45.0	51.0	58.0	64.0
36 x 12 CFM	745	930	1120	1305	1490	1680	1865	2050	2235	2425	2610	2980	3355	3730
Ak. 1.864 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

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	50	60	75	85	100	110	125	135	150	160	175	200	225	250
Ak. 119 Throw	2.5	3.0	4.0	4.5	5.0	5.5	6.5	7.0	8.0	8.5	9.0	10.0	12.0	13.0
10 x 4 CFM	55	70	85	100	115	130	145	155	170	185	200	230	255	285
Ak. 143 Throw	2.5	3.5	4.0	5.0	5.5	6.5	7.0	7.5	8.0	9.0	9.5	11.0	12.0	14.0
12 x 4 CFM	70	85	105	120	140	155	175	190	210	225	240	275	310	345
Ak. 173 Throw	3.0	3.5	4.5	5.5	6.0	7.0	7.5	8.5	9.0	10.0	11.0	12.0	14.0	15.0
14 x 4 CFM	80	100	120	140	160	180	200	220	240	265	285	325	365	405
Ak. 202 Throw	3.0	4.0	5.0	5.5	6.5	7.5	8.0	9.0	9.5	11.0	12.0	13.0	15.0	16.0
12 x 5 CFM	90	110	130	155	175	200	220	240	265	285	310	350	395	440
Ak. 220 Throw	3.5	4.5	5.0	6.0	7.0	8.0	8.5	9.5	10.0	11.0	12.0	14.0	15.0	17.0
10 x 6 CFM	90	110	135	155	180	200	220	245	265	290	310	355	400	445
Ak. 222 Throw	3.5	4.5	5.0	6.0	7.0	7.5	8.5	9.5	10.0	11.0	12.0	14.0	15.0	17.0
14 x 5 CFM	105	130	155	180	205	230	260	285	310	335	360	415	465	515
Ak. 258 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	18.0
12 x 6 CFM	105	135	160	190	215	240	270	295	320	350	375	430	480	535
Ak. 268 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
16 x 5 CFM	120	150	180	205	235	265	295	325	355	385	415	475	535	590
Ak. 296 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
14 x 6 CFM	125	155	190	220	250	285	315	345	375	410	440	500	565	630
Ak. 314 Throw	4.0	5.0	6.0	7.0	8.0	9.5	10.0	11.0	12.0	13.0	14.0	16.0	18.0	20.0
16 x 6 CFM	145	180	215	250	290	325	360	395	430	470	505	575	650	720
Ak. 360 Throw	4.5	5.5	6.5	7.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	17.0	20.0	22.0
20 x 5 CFM	150	185	225	260	300	335	370	410	445	485	520	595		



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

**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:

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

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

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

$D_s$  = Drop resulting from vertical spread.

