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^2) 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^2) 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^2) 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^2)	Ton (cfm)	Filter Size		Area (in^2)	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

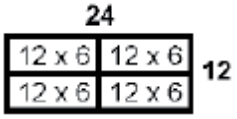
When a size is not listed there are a couple ways to do an engineered estimate. Airflow principles permit you to utilize existing sizes to determine sizes not shown.

Method 1: Use nearest nominal size table entry. If a 14x14 is not given, but a 20x10 is, since the 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 + [{(X - X1) * (Y2-Y1)} / (X2 - X1)] 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^2 (nominal area of 14x14)
X1 = 180 in^2 (nominal area of 18x10)
X2 = 200 in^2 (nominal area of 20x10)

Using equation above computes Y = 600 + [{(196 – 180) * (640 – 600)} / (200 – 180)] =
600 + [{16 * 40} / 20] = 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



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

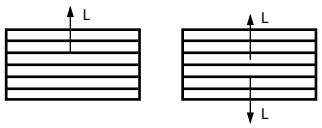
*Pressure loss, face velocity and noise criteria will all remain the same relative to the listed size used to determine the larger or smaller sizes not shown.

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY

C Series Curved-Blade Diffusers



C Series Curved-Blade Diffusers Selection Procedure

1. Determine the diffuser air pattern best suited to the duct layout and room area to be served.

2. Select the air pattern type and CFM per outlet. The tables give the recommended limits of air volume per outlet for various ceiling heights. Choose the correct table for the style diffuser selected. Outlets are assumed to be mounted flush on the ceiling and no obstruction to the air stream.

3. Turn to the proper SIZE SELECTION TABLE for the air pattern desired.

4. Determine the appropriate size based on the CFM, Throw, Pressure Loss, and Face Velocity requirements.

One-Way, Two-Way

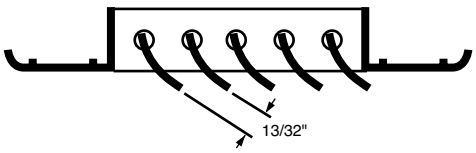
Face Velocity		400	500	600	700	800	900	1000	1100	1200
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090
6 x 6	CFM	35	45	55	65	70	80	90	100	110
Ak .090	Throw 1/2	3.5/2.5	5.0/3.5	6.0/4.0	7.0/5.0	7.5/5.5	8.5/6.0	9.5/7.0	11.0/7.5	11.5/8.5
8 x 6	CFM	40	50	60	70	80	90	100	110	120
Ak .100	Throw 1/2	3.5/2.5	4.5/3.0	5.5/4.0	6.5/4.5	7.0/5.0	8.0/6.0	9.0/6.5	10.0/7.0	11.0/7.5
10 x 6	CFM	60	75	90	105	120	135	150	165	180
Ak .150	Throw 1/2	5.0/3.5	6.0/4.5	7.0/5.0	8.5/6.0	9.5/7.0	11.0/7.5	12.0/8.5	13.0/9.5	14.0/10.0
8 x 8	CFM	65	80	95	110	130	145	160	175	190
Ak .160	Throw 1/2	5.0/3.5	6.0/4.5	7.5/5.0	8.5/6.0	10.0/7.0	11.0/8.0	12.0/9.0	14.0/9.5	15.0/10.0
12 x 6	CFM	70	90	110	125	145	160	180	200	215
Ak .180	Throw 1/2	5.0/3.5	6.5/4.5	8.0/5.5	9.0/6.5	11.0/7.5	12.0/8.5	13.0/9.5	15.0/10.0	16.0/11.0
14 x 6	CFM	85	105	125	145	170	190	210	230	250
Ak .210	Throw 1/2	5.5/4.0	7.0/5.0	8.5/6.0	10.0/7.0	11.0/8.0	13.0/9.0	14.0/10.0	16.0/11.0	17.0/12.0
10 x 10	CFM	95	120	145	170	190	215	240	265	290
Ak .240	Throw 1/2	6.0/4.0	7.5/5.0	9.0/6.5	10.0/7.5	12.0/8.0	13.0/9.5	15.0/10.0	16.0/11.0	18.0/13.0
12 x 10	CFM	115	145	175	205	230	260	290	320	350
Ak .290	Throw 1/2	6.5/4.5	8.0/5.5	9.5/7.0	11.0/8.0	13.0/9.0	14.0/10.0	16.0/11.0	18.0/13.0	19.0/14.0
16 x 8	CFM	125	155	185	215	250	280	310	340	370
Ak .310	Throw 1/2	6.5/5.0	8.5/6.0	10.0/7.0	12.0/8.0	13.0/9.5	15.0/11.0	17.0/12.0	18.0/13.0	20.0/14.0
12 x 12	CFM	140	175	210	245	280	315	350	385	420
Ak .350	Throw 1/2	7.0/5.0	9.0/6.0	11.0/7.5	12.0/8.5	14.0/10.0	16.0/11.0	18.0/12.0	19.0/14.0	21.0/15.0
16 x 12	CFM	185	230	275	320	370	415	460	505	550
Ak .460	Throw 1/2	8.0/5.5	10.0/7.5	12.0/9.0	14.0/10.0	16.0/11.0	18.0/13.0	20.0/14.0	22.0/16.0	24.0/17.0
14 x 14	CFM	190	240	290	335	385	430	480	530	575
Ak .480	Throw 1/2	8.0/5.5	10.0/7.5	12.0/9.0	14.0/10.0	17.0/12.0	18.0/13.0	21.0/15.0	23.0/16.0	25.0/17.0
16 x 16	CFM	250	315	380	440	505	565	630	695	755
Ak .630	Throw 1/2	9.5/6.5	12.0/8.5	14.0/10.0	16.0/12.0	19.0/13.0	21.0/15.0	23.0/17.0	26.0/18.0	28.0/20.0
20 x 14	CFM	270	340	410	475	545	610	680	750	815
Ak .680	Throw 1/2	9.5/7.0	12.0/8.5	15.0/10.0	17.0/12.0	19.0/14.0	22.0/15.0	24.0/17.0	27.0/19.0	29.0/21.0
24 x 12	CFM	280	350	420	490	560	630	700	770	840
Ak. 700	Throw 1/2	10.0/7.0	12.0/8.5	15.0/10.0	17.0/12.0	20.0/14.0	22.0/16.0	25.0/17.0	27.0/19.0	30.0/21.0
30 x 10	CFM	290	365	440	510	585	655	730	805	875
Ak .730	Throw 1/2	10.0/7.0	13.0.9.0	15.0/11.0	18.0/12.0	20.0/14.0	23.0/16.0	25.0/18.0	28.0/20.0	30.0/21.0
36 x 10	CFM	350	440	530	615	705	790	880	970	1055
Ak .880	Throw 1/2	11.0/8.0	14.0/10.0	17.0/12.0	19.0/14.0	22.0/16.0	25.0/18.0	28.0/20.0	31.0/22.0	33.0/24.0
36 x 12	CFM	420	525	630	735	840	945	1050	1155	1260
Ak 1.050	Throw 1/2	12.0/8.5	15.0/11.0	18.0/13.0	21.0/15.0	24.0/17.0	27.0/19.0	30.0/21.0	33.0/23.0	36.0/25.0
30 x 16	CFM	460	575	690	805	920	1035	1150	1265	1380
Ak 1.150	Throw 1/2	12.0/9.0	16.0/11.0	19.0/13.0	22.0/15.0	25.0/18.0	28.0/20.0	31.0/22.0	34.0/24.0	37.0/26.0
36 x 16	CFM	560	700	840	980	1120	1260	1400	1540	1680
Ak 1.400	Throw 1/2	14.0/9.5	17.0/12.0	21.0/15.0	24.0/17.0	27.0/19.0	31.0/22.0	34.0/24.0	38.0/27.0	41.0/29.0

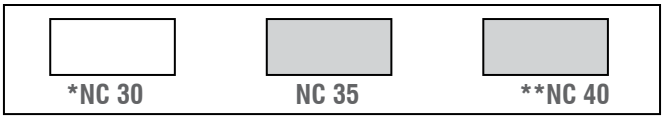
For sizes not listed and sizing tips see page 6

Terminal Velocity of 75 FPM

Curved-Blade – C Series

The Face Bars on the Curved-Blade Diffuser should be pre-set to the dimension shown below.





* less than or equal to

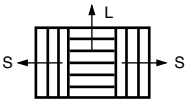
** greater than or equal to

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY

C Series Curved-Blade Diffusers

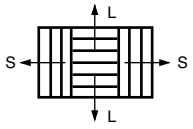


Three-Way

Face Velocity		400	500	600	700	800	900	1000	1100	1200
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090
6 x 6 Ak .090	Total CFM	35	45	55	65	70	80	90	100	110
	CFM L/S	9/13	11/17	15/20	17/24	18/26	22/29	24/33	26/37	30/40
	Throw L/S	2.0/2.0	2.5/3.0	3.0/3.5	3.5/4.0	4.0/4.5	4.5/5.0	5.0/6.0	5.5/6.5	6.0/7.0
8 x 6 Ak .100	Total CFM	40	50	60	70	80	90	100	110	120
	CFM L/S	18/11	24/13	28/16	32/19	36/22	42/24	46/27	50/30	56/32
	Throw L/S	2.5/2.0	3.0/2.5	3.5/3.0	4.5/3.5	5.0/4.0	5.5/4.5	6.0/5.0	7.0/5.0	7.5/5.5
10 x 6 Ak .150	Total CFM	60	75	90	105	120	135	150	165	180
	CFM L/S	22/19	27/24	32/29	39/33	44/38	49/43	54/48	61/52	66/57
	Throw L/S	3.0/2.5	3.5/3.0	4.5/4.0	5.0/4.5	6.0/5.0	6.5/5.5	7.0/6.5	8.0/7.0	9.0/7.5
8 x 8 Ak .160	Total CFM	65	80	95	110	130	145	160	175	190
	CFM L/S	31/17	36/22	43/26	50/30	60/35	67/39	74/43	81/47	88/51
	Throw L/S	3.5/2.5	4.0/3.5	5.0/4.0	5.5/4.5	7.0/5.0	7.5/6.0	8.5/6.5	9.0/7.0	10.0/7.5
12 x 6 Ak .180	Total CFM	70	90	110	125	145	160	180	200	215
	CFM L/S	20/25	26/32	32/39	37/44	43/51	48/56	54/63	60/70	65/75
	Throw L/S	2.5/3.0	3.5/4.0	4.5/5.0	5.0.5.5	5.5/6.5	6.5/7.0	7.0/8.0	8.0/8.5	8.5/9.5
14 x 6 Ak .210	Total CFM	85	105	125	145	170	190	210	230	250
	CFM L/S	21/32	27/39	31/47	37/54	44/63	48/71	54/78	58/86	64/93
	Throw L/S	2.5/3.5	3.5/4.5	4.0/5.0	5.0/6.0	6.0/7.0	6.5/8.0	7.0/8.5	8.0/9.5	17.0/12.0
10 x 10 Ak .240	Total CFM	95	120	145	170	190	215	240	265	290
	CFM L/S	35/30	44/38	53/46	62/54	70/60	79/68	88/76	97/84	106/92
	Throw L/S	3.5/3.0	4.5/4.0	5.5/5.0	6.0/6.0	7.0/6.5	8.0/7.5	9.0/8.0	10.0/9.0	11.0/10.0
12 x 10 Ak .290	Total CFM	115	145	175	205	230	260	290	320	350
	CFM L/S	35/40	44/51	53/61	62/72	70/80	78/91	88/101	96/112	106/122
	Throw L/S	3.5/4.0	4.5/5.0	5.5/5.5	6.5/7.0	7.0/7.5	8.0/8.5	9.0/9.5	9.5/11.0	11.0/11.0
16 x 8 Ak .310	Total CFM	125	155	185	215	250	280	310	340	370
	CFM L/S	43/41	55/50	65/60	75/70	88/81	98/91	108/101	120/110	130/120
	Throw L/S	4.0/4.0	5.0/4.5	6.0/5.5	7.0/6.5	8.0/7.5	9.0/8.5	10.0/9.5	11.0/10.0	12.0/11.0
12 x 12 Ak .350	Total CFM	140	175	210	245	280	315	350	385	420
	CFM L/S	42/49	53/61	62/74	73/86	84/98	95/110	105/123	115/135	126/147
	Throw L/S	4.0/4.0	5.0/5.0	6.0/6.5	6.5/7.5	7.5/8.5	8.5/9.5	9.5/10.0	11.0/11.0	13.0/13.0
16 x 12 Ak .460	Total CFM	185	230	275	320	370	415	460	505	550
	CFM L/S	65/60	80/75	97/89	113/104	130/120	146/134	162/149	178/164	194/178
	Throw L/S	4.5/4.5	6.0/5.5	7.0/7.0	8.5/8.0	9.5/9.0	11.0/10.0	12.0/11.0	13.0/12.0	14.0/14.0
14 x 14 Ak .480	Total CFM	190	240	290	335	385	430	480	530	575
	CFM L/S	48/71	62/89	74/108	86/125	99/143	110/160	123/179	136/197	147/214
	Throw L/S	4.0/5.0	5.0/6.5	6.5/7.5	7.5/9.0	8.5/10.0	9.5/11.0	10.0/13.0	12.0/14.0	13.0/15.0
16 x 16 Ak .630	Total CFM	250	315	380	440	505	565	630	695	755
	CFM L/S	88/81	111/102	134/123	155/143	178/164	199/183	222/204	245/225	266/245
	Throw L/S	5.5/5.5	7.0/7.0	8.5/8.0	9.5/9.5	11.0/11.0	13.0/12.0	14.0/13.0	15.0/15.0	17.0/16.0
20 x 14 Ak .680	Total CFM	270	340	410	475	545	610	680	750	815
	CFM L/S	76/97	95/122	115/148	133/171	153/196	171/220	190/245	210/270	228/293
	Throw L/S	5.0/6.0	6.5/7.0	7.5/9.0	9.0/10.0	10.0/12.0	12.0/13.0	13.0/15.0	14.0/16.0	15.0/17.0
24 x 12 Ak. 700	Total CFM	280	350	420	490	560	630	700	770	840
	CFM L/S	90/95	112/119	134/143	156/167	178/191	200/215	222/239	244/263	268/286
	Throw L/S	5.5/5.5	7.0/7.0	8.5/8.5	9.5/10.0	11.0/12.0	12.0/13.0	14.0/14.0	15.0/16.0	17.0/17.0
30 x 10 Ak .730	Total CFM	290	365	440	510	585	655	730	805	875
	CFM L/S	92/99	117/124	140/150	164/173	187/199	210/223	234/248	258/274	280/298
	Throw L/S	5.5/6.0	7.0/7.5	8.5/9.0	10.0/10.0	11.0/12.0	13.0/13.0	14.0/15.0	16.0/16.0	17.0/18.0
36 x 10 Ak .880	Total CFM	350	440	530	615	705	790	880	970	1055
	CFM L/S	113/118	143/149	172/179	199/208	228/238	256/267	285/297	314/328	342/357
	Throw L/S	6.5/6.5	8.0/8.0	9.5/9.5	11.0/11.0	13.0/13.0	14.0/14.0	16.0/16.0	17.0/18.0	19.0/19.0
36 x 12 Ak 1.050	Total CFM	420	525	630	735	840	945	1050	1155	1260
	CFM L/S	135/142	169/178	203/214	237/249	270/285	304/320	338/356	372/392	406/427
	Throw L/S	7.0/7.0	8.5/9.0	10.0/11.0	12.0/12.0	14.0/14.0	15.0/16.0	17.0/18.0	19.0/19.0	20.0/21.0
30 x 16 Ak 1.150	Total CFM	460	575	690	805	920	1035	1150	1265	1380
	CFM L/S	148/156	183/196	220/235	258/274	294/313	331/352	368/391	405/430	442/469
	Throw L/S	7.0/7.0	9.0/9.0	10.0/11.0	12.0/13.0	14.0/15.0	16.0/16.0	18.0/18.0	19.0/20.0	21.0/22.0
36 x 16 Ak 1.400	Total CFM	560	700	840	980	1120	1260	1400	1540	1680
	CFM L/S	180/190	226/237	270/285	316/332	360/380	406/427	450/475	496/522	540/570
	Throw L/S	8.0/8.0	10.0/10.0	12.0/12.0	14.0/14.0	16.0/16.0	18.0/18.0	19.0/20.0	21.0/22.0	23.0/24.0

For sizes not listed and sizing tips see page 6

Terminal Velocity of 75 FPM

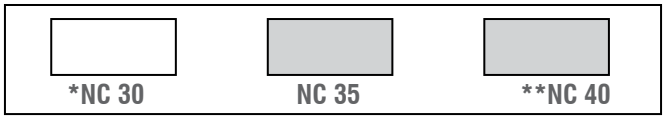


Four-Way

Face Velocity		400	500	600	700	800	900	1000	1100	1200
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090
6 x 6 Ak .090	Total CFM	35	45	55	65	70	80	90	100	110
	CFM L/S	5/13	6/17	7/20	9/24	9/26	11/29	12/33	13/37	15/40
	Throw L/S	1.5/2.0	1.5/3.0	2.0/3.5	2.5/4.0	2.5/4.5	3.0/5.0	3.5/6.0	4.0/6.5	4.5/7.0
8 x 6 Ak .100	Total CFM	40	50	60	70	80	90	100	110	120
	CFM L/S	9/11	12/13	14/16	16/19	18/22	21/24	23/27	25/30	28/32
	Throw L/S	1.5/1.5	2.5/2.0	2.5/2.5	3.0/2.5	3.5/3.0	4.0/3.5	4.5/4.0	4.5/4.5	5.5/4.5
10 x 6 Ak .150	Total CFM	60	75	90	105	120	135	150	165	180
	CFM L/S	11/19	14/24	16/29	19/33	22/38	25/43	27/48	30/52	33/57
	Throw L/S	2.0/2.5	2.5/3.5	3.0/4.0	3.5/4.5	4.0/5.5	4.5/6.0	5.0/7.0	5.5/7.5	6.0/8.0
8 x 8 Ak .160	Total CFM	65	80	95	110	130	145	160	175	190
	CFM L/S	15/17	18/22	22/26	25/30	30/35	33/39	37/43	40/47	44/51
	Throw L/S	2.5/2.0	3.0/2.5	3.5/3.0	4.0/3.5	5.0/4.5	3.5/5.0	6.0/5.5	6.5/6.0	7.0/6.5
12 x 6 Ak .180	Total CFM	70	90	110	125	145	160	180	200	215
	CFM L/S	10/25	13/32	16/39	19/44	22/51	24/56	27/63	30/70	32/75
	Throw L/S	2.0/3.0	2.5/4.0	3.0/5.0	3.5/5.5	4.0/6.5	4.5/7.0	5.0/8.0	5.5/8.5	6.0/9.5
14 x 6 Ak .210	Total CFM	85	105	125	145	170	190	210	230	250
	CFM L/S	11/32	13/39	16/47	18/54	22/63	24/71	27/78	29/86	32/93
	Throw L/S	2.0/3.5	2.5/4.5	3.0/5.0	3.5/6.0	4.0/7.0	4.5/8.0	5.0/8.5	5.5/9.5	6.0/10.0
10 x 10 Ak .240	Total CFM	95	120	145	170	190	215	240	265	290
	CFM L/S	17/30	22/38	26/46	31/54	35/60	39/68	44/76	48/84	53/92
	Throw L/S	2.5/3.0	3.0/4.0	3.5/5.0	4.5/6.0	5.0/6.5	5.5/7.5	6.5/8.0	7.0/9.0	7.5/10.0
12 x 10 Ak .290	Total CFM	115	145	175	205	230	260	290	320	350
	CFM L/S	17/40	22/51	26/61	31/72	35/80	39/91	44/101	48/112	53/122
	Throw L/S	2.5/4.0	3.0/5.0	3.5/5.5	4.5/7.0	5.0/7.5	5.5/8.5	6.5/9.5	7.0/11.0	7.5/11.0
16 x 8 Ak .310	Total CFM	125	155	185	215	250	280	310	340	370
	CFM L/S	22/41	27/50	33/60	38/70	44/81	49/91	55/100	60/110	65/120
	Throw L/S	3.0/4.0	3.5/4.5	4.0/5.5	5.0/6.5	5.5/7.5	6.5/8.5	7.0/9.5	7.5/10.0	8.5/11.0
12 x 12 Ak .350	Total CFM	140	175	210	245	280	315	350	385	420
	CFM L/S	21/49	26/61	31/74	37/86	42/98	47/110	52/123	58/135	63/147
	Throw L/S	2.5/4.0	3.5/5.0	4.0/6.5	5.0/7.5	5.5/8.5	6.0/9.5	7.0/10.0	7.5/11.0	8.0/13.0
16 x 12 Ak .460	Total CFM	185	230	275	320	370	415	460	505	550
	CFM L/S	33/60	40/75	48/89	56/104	65/120	73/135	81/149	89/164	97/178
	Throw L/S	3.5/4.5	4.0/5.5	5.0/7.0	6.0/8.0	7.0/9.0	7.5/10.0	8.5/11.0	9.0/12.0	10.0/14.0
14 x 14 Ak .480	Total CFM	190	240	290	335	385	430	480	530	575
	CFM L/S	24/71	31/89	37/108	43/125	49/143	55/160	61/179	68/197	74/214
	Throw L/S	3.0/5.0	3.5/6.5	4.5/7.5	5.0/9.0	6.0/10.0	6.5/11.0	7.5/13.0	8.0/14.0	9.0/15.0
16 x 16 Ak .630	Total CFM	250	315	380	440	505	565	630	695	755
	CFM L/S	44/81	55/102	67/123	77/143	89/164	99/183	111/204	122/225	133/245
	Throw L/S	4.0/5.5	5.0/6.5	6.0/8.0	7.0/9.5	8.0/11.0	9.0/12.0	10.0/13.0	11.0/15.0	12.0/16.0
20 x 14 Ak .680	Total CFM	270	340	410	475	545	610	680	750	815
	CFM L/S	38/97	48/122	57/148	67/171	76/196	85/220	95/245	105/270	114/293
	Throw L/S	3.5/6.0	4.5/7.0	5.5/9.0	6.5/10.0	7.0/12.0	8.0/13.0	9.0/15.0	10.0/16.0	11.0/17.0
24 x 12 Ak. 700	Total CFM	280	350	420	490	560	630	700	770	840
	CFM L/S	45/95	56/119	67/143	78/167	89/191	100/215	111/239	122/263	134/286
	Throw L/S	4.0/5.5	5.0/7.0	6.0/8.5	7.0/10.0	8.0/12.0	9.0/13.0	10.0/14.0	11.0/16.0	12.0/17.0
30 x 10 Ak .730	Total CFM	290	365	440	510	585	655	730	805	875
	CFM L/S	46/99	58/124	70/150	82/173	94/199	105/223	117/248	129/274	140/298
	Throw L/S	4.0/6.0	5.0/7.5	6.0/9.0	7.0/10.0	8.0/12.0	9.0/13.0	10.0/15.0	11.0/16.0	12.0/18.0
36 x 10 Ak .880	Total CFM	350	440	530	615	705	790	880	970	1055
	CFM L/S	57/118	71/149	86/179	100/208	114/238	128/267	143/297	157/328	171/357
	Throw L/S	4.5/6.5	5.5/8.0	6.5/9.5	8.0/11.0	9.0/13.0	10.0/14.0	11.0/16.0	12.0/18.0	13.0/19.0
36 x 12 Ak 1.050	Total CFM	420	525	630	735	840	945	1050	1155	1260
	CFM L/S	67/142	85/178	101/214	118/249	135/285	152/320	169/356	186/392	203/427
	Throw L/S	5.0/7.0	6.0/9.0	7.0/11.0	8.5/12.0	9.5/14.0	11.0/16.0	12.0/18.0	13.0/19.0	14.0/21.0
30 x 16 Ak 1.150	Total CFM	460	575	690	805	920	1035	1150	1265	1380
	CFM L/S	74/156	92/196	110/235	129/274	147/313	166/352	184/391	202/430	221/469
	Throw L/S	5.0/7.0	6.0/9.0	7.5/11.0	8.5/13.0	10.0/15.0	11.0/16.0	12.0/18.0	14.0/20.0	15.0/22.0
36 x 16 Ak 1.400	Total CFM	560	700	840	980	1120	1260	1400	1540	1680
	CFM L/S	90/190	113/237	135/285	158/332	180/380	203/427	225/475	248/522	270/570
	Throw L/S	5.5/8.0	7.0/10.0	8.5/12.0	9.5/14.0	11.0/16.0	12.0/18.0	14.0/20.0	15.0/22.0	17.0/24.0

For sizes not listed and sizing tips see page 6

Terminal Velocity of 75 FPM



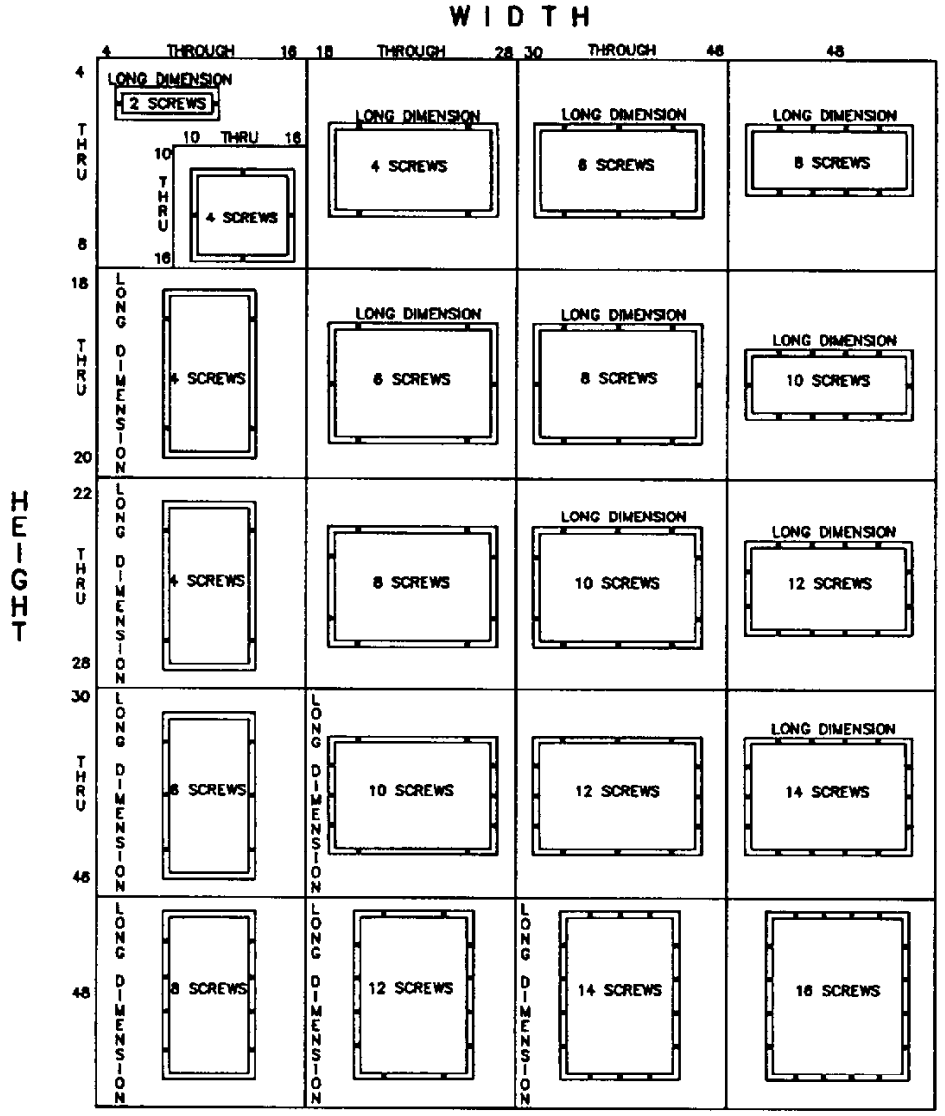
* less than or equal to

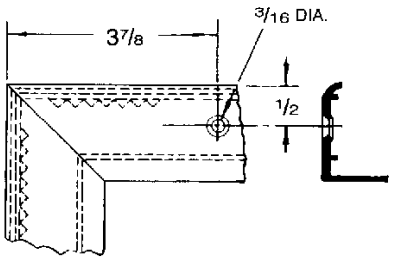
** greater than or equal to

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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





Recommended Noise Criteria and Face Velocity Ranges are on page 6