HART COOLEY®

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Grilles, Registers and Diffusers

ENGINEERING DATA

June 2017 | Edition 13

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T-BAR GRILLES & DIFFUSERS

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

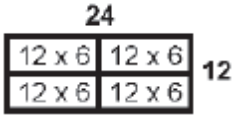
When a size is not listed there are a couple ways to do an engineered estimate. Airflow principles permit you to utilize existing sizes to determine sizes not shown.

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

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821, 831

Deflection A

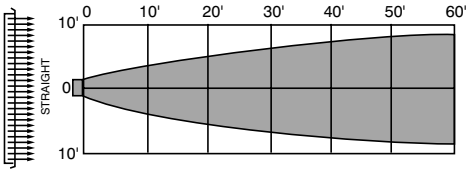
Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	65	80	100	110	130	145	160	175	190	210	225	255	290	320
Ak .160	Throw	6.5	8.0	10.0	11.0	13.0	15.0	16.0	18.0	19.0	21.0	23.0	26.0	29.0	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	530	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	59.0
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	995	1115	1275	1435	1595	1750	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

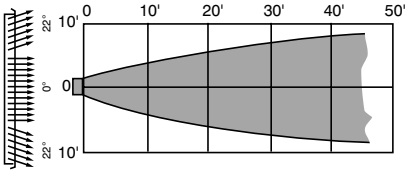
Terminal Velocity of 75 FPM

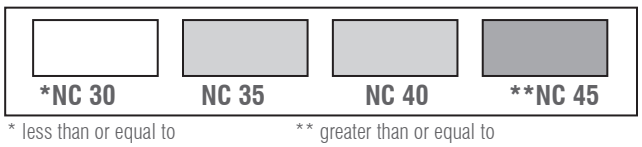
Deflection C

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	15.0	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	355	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	44.0
20 x 5	CFM	185	230	280	325	370	415	465	510	555	600	650	740	835	925
Ak .463	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	44.0
24 x 5	CFM	225	280	335	390	445	500	555	615	670	725	780	890	1005	1115
Ak .557	Throw	10.0	12.0	15.0	17.0	19.0	22.0	24.0	27.0	29.0	32.0	34.0	40.0	44.0	49.0
20 x 6	CFM	225	280	340	395	450	505	565	620	675	730	790	900	1015	1125
Ak .563	Throw	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	29.0	32.0	34.0	39.0	44.0	49.0
24 x 6	CFM	270	340	405	475	540	610	680	745	815	880	950	1085	1220	1355
Ak .678	Throw	11.0	14.0	16.0	19.0	21.0	24.0	27.0	30.0	32.0	35.0	38.0	43.0	49.0	54.0
20 x 8	CFM	305	380	460	535	610	685	765	840	915	990	1070	1220	1375	1525
Ak .763	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 6	CFM	340	425	510	595	680	765	850	935	1020	1105	1190	1360	1530	1700
Ak .850	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 8	CFM	370	460	550	645	735	825	920	1010	1105	1195	1285	1470	1655	1840
Ak .919	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 8	CFM	460	575	690	805	920	1035	1150	1265	1380	1500	1615	1845	2075	2305
Ak 1.152	Throw	14.0	15.0	21.0	25.0	28.0	32.0	35.0	39.0	42.0	46.0	49.0	56.0	63.0	70.0
24 x 10	CFM	465	580	695	810	930	1045	1160	1275	1390	1510	1625	1855	2090	2320
Ak 1.160	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	64.0	71.0
36 x 8	CFM	555	695	830	970	1110	1245	1385	1525	1665	1800	1940	2220	2495	2770
Ak 1.386	Throw	15.0	19.0	19.0	27.0	31.0	35.0	39.0	42.0	46.0	50.0	54.0	62.0	69.0	77.0
24 x 12	CFM	560	700	840	980	1120	1260	1400	1540	1680	1820	1960	2240	2520	2800
Ak 1.401	Throw	16.0	19.0	23.0	27.0	31.0	35.0	39.0	43.0	47.0	50.0	54.0	62.0	70.0	78.0
30 x 10	CFM	580	725	870	1020	1165	1310	1455	1600	1745	1890	2035	2325	2615	2910
Ak 1.454	Throw	16.0	20.0	24.0	28.0	32.0	36.0	39.0	43.0	47.0	51.0	55.0	63.0	71.0	79.0
36 x 10	CFM	700	875	1050	1225	1400	1575	1750	1925	2100	2275	2450	2800	3150	3500
Ak 1.749	Throw	17.0	22.0	26.0	30.0	35.0	39.0	43.0	48.0	52.0	56.0	61.0	69.0	78.0	87.0
30 x 12	CFM	700	880	1055	1230	1405	1580	1755	1930	2110	2285	2460	2810	3160	3510
Ak 1.756	Throw	17.0	22.0	26.0	30.0	35.0	39.0	43.0	48.0	52.0	56.0	61.0	69.0	78.0	87.0
36 x 12	CFM	845	1055	1265	1480	1690	1990	2110	2325	2535	2745	2955	3380	3800	4225
Ak 2.112	Throw	19.0	24.0	28.0	33.0	38.0	43.0	47.0	52.0	57.0	62.0	66.0	76.0	86.0	95.0

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

HART COOLEY
install confidence.

821, 831

Deflection E

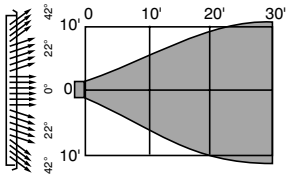
Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	50	60	75	85	100	110	125	135	150	160	175	200	225	250
Ak .124	Throw	3.5	4.5	5.5	6.0	7.5	8.0	9.0	10.0	11.0	12.0	13.0	15.0	16.0	18.0
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	150	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 5	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	550	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	16	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

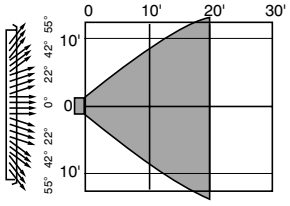
Terminal Velocity of 75 FPM

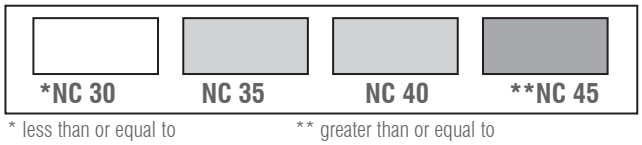
Deflection G

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	70	85	95	105	120	130	145	155	165	190	215	240
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	670	745
Ak .372	Throw	4.5	5.5	6.5	7.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	18.0	20.0	22.0
24 x 5	CFM	180	225	270	315	360	405	450	495	540	580	625	715	805	895
Ak .448	Throw	5.0	7.5	7.5	8.5	10.0	11.0	12.0	13.0	15.0	16.0	17.0	19.0	22.0	24.0
20 x 6	CFM	180	225	270	315	360	410	455	500	545	590	635	725	815	905
Ak .453	Throw	5.0	6.0	7.5	8.5	10.0	11.0	12.0	14.0	15.0	16.0	17.0	20.0	22.0	25.0
24 x 6	CFM	220	275	325	380	435	490	545	600	655	710	765	870	980	1090
Ak .545	Throw	5.5	7.0	8.0	9.5	11.0	12.0	13.0	15.0	16.0	18.0	19.0	21.0	24.0	27.0
20 x 8	CFM	245	305	370	430	490	555	615	675	735	800	860	980	1105	1230
Ak .614	Throw	5.5	7.0	8.5	10.0	11.0	13.0	14.0	16.0	17.0	19.0	20.0	23.0	26.0	29.0
30 x 6	CFM	275	340	410	480	545	615	685	750	820	890	955	1095	1230	1365
Ak .683	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
24 x 8	CFM	295	370	445	515	590	665	740	815	885	960	1035	1180	1330	1480
Ak .739	Throw	6.5	8.0	9.5	11.0	13.0	14.0	16.0	17.0	19.0	20.0	22.0	25.0	28.0	31.0
30 x 8	CFM	370	465	555	650	740	835	925	1020	1110	1205	1295	1480	1665	1850
Ak .926	Throw	7.0	9.0	10.0	12.0	14.0	16.0	17.0	19.0	21.0	23.0	24.0	28.0	31.0	35.0
24 x 10	CFM	375	465	560	650	745	840	930	1025	1120	1210	1305	1490	1675	1865
Ak .932	Throw	7.0	9.0	11.0	12.0	14.0	16.0	18.0	19.0	21.0	23.0	25.0	28.0	32.0	35.0
36 x 8	CFM	445	555	670	780	890	1005	1115	1225	1335	1450	1560	1780	2005	2230
Ak 1.114	Throw	7.5	9.5	12.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	31.0	35.0	39.0
24 x 12	CFM	450	565	675	790	900	1015	1125	1240	1350	1465	1575	1800	2025	2250
Ak 1.126	Throw	7.5	9.5	12.0	14.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	31.0	35.0	39.0
30 x 10	CFM	470	585	700	820	935	1050	1170	1285	1405	1520	1635	1870	2105	2340
Ak 1.169	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	27.0	31.0	35.0	39.0
36 x 10	CFM	560	705	845	985	1125	1265	1405	1545	1685	1830	1970	2250	2530	2810
Ak 1.406	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
30 x 12	CFM	565	705	845	990	1130	1270	1410	1555	1695	1835	1975	2260	2540	2825
Ak 1.412	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
36 x 12	CFM	680	850	1020	1190	1360	1530	1700	1870	2040	2210	2375	2715	3055	3395
Ak 1.698	Throw	9.5	12.0	14.0	17.0	19.0	21.0	24.0	26.0	29.0	31.0	33.0	38.0	43.0	48.0

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

HART COOLEY
install confidence.

92HVO, 92HVV, 92VHO, 92VHV
Performance based on nominal sizes shown in bold

							NC-20		NC-30		NC-40	
Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)	Core Vel.	300	400	500	600	700	800	1000	1200	1400
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
			cfm	57	76	95	114	133	152	190	228	266
			NC	-	-	-	15	20	24	31	36	41
6x6	0.25	0.19	0°	5-7-14	7-10-16	8-12-18	10-14-20	12-15-21	13-16-23	15-18-25	16-20-28	17-21-30
			Throw 22.5°	4-6-11	5-8-12	6-10-14	8-11-15	9-12-16	10-12-18	11-14-20	12-15-22	13-16-23
			(ft) 45°	2-3-6	3-4-7	4-6-8	4-6-9	5-7-10	6-7-10	7-8-11	7-9-12	8-10-13
			cfm	78	104	130	156	182	208	260	312	364
			NC	-	-	11	17	21	25	32	38	42
8x6	0.33	0.26	0°	5-9-16	8-12-19	10-15-21	12-16-23	14-18-25	15-19-27	17-21-30	19-23-32	20-25-35
			Throw 22.5°	4-7-13	6-9-15	8-11-16	9-13-18	11-14-19	12-15-21	13-16-23	15-18-25	16-19-27
			(ft) 45°	2-4-7	3-5-8	4-7-9	5-7-10	6-8-11	7-8-12	8-9-13	8-10-15	9-11-16
			cfm	102	136	170	204	238	272	340	408	476
			NC	-	-	12	18	23	27	33	39	43
10x6	0.42	0.34	0°	6-10-19	9-13-21	11-17-24	13-19-26	16-20-28	18-21-30	20-24-34	21-26-37	23-28-40
			Throw 22.5°	5-8-14	7-10-17	9-13-19	10-14-20	12-16-22	14-17-23	15-19-26	17-20-29	18-22-31
			(ft) 45°	3-4-8	4-6-10	5-7-11	6-8-12	7-9-13	8-10-14	9-11-15	10-12-17	10-13-18
			cfm	111	148	185	222	259	296	370	444	518
			NC	-	-	13	18	23	27	34	39	44
8x8	0.44	0.37	0°	6-10-19	9-14-22	12-17-25	14-19-27	16-21-30	18-22-32	20-25-35	22-27-39	24-30-42
			Throw 22.5°	5-8-15	7-11-17	9-13-19	11-15-21	13-16-23	14-17-25	16-19-27	17-21-30	19-23-32
			(ft) 45°	3-5-9	4-6-10	5-8-11	6-9-12	7-9-13	8-10-14	9-11-16	10-12-17	11-13-19
			cfm	123	164	205	246	287	328	410	492	574
			NC	-	-	13	19	23	27	34	39	44
12x6	0.50	0.41	0°	7-11-20	10-15-24	12-18-26	15-20-29	17-22-31	19-24-33	21-26-37	24-29-41	25-31-44
			Throw 22.5°	5-8-16	8-11-18	9-14-20	11-16-22	13-17-24	15-18-26	17-20-29	18-22-32	20-24-34
			(ft) 45°	3-5-9	4-7-11	5-8-12	7-9-13	8-10-14	9-11-15	10-12-17	11-13-18	11-14-20
			cfm	144	192	240	288	336	384	480	576	672
			NC	-	-	14	19	24	28	35	40	45
14x6	0.58	0.48	0°	7-12-22	11-16-25	13-20-28	16-22-31	18-24-34	21-25-36	23-28-40	25-31-44	28-34-48
			Throw 22.5°	6-9-17	8-12-20	10-15-22	12-17-24	14-18-26	16-20-28	18-22-31	20-24-34	21-26-37
			(ft) 45°	3-5-10	5-7-11	6-9-13	7-10-14	8-11-15	9-11-16	10-13-18	11-14-20	12-15-21
			cfm	171	228	285	342	399	456	570	684	798
16x6			NC	-	-	15	20	25	29	35	41	45
12x8	0.67	0.57	0°	8-13-24	11-17-28	14-22-31	17-24-34	20-26-37	23-28-39	25-31-44	28-34-48	30-37-52
			Throw 22.5°	6-10-19	9-13-22	11-17-24	13-19-26	16-20-28	18-22-30	20-24-34	22-26-37	23-28-40
			(ft) 45°	4-6-11	5-8-12	6-10-14	8-11-15	9-12-17	10-12-18	11-14-20	12-15-22	13-17-23
			cfm	177	236	295	354	413	472	590	708	826
			NC	-	-	15	20	25	29	35	41	46
10x10	0.69	0.59	0°	8-13-24	12-18-28	15-22-32	18-24-35	20-26-37	23-28-40	26-32-45	28-35-49	31-37-53
			Throw 22.5°	6-10-19	9-14-22	11-17-24	14-19-27	16-20-29	18-22-31	20-24-35	22-27-38	24-29-41
			(ft) 45°	4-6-11	5-8-13	7-10-14	8-11-16	9-12-17	10-13-18	12-14-20	13-16-22	14-17-24
			cfm	189	252	315	378	441	504	630	756	882
			NC	-	-	15	20	25	29	36	41	46
18x6	0.75	0.63	0°	8-14-25	12-18-29	15-23-33	18-25-36	21-27-39	24-29-41	27-33-46	29-36-51	32-39-55
			Throw 22.5°	7-11-20	9-14-23	12-18-25	14-20-28	16-21-30	18-23-32	21-25-36	23-28-39	24-30-42
			(ft) 45°	4-6-11	5-8-13	7-10-15	8-11-16	9-12-17	11-13-19	12-15-21	13-16-23	14-17-25
			cfm	216	288	360	432	504	576	720	864	1008
20x6			NC	-	-	16	21	26	30	36	42	46
12x10	0.83	0.72	0°	9-15-27	13-19-31	16-24-35	19-27-38	23-29-41	25-31-44	28-35-49	31-38-54	34-41-58
			Throw 22.5°	7-11-21	10-15-24	12-19-27	15-21-30	17-23-32	20-24-34	22-27-38	24-30-42	26-32-45
			(ft) 45°	4-7-12	6-9-14	7-11-16	9-12-17	10-13-19	11-14-20	13-16-22	14-17-24	15-19-26
			cfm	231	308	385	462	539	616	770	924	1078
			NC	-	-	16	21	26	30	37	42	47
22x6	0.92	0.77	0°	9-15-28	13-20-32	17-25-36	20-28-40	23-30-43	26-32-46	29-36-51	32-40-56	35-43-60
			Throw 22.5°	7-12-22	10-16-25	13-19-28	16-22-31	18-23-33	20-25-35	23-28-40	25-31-43	27-33-47
			(ft) 45°	4-7-13	6-9-15	8-11-16	9-13-18	11-14-19	12-15-21	13-16-23	15-18-25	16-19-27
			cfm	264	352	440	528	616	704	880	1056	1232
24x6			NC	-	-	16	22	26	30	37	43	47
18x8	1.00	0.88	0°	10-16-30	14-21-34	18-27-39	21-30-42	25-32-46	28-34-49	31-39-55	34-42-60	37-46-65
12x12			Throw 22.5°	8-12-23	11-17-27	14-21-30	17-23-33	19-25-35	22-27-38	24-30-42	27-33-46	29-35-50
			(ft) 45°	4-7-13	6-10-16	8-12-17	10-13-19	11-15-21	13-16-22	14-17-25	16-19-27	17-21-29
			cfm	333	444	555	666	777	888	1110	1332	1554
30x6			NC	-	11	17	23	27	31	38	44	48
18x10	1.25	1.11	0°	11-18-34	16-24-39	20-30-43	24-34-47	28-36-51	32-39-55	35-43-61	39-47-67	42-51-72
			Throw 22.5°	9-14-26	12-19-30	16-23-34	19-26-37	22-28-40	25-30-42	27-34-47	30-37-52	32-40-56
			(ft) 45°	5-8-15	7-11-17	9-14-19	11-15-21	13-16-23	14-17-25	16-19-28	17-21-30	19-23-33

Performance notes appear at end of table

Recommended Noise Criteria and Face Velocity Ranges are on page 6

HART COOLEY
install confidence.

92HVO, 92HVV, 92VHO, 92VHV
Performance based on nominal sizes shown in bold

							NC-20		NC-30		NC-40		NC-50
Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)	Core Vel.	300	400	500	600	700	800	1000	1200	1400
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
			cfm	366	488	610	732	854	976	1220	1464	1708
			NC	-	11	18	23	28	32	39	44	49
14x14	**1.36**	**1.22**	0°	12-19-35	17-25-41	21-31-45	25-35-50	29-38-54	33-41-57	37-45-64	41-50-70	44-54-76
			Throw 22.5°	9-15-27	13-20-31	16-24-35	20-27-39	23-29-42	26-31-45	29-35-50	31-39-55	34-42-59
			(ft) 45°	5-8-16	8-11-18	9-14-20	11-16-22	13-17-24	15-18-26	17-20-29	18-22-32	20-24-34
			cfm	405	540	675	810	945	1080	1350	1620	1890
36x6			NC	-	12	18	24	28	32	39	44	49
27x8	**1.50**	**1.35**	0°	12-20-37	18-26-43	22-33-48	26-37-52	31-40-57	35-43-60	39-48-68	43-52-74	46-57-80
18x12			Throw 22.5°	10-15-29	14-21-33	17-26-37	21-29-41	24-31-44	27-33-47	30-37-52	33-41-57	36-44-62
			(ft) 45°	6-9-17	8-12-19	10-15-21	12-17-24	14-18-25	16-19-27	18-21-30	19-24-33	21-25-36
			cfm	411	548	685	822	959	1096	1370	1644	1918
			NC	-	12	18	24	28	32	39	44	49
22x10	**1.53**	**1.37**	0°	12-20-37	18-27-43	22-33-48	27-37-53	31-40-57	35-43-61	39-48-68	43-53-75	46-57-81
			Throw 22.5°	10-16-29	14-21-33	17-26-37	21-29-41	24-31-44	27-33-47	30-37-53	33-41-58	36-44-62
			(ft) 45°	6-9-17	8-12-19	10-15-22	12-17-24	14-18-26	16-19-27	18-22-31	19-24-34	21-26-36
			cfm	447	596	745	894	1043	1192	1490	1788	2086
30x8			NC	-	12	19	24	29	33	39	45	49
24x10	**1.67**	**1.49**	0°	13-21-39	19-28-45	23-35-50	28-39-55	32-42-59	37-45-63	41-50-71	45-55-78	48-59-84
			Throw 22.5°	10-16-30	14-22-35	18-27-39	22-30-43	25-33-46	28-35-49	32-39-55	35-43-60	38-46-65
			(ft) 45°	6-9-17	8-13-20	10-16-23	13-17-25	15-19-27	16-20-29	18-23-32	20-25-35	22-27-38
			cfm	477	636	795	954	1113	1272	1590	1908	2226
42x6			NC	-	12	19	24	29	33	40	45	50
18x14	**1.75**	**1.59**	0°	13-22-40	19-29-46	24-36-52	29-40-57	34-43-61	38-46-66	42-52-73	46-57-80	50-61-87
			Throw 22.5°	10-17-31	15-22-36	19-28-40	22-31-44	26-34-48	29-36-51	33-40-57	36-44-62	39-48-67
			(ft) 45°	6-10-18	9-13-21	11-16-23	13-18-26	15-20-28	17-21-30	19-23-33	21-26-36	23-28-39
			cfm	486	648	810	972	1134	1296	1620	1944	2268
			NC	-	12	19	24	29	33	40	45	50
16x16	**1.78**	**1.62**	0°	14-22-41	19-29-47	24-36-52	29-41-57	34-44-62	38-47-66	43-52-74	47-57-81	51-62-88
			Throw 22.5°	11-17-31	15-22-36	19-28-41	22-31-44	26-34-48	30-36-51	33-41-57	36-44-63	39-48-68
			(ft) 45°	6-10-18	9-13-21	11-16-24	13-18-26	15-20-28	17-21-30	19-24-33	21-26-36	23-28-39
48x6			cfm	546	728	910	1092	1274	1456	1820	2184	2548
36x8			NC	-	13	19	25	30	34	40	46	50
24x12	**2.00**	**1.82**	0°	14-23-43	20-31-50	26-38-55	31-43-61	36-46-66	41-50-70	45-55-78	50-61-86	54-66-93
18x16			Throw 22.5°	11-18-33	16-24-38	20-30-43	24-33-47	28-36-51	31-38-54	35-43-61	38-47-67	42-51-72
			(ft) 45°	6-10-19	9-14-22	12-17-25	14-19-27	16-21-30	18-22-32	20-25-35	22-27-39	24-30-42
			cfm	621	828	1035	1242	1449	1656	2070	2484	2898
			NC	-	13	20	25	30	34	41	46	51
18x18	**2.25**	**2.07**	0°	15-25-46	22-33-53	27-41-59	33-46-65	38-49-70	43-53-75	48-59-84	53-65-92	57-70-99
			Throw 22.5°	12-19-36	17-25-41	21-32-46	25-36-50	30-38-54	33-41-58	37-46-65	41-50-71	44-54-77
			(ft) 45°	7-11-21	10-15-24	12-18-27	15-21-29	17-22-31	19-24-34	22-27-38	24-29-41	26-31-45
			cfm	642	856	1070	1284	1498	1712	2140	2568	2996
42x8			NC	-	13	20	26	30	34	41	46	51
24x14	**2.33**	**2.14**	0°	16-25-47	22-33-54	28-42-60	33-47-66	39-50-71	44-54-76	49-60-85	54-66-93	58-71-101
			Throw 22.5°	12-19-36	17-26-42	22-32-47	26-36-51	30-39-55	34-42-59	38-47-66	42-51-72	45-55-78
			(ft) 45°	7-11-21	10-15-24	13-19-27	15-21-30	18-23-32	20-24-34	22-27-38	24-30-42	26-32-45
			cfm	687	916	1145	1374	1603	1832	2290	2748	3206
36x10			NC	-	14	20	26	30	34	41	47	51
30x12	**2.50**	**2.29**	0°	16-26-48	23-34-56	29-43-62	34-48-68	40-52-74	45-56-79	51-62-88	56-68-96	60-74-104
			Throw 22.5°	12-20-37	18-27-43	22-33-48	27-37-53	31-40-57	35-43-61	39-48-68	43-53-75	47-57-81
			(ft) 45°	7-12-22	10-16-25	13-19-28	16-22-31	18-23-33	20-25-35	23-28-40	25-31-43	27-33-47
			cfm	738	984	1230	1476	1722	1968	2460	2952	3444
48x8			NC	-	14	21	26	31	35	41	47	51
24x16	**2.67**	**2.46**	0°	17-27-50	24-36-58	30-45-64	36-50-71	42-54-76	47-58-82	53-64-91	58-71-100	62-76-108
			Throw 22.5°	13-21-39	18-28-45	23-35-50	28-39-55	32-42-59	36-45-63	41-50-71	45-55-77	48-59-84
			(ft) 45°	8-12-22	11-16-26	13-20-29	16-22-32	19-24-34	21-26-37	24-29-41	26-32-45	28-34-49
			cfm	771	1028	1285	1542	1799	2056	2570	3084	3598
			NC	-	14	21	26	31	35	42	47	52
20x20	**2.78**	**2.57**	0°	17-27-51	24-37-59	30-46-66	37-51-72	43-55-78	48-59-83	54-66-93	59-72-102	64-78-110
			Throw 22.5°	13-21-40	19-28-46	24-35-51	28-40-56	33-43-60	37-46-65	42-51-72	46-56-79	49-60-85
			(ft) 45°	8-12-23	11-16-27	14-21-30	16-23-32	19-25-35	22-27-38	24-30-42	27-32-46	29-35-50
			cfm	825	1100	1375	1650	1925	2200	2750	3300	3850
36x12			NC	-	15	21	27	31	35	42	47	52
24x18	**3.00**	**2.75**	0°	18-28-53	25-38-61	31-47-68	38-53-75	44-57-81	50-61-86	56-68-96	61-75-106	66-81-114
			Throw 22.5°	14-22-41	20-29-47	24-37-53	29-41-58	34-44-63	39-47-67	43-53-75	47-58-82	51-63-88
			(ft) 45°	8-13-24	11-17-27	14-21-31	17-24-34	20-26-36	22-27-39	25-31-43	27-34-48	30-36-51

Performance notes appear at end of table

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
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92HVO, 92HVV, 92VHO, 92VHV
Performance based on nominal sizes shown in bold

Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)		NC-20		NC-30		NC-40		NC-50		
			Core Vel.	300	400	500	600	700	800	1000	1200	1400
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
			cfm	933	1244	1555	1866	2177	2488	3110	3732	4354
48x10			NC	-	15	22	27	32	36	42	48	52
30x16	3.33	3.11	0°	19-30-56	27-40-65	33-50-72	40-56-79	47-61-86	53-65-92	59-72-103	65-79-112	70-86-121
24x20			Throw 22.5°	15-23-44	21-31-50	26-39-56	31-44-62	36-47-66	41-50-71	46-56-79	50-62-87	54-66-94
			(ft) 45°	8-14-25	12-18-29	15-23-33	18-25-36	21-27-39	24-29-41	27-33-46	29-36-51	32-39-55
			cfm	942	1256	1570	1884	2198	2512	3140	3768	4396
			NC	-	15	22	27	32	36	42	48	53
22x22	3.36	3.14	0°	19-30-56	27-40-65	34-50-73	40-56-80	47-61-86	53-65-92	59-73-103	65-80-113	70-86-122
			Throw 22.5°	15-23-44	21-31-50	26-39-56	31-44-62	37-47-67	41-50-71	46-56-80	50-62-87	55-67-94
			(ft) 45°	8-14-25	12-18-29	15-23-33	18-25-36	21-27-39	24-29-41	27-33-46	29-36-51	32-39-55
			cfm	966	1288	1610	1932	2254	2576	3220	3864	4508
42x12			NC	-	15	22	27	32	36	43	48	53
36x14	3.50	3.22	0°	19-31-57	27-41-66	34-51-74	41-57-81	48-62-87	54-66-93	60-74-104	66-81-114	71-87-123
			Throw 22.5°	15-24-44	21-32-51	26-40-57	32-44-63	37-48-68	42-51-72	47-57-81	51-63-89	55-68-96
			(ft) 45°	9-14-26	12-18-30	15-23-33	18-26-36	21-28-39	24-30-42	27-33-47	30-36-51	32-39-56
			cfm	1029	1372	1715	2058	2401	2744	3430	4116	4802
			NC	-	15	22	28	32	36	43	48	53
24x22	3.67	3.43	0°	20-32-59	28-42-68	35-53-76	42-59-83	49-64-90	56-68-96	62-76-108	68-83-118	74-90-127
			Throw 22.5°	15-25-46	22-33-53	27-41-59	33-46-65	38-49-70	43-53-75	48-59-83	53-65-91	57-70-99
			(ft) 45°	9-14-27	13-19-31	16-24-34	19-27-38	22-29-41	25-31-43	28-34-48	31-38-53	33-41-57
			cfm	1050	1400	1750	2100	2450	2800	3500	4200	4900
			NC	-	16	22	28	32	36	43	48	53
30x18	3.75	3.5	0°	20-32-60	28-43-69	36-53-77	43-60-84	50-64-91	56-69-97	63-77-109	69-84-119	74-91-129
			Throw 22.5°	15-25-46	22-33-53	28-41-60	33-46-65	39-50-71	44-53-75	49-60-84	53-65-92	58-71-100
			(ft) 45°	9-14-27	13-19-31	16-24-35	19-27-38	22-29-41	25-31-44	28-35-49	31-38-54	33-41-58
			cfm	1125	1500	1875	2250	2625	3000	3750	4500	5250
48x12			NC	-	16	22	28	33	37	43	49	53
36x16	4.00	3.75	0°	21-33-62	29-44-71	37-55-80	44-62-87	51-67-94	58-71-101	65-80-113	71-87-123	77-94-133
24x24			Throw 22.5°	16-26-48	23-34-55	29-43-62	34-48-68	40-52-73	45-55-78	50-62-87	55-68-96	60-73-103
			(ft) 45°	9-15-28	13-20-32	17-25-36	20-28-39	23-30-42	26-32-45	29-36-51	32-39-55	35-42-60
			cfm	1266	1688	2110	2532	2954	3376	4220	5064	5908
			NC	-	16	23	28	33	37	44	49	54
36x18	4.50	4.22	0°	22-35-65	31-47-76	39-59-84	47-65-93	55-71-100	62-76-107	69-84-119	76-93-131	82-100-141
			Throw 22.5°	17-27-51	24-36-59	30-45-65	36-51-72	42-55-77	48-59-83	53-65-93	59-72-101	63-77-110
			(ft) 45°	10-16-29	14-21-34	18-26-38	21-29-42	25-32-45	28-34-48	31-38-54	34-42-59	37-45-64
			cfm	1413	1884	2355	2826	3297	3768	4710	5652	6594
36x20			NC	-	17	23	29	33	37	44	50	54
30x24	5.00	4.71	0°	23-37-69	33-49-80	41-62-89	49-69-98	58-75-106	65-80-113	73-89-126	80-98-138	86-106-149
			Throw 22.5°	18-29-54	26-38-62	32-48-69	38-54-76	45-58-82	50-62-87	56-69-98	62-76-107	67-82-116
			(ft) 45°	10-17-31	15-22-36	19-28-40	22-31-44	26-34-48	29-36-51	33-40-57	36-44-62	39-48-67
			cfm	1482	1976	2470	2964	3458	3952	4940	5928	6916
			NC	-	17	24	29	34	38	44	50	54
42x18	5.25	4.94	0°	24-38-71	34-51-82	42-63-91	51-71-100	59-76-108	67-82-116	75-91-129	82-100-142	88-108-153
			Throw 22.5°	18-29-55	26-39-63	33-49-71	39-55-78	46-59-84	52-63-90	58-71-100	63-78-110	68-84-118
			(ft) 45°	11-17-32	15-23-37	19-28-41	23-32-45	27-34-49	30-37-52	34-41-58	37-45-64	40-49-69
			cfm	1548	2064	2580	3096	3612	4128	5160	6192	7224
			NC	-	17	24	29	34	38	45	50	55
28x28	5.44	5.16	0°	24-39-72	35-52-84	43-65-93	52-72-102	60-78-110	68-84-118	76-93-132	84-102-145	90-110-156
			Throw 22.5°	19-30-56	27-40-65	33-50-72	40-56-79	47-61-86	53-65-92	59-72-102	65-79-112	70-86-121
			(ft) 45°	11-17-33	16-23-38	19-29-42	23-33-46	27-35-50	31-38-53	34-42-59	38-46-65	41-50-70
			cfm	1653	2204	2755	3306	3857	4408	5510	6612	7714
42x20			NC	-	17	24	30	34	38	45	50	55
30x28	5.83	5.51	0°	25-40-75	36-54-86	45-67-96	54-75-106	62-81-114	70-86-122	79-96-136	86-106-149	93-114-161
			Throw 22.5°	19-31-58	28-41-67	35-52-75	41-58-82	48-63-88	55-67-95	61-75-106	67-82-116	72-88-125
			(ft) 45°	11-18-34	16-24-39	20-30-43	24-34-48	28-36-51	32-39-55	35-43-61	39-48-67	42-51-73
			cfm	1698	2264	2830	3396	3962	4528	5660	6792	7924
48x18			NC	-	18	24	30	34	38	45	50	55
36x24	6.00	5.66	0°	25-41-76	36-54-87	45-68-98	54-76-107	63-82-116	71-87-124	80-98-138	87-107-152	94-116-164
			Throw 22.5°	20-32-59	28-42-68	35-53-76	42-59-83	49-63-90	55-68-96	62-76-107	68-83-117	73-90-127
			(ft) 45°	11-18-34	16-24-39	20-31-44	24-34-48	28-37-52	32-39-56	36-44-62	39-48-68	43-52-74
			cfm	1782	2376	2970	3564	4158	4752	5940	7128	8316
			NC	-	18	24	30	34	38	45	51	55
30x30	6.25	5.94	0°	26-42-78	37-56-90	46-69-100	56-78-110	65-84-119	73-90-127	82-100-142	90-110-155	97-119-168
			Throw 22.5°	20-32-60	29-43-69	36-54-78	43-60-85	50-65-92	57-69-98	63-78-110	69-85-120	75-92-130
			(ft) 45°	12-19-35	17-25-40	21-31-45	25-35-49	29-38-53	33-40-57	37-45-64	40-49-70	44-53-75

Performance notes appear at end of table

Recommended Noise Criteria and Face Velocity Ranges are on page 6

92HVO, 92HVV, 92VHO, 92VHH
Performance based on nominal sizes shown in bold

Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)		NC-20		NC-30			NC-40	NC-50		
			Core Vel.	300	400	500	600	700	800	1000	1200	1400
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
42x24			cfm	1998	2664	3330	3996	4662	5328	6660	7992	9324
36x28	**7.00**	**6.66**	NC	-	18	25	30	35	39	46	51	56
			0°	28-44-82	39-59-95	49-74-106	59-82-116	69-89-126	77-95-134	87-106-150	95-116-164	102-126-178
			Throw 22.5°	21-34-64	30-46-74	38-57-82	46-64-90	53-69-97	60-74-104	67-82-116	74-90-127	79-97-138
			(ft) 45°	12-20-37	18-26-43	22-33-48	26-37-52	31-40-56	35-43-60	39-48-68	43-52-74	46-56-80
			cfm	2004	2672	3340	4008	4676	5344	6680	8016	9352
			NC	-	18	25	30	35	39	46	51	56
46x22	**7.03**	**6.68**	0°	28-44-82	39-59-95	49-74-106	59-82-116	69-89-126	78-95-134	87-106-150	95-116-165	103-126-178
			Throw 22.5°	21-34-64	30-46-74	38-57-82	46-64-90	53-69-97	60-74-104	67-82-116	74-90-128	80-97-138
			(ft) 45°	12-20-37	18-27-43	22-33-48	27-37-52	31-40-57	35-43-60	39-48-68	43-52-74	46-57-80
			cfm	2034	2712	3390	4068	4746	5424	6780	8136	9492
			NC	-	18	25	30	35	39	46	51	56
32x32	**7.11**	**6.78**	0°	28-45-83	40-59-96	49-74-107	59-83-117	69-90-127	78-96-135	87-107-151	96-117-166	103-127-179
			Throw 22.5°	22-34-64	31-46-74	38-57-83	46-64-91	54-69-98	61-74-105	68-83-117	74-91-129	80-98-139
			(ft) 45°	12-20-37	18-27-43	22-33-48	27-37-53	31-40-57	35-43-61	39-48-68	43-53-75	47-57-81
			cfm	2148	2864	3580	4296	5012	5728	7160	8592	10024
			NC	-	19	25	31	35	39	46	51	56
36x30	**7.50**	**7.16**	0°	29-46-85	41-61-98	51-76-110	61-85-121	71-92-130	80-98-139	90-110-156	98-121-170	106-130-184
			Throw 22.5°	22-35-66	32-47-76	39-59-85	47-66-93	55-71-101	62-76-108	70-85-121	76-93-132	82-101-143
			(ft) 45°	13-21-38	18-27-44	23-34-50	27-38-54	32-41-59	36-44-63	40-50-70	44-54-77	48-59-83
48x24			cfm	2289	3052	3815	4578	5341	6104	7630	9156	10682
			NC	-	19	25	31	35	39	46	52	56
36x32	**8.00**	**7.63**	0°	29-47-88	42-63-102	52-79-114	63-88-124	73-95-134	83-102-144	93-114-161	102-124-176	110-134-190
			Throw 22.5°	23-37-68	33-49-79	41-61-88	49-68-96	57-74-104	64-79-111	72-88-124	79-96-136	85-104-147
			(ft) 45°	13-21-40	19-28-46	24-35-51	28-40-56	33-43-60	37-46-65	42-51-72	46-56-79	49-60-86
			cfm	2304	3072	3840	4608	5376	6144	7680	9216	10752
			NC	-	19	25	31	36	40	46	52	56
34x34	**8.03**	**7.68**	0°	30-47-88	42-63-102	53-79-114	63-88-125	74-95-135	83-102-144	93-114-161	102-125-176	110-135-191
			Throw 22.5°	23-37-68	33-49-79	41-61-88	49-68-97	57-74-104	64-79-112	72-88-125	79-97-137	85-104-148
			(ft) 45°	13-21-40	19-28-46	24-36-51	28-40-56	33-43-61	37-46-65	42-51-73	46-56-79	50-61-86
			cfm	2442	3256	4070	4884	5698	6512	8140	9768	11396
			NC	-	19	26	31	36	40	46	52	56
36x34	**8.50**	**8.14**	0°	30-49-91	43-65-105	54-81-117	65-91-128	76-98-139	86-105-148	96-117-166	105-128-182	113-139-196
			Throw 22.5°	24-38-70	34-50-81	42-63-91	50-70-100	59-76-108	66-81-115	74-91-129	81-100-141	88-108-152
			(ft) 45°	14-22-41	20-29-47	24-37-53	29-41-58	34-44-62	39-47-67	43-53-75	47-58-82	51-62-88
			cfm	2514	3352	4190	5028	5866	6704	8380	10056	11732
			NC	11	19	26	31	36	40	47	52	57
42x30	**8.75**	**8.38**	0°	31-49-92	44-66-106	55-82-119	66-92-130	77-100-141	87-106-151	97-119-168	106-130-184	115-141-199
			Throw 22.5°	24-38-71	34-51-82	43-64-92	51-71-101	60-77-109	67-82-117	75-92-130	82-101-143	89-109-154
			(ft) 45°	14-22-41	20-30-48	25-37-54	30-41-59	35-45-63	39-48-68	44-54-76	48-59-83	52-63-90
			cfm	2589	3452	4315	5178	6041	6904	8630	10356	12082
			NC	11	19	26	31	36	40	47	52	57
36x36	**9.00**	**8.63**	0°	31-50-94	45-67-108	56-84-121	67-94-132	78-101-143	88-108-153	99-121-171	108-132-187	117-143-202
			Throw 22.5°	24-39-72	35-52-84	43-65-94	52-72-103	61-78-111	68-84-118	76-94-132	84-103-145	90-111-157
			(ft) 45°	14-23-42	20-30-49	25-38-54	30-42-60	35-45-64	40-49-69	44-54-77	49-60-84	53-64-91
			cfm	2880	3840	4800	5760	6720	7680	9600	11520	13440
42x34			NC	11	20	26	32	36	40	47	53	57
48x30	**10.00**	**9.6**	0°	33-53-99	47-71-114	59-88-127	71-99-140	82-107-151	93-114-161	104-127-180	114-140-197	123-151-213
			Throw 22.5°	26-41-76	36-55-88	46-68-99	55-76-108	64-83-117	72-88-125	81-99-140	88-108-153	95-117-165
			(ft) 45°	15-24-44	21-32-51	26-40-57	32-44-63	37-48-68	42-51-73	47-57-81	51-63-89	55-68-96
			cfm	2892	3856	4820	5784	6748	7712	9640	11568	13496
			NC	11	20	26	32	36	40	47	53	57
38x38	**10.03**	**9.64**	0°	33-53-99	47-71-114	59-88-128	71-99-140	83-107-151	93-114-161	104-128-181	114-140-198	123-151-214
			Throw 22.5°	26-41-77	37-55-88	46-69-99	55-77-108	64-83-117	72-88-125	81-99-140	88-108-153	96-117-166
			(ft) 45°	15-24-44	21-32-51	27-40-57	32-44-63	37-48-68	42-51-73	47-57-81	51-63-89	55-68-96
			cfm	3030	4040	5050	6060	7070	8080	10100	12120	14140
			NC	11	20	27	32	37	41	47	53	57
42x36	**10.50**	**10.1**	0°	34-54-101	48-72-117	60-91-131	72-101-143	85-109-155	95-117-165	107-131-185	117-143-202	126-155-219
			Throw 22.5°	26-42-78	37-56-91	47-70-101	56-78-111	65-85-120	74-91-128	83-101-143	91-111-157	98-120-169
			(ft) 45°	15-24-46	22-33-53	27-41-59	33-46-64	38-49-70	43-53-74	48-59-83	53-64-91	57-70-98
			cfm	3135	4180	5225	6270	7315	8360	10450	12540	14630
			NC	11	20	27	32	37	41	47	53	58
46x34	**10.86**	**10.45**	0°	34-55-103	49-74-119	61-92-133	74-103-146	86-111-157	97-119-168	109-133-188	119-146-206	128-157-222
			Throw 22.5°	27-43-80	38-57-92	48-71-103	57-80-113	67-86-122	75-92-130	84-103-146	92-113-160	99-122-172
			(ft) 45°	16-25-46	22-33-53	28-41-60	33-46-66	39-50-71	44-53-76	49-60-85	53-66-93	58-71-100

Performance notes appear at end of table

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

92HVO, 92HVV, 92VHO, 92VHV
Performance based on nominal sizes shown in bold

				NC-20		NC-30		NC-40		NC-50		
Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)	Core Vel.	300	400	500	600	700	800	1000	1200	1400
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			Total Press. 0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total Press. 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Total Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
42x38	11.08	10.67	cfm	3201	4268	5335	6402	7469	8536	10670	12804	14938
			NC	12	20	27	32	37	41	48	53	58
			Throw (ft) 0°	35-56-104	50-74-120	62-93-134	74-104-147	87-112-159	98-120-170	110-134-190	120-147-208	130-159-225
			Throw (ft) 22.5°	27-43-81	38-58-93	48-72-104	58-81-114	67-87-123	76-93-132	85-104-147	93-114-161	101-123-174
			Throw (ft) 45°	16-25-47	22-34-54	28-42-60	34-47-66	39-51-71	44-54-76	49-60-85	54-66-94	58-71-101
40x40	11.11	10.7	cfm	3210	4280	5350	6420	7490	8560	10700	12840	14980
			NC	12	20	27	32	37	41	48	53	58
			Throw (ft) 0°	35-56-104	50-75-120	62-93-134	75-104-147	87-113-159	98-120-170	110-134-190	120-147-208	130-159-225
			Throw (ft) 22.5°	27-43-81	39-58-93	48-72-104	58-81-114	67-87-123	76-93-132	85-104-147	93-114-161	101-123-174
			Throw (ft) 45°	16-25-47	22-34-54	28-42-61	34-47-66	39-51-72	44-54-77	49-61-86	54-66-94	58-72-101
48x36	12.00	11.57	cfm	3471	4628	5785	6942	8099	9256	11570	13884	16198
			NC	12	21	27	33	37	41	48	53	58
			Throw (ft) 0°	36-58-108	52-78-125	65-97-140	78-108-153	90-117-165	102-125-177	114-140-198	125-153-217	135-165-234
			Throw (ft) 22.5°	28-45-84	40-60-97	50-75-108	60-84-119	70-91-128	79-97-137	88-108-153	97-119-168	105-128-181
			Throw (ft) 45°	16-26-49	23-35-56	29-44-63	35-49-69	41-53-74	46-56-80	51-63-89	56-69-97	61-74-105
42x42	12.25	11.82	cfm	3546	4728	5910	7092	8274	9456	11820	14184	16548
			NC	12	21	27	33	37	41	48	53	58
			Throw (ft) 0°	37-59-109	52-78-126	65-98-141	78-109-155	91-118-167	103-126-179	115-141-200	126-155-219	137-167-236
			Throw (ft) 22.5°	28-46-85	40-61-98	51-76-110	61-85-120	71-92-130	80-98-139	89-110-155	98-120-170	106-130-183
			Throw (ft) 45°	16-26-49	24-35-57	29-44-64	35-49-70	41-53-75	46-57-80	52-64-90	57-70-99	61-75-106
44x44	13.44	12.99	cfm	3897	5196	6495	7794	9093	10392	12990	15588	18186
			NC	12	21	28	33	38	42	48	54	58
			Throw (ft) 0°	38-62-115	55-82-133	68-103-148	82-115-162	96-124-175	108-133-187	121-148-210	133-162-230	143-175-248
			Throw (ft) 22.5°	30-48-89	42-64-103	53-80-115	64-89-126	74-96-136	84-103-145	94-115-162	103-126-178	111-136-192
			Throw (ft) 45°	17-28-52	25-37-60	31-46-67	37-52-73	43-56-79	49-60-84	54-67-94	60-73-103	64-79-112
48x42	14.00	13.54	cfm	4062	5416	6770	8124	9478	10832	13540	16248	18956
			NC	13	21	28	33	38	42	49	54	59
			Throw (ft) 0°	39-63-117	56-84-135	70-105-151	84-117-166	98-127-179	110-135-191	124-151-214	135-166-234	146-179-253
			Throw (ft) 22.5°	30-49-91	43-65-105	54-81-117	65-91-128	76-98-139	86-105-148	96-117-166	105-128-182	113-139-196
			Throw (ft) 45°	18-28-53	25-38-61	31-47-68	38-53-75	44-57-81	50-61-86	56-68-96	61-75-105	66-81-114
46x46	14.69	14.22	cfm	4266	5688	7110	8532	9954	11376	14220	17064	19908
			NC	13	21	28	33	38	42	49	54	59
			Throw (ft) 0°	40-64-120	57-86-139	72-107-155	86-120-170	100-130-183	113-139-196	127-155-219	139-170-240	150-183-259
			Throw (ft) 22.5°	31-50-93	44-67-107	56-83-120	67-93-132	78-101-142	88-107-152	98-120-170	107-132-186	116-142-201
			Throw (ft) 45°	18-29-54	26-39-62	32-48-70	39-54-76	45-58-83	51-62-88	57-70-99	62-76-108	67-83-117
48x46	15.33	14.85	cfm	4455	5940	7425	8910	10395	11880	14850	17820	20790
			NC	13	22	28	34	38	42	49	54	59
			Throw (ft) 0°	41-66-123	59-88-142	73-110-158	88-123-174	102-133-187	116-142-200	129-158-224	142-174-245	153-187-265
			Throw (ft) 22.5°	32-51-95	45-68-110	57-85-123	68-95-134	79-103-145	90-110-155	100-123-174	110-134-190	119-145-205
			Throw (ft) 45°	18-30-55	26-40-64	33-49-71	40-55-78	46-60-84	52-64-90	58-71-101	64-78-110	69-84-119
48x48	16.00	15.50	cfm	4650	6200	7750	9300	10850	12400	15500	18600	21700
			NC	13	22	28	34	38	42	49	55	59
			Throw (ft) 0°	42-67-125	60-90-145	75-112-162	90-125-177	105-135-192	118-145-205	132-162-229	145-177-251	156-192-271
			Throw (ft) 22.5°	33-52-97	46-70-112	58-87-125	70-97-137	81-105-148	92-112-159	102-125-177	112-137-194	121-148-210
			Throw (ft) 45°	19-30-56	27-40-65	34-50-73	40-56-80	47-61-86	53-65-92	59-73-103	65-80-113	70-86-122

- 0°, 22.5° & 45° represent blade deflection angles
- Performance data is based on duct sizes in bold, the performance varies slightly for duct sizes not shown in bold
- See the section, Engineering Guidelines, for drop information when selecting larger supply grilles for cooling purposes
- See the "Performance Notes" portion in this section for notes and correction factors
- See the section, Engineering Guidelines, for catalog throw information
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts

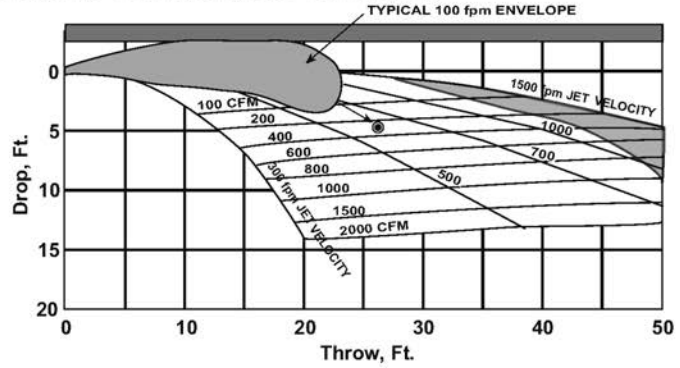
Recommended Noise Criteria and Face Velocity Ranges are on page 6

92HVO, 92HVV, 92VHO, 92VHV

PERFORMANCE NOTES

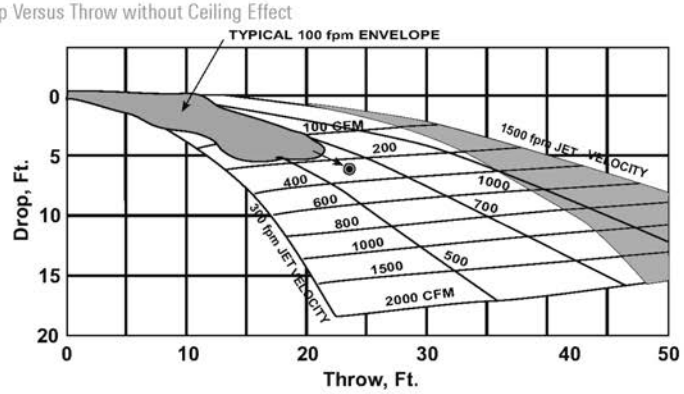
- Performance data includes damper
- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006
- All pressures are in inches of water
- Core velocities are in feet per minute
- Throw values given are for isothermal terminal velocities of 150, 100 and 50 fpm
- Each NC value represents the noise criterion curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7. Each NC value is based on a room absorption of 10 dB, re 10^{-12} watts. Each NC value is further based on grille operating at a 0° deflection. Settings of 22½° or 45°, increase the stated sound levels by 1 or 7 NC, respectively.
- Bold dividing lines on H12-H16 denote ranges of NC values
- The stated deflection settings refer to the horizontal setting of the blade's deflection angle. For a 20° upward deflection, use the throw rating for the 0° setting and the total pressure for the 22½° horizontal setting.
- Dash (—) in space indicates NC value less than 10
- For additional information concerning drop and throw, see the Engineering Guidelines section of this catalog

Drop Versus Throw Showing Ceiling Effect - 20°F ΔT Cooling



(Side view of air jet leaving wall mounted grille)

Drop Versus Throw without Ceiling Effect



(Side view of air jet leaving wall mounted grille)

VARIABLE AIR VOLUME APPLICATIONS

All supply grilles can be applied to variable air volume systems with excellent results. For detailed selection methods, consult your Titus representative or the Engineering Guidelines section of this catalog.

Correction Factors for Supply Grilles

Damper	A_k/A_c	Throw	Total Pressure	NC
With	0.77	1.00	1.00	0
Without	0.82	0.98	0.88	-2

Note: Throw and total pressure corrections are multipliers. The NC correction is an addition. A_k is the flow factor. A_c is the core area from the main table.

Recommended Noise Criteria and Face Velocity Ranges are on page 6

92HVO, 92HVV, 92VHO, 92VHV

HORIZONTAL DEFLECTION (SPREAD)

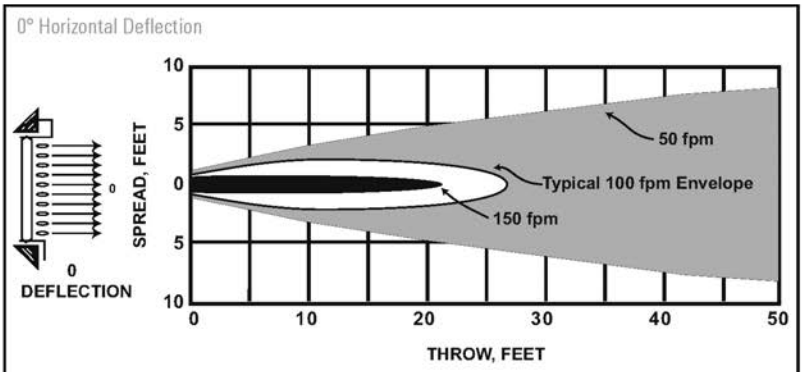
SUPPLY GRILLES

The figures depicting deflection, throw and drop are based on actual tests conducted by Titus. They show the relationship of spread to throw for a typical high side-wall supply outlet selection.

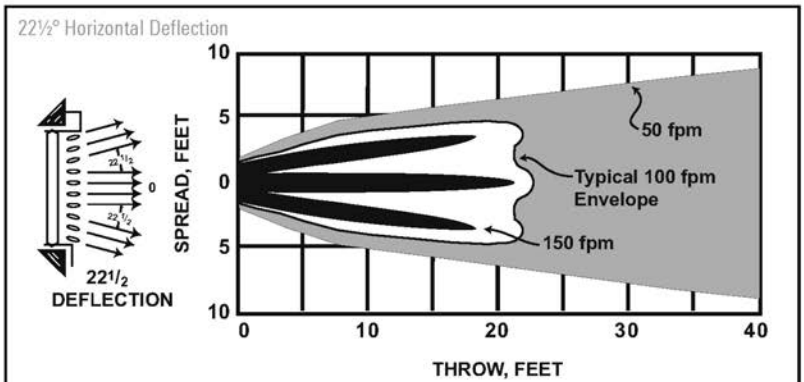
Notice the outer shaded area represents the 50 fpm isovel, the white area, the 100 fpm isovel, and the inner area, the 150 fpm isovel.

The spread angle also affects the airstream drop amount. Always consider for any given temperature, volume and core velocity; the wider spread results in a smaller drop. See section, Engineering Guidelines, for more drop, throw and spread relationship information.

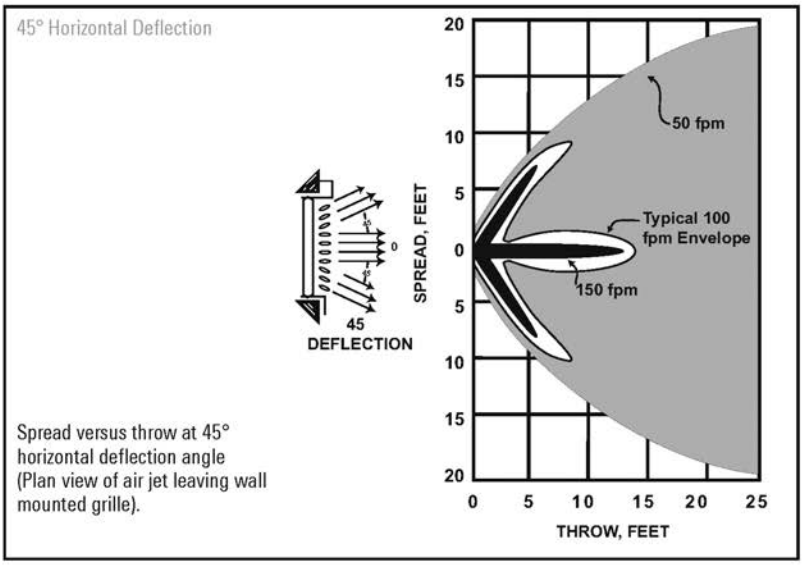
Grilles can be selected with a single set of blades for adjusting either horizontal or vertical deflection, or with two sets of blades for adjusting both horizontal and vertical deflections.



Spread versus throw at 0° horizontal deflection angle (Plan view of air jet leaving wall mounted grille).



Spread versus throw at 22½° horizontal deflection angle (Plan view of air jet leaving wall mounted grille).



Spread versus throw at 45° horizontal deflection angle (Plan view of air jet leaving wall mounted grille).

Recommended Noise Criteria and Face Velocity Ranges are on page 6

HART COOLEY
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94A Series: 94A, 94AHOV, 94AT, 94HOV Return Air Grilles & Registers
96AFB Steel Fixed-Bar Filter Grille
Performance based on nominal sizes shown in bold

Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity Velocity Pressure Neg. Static Pressure	100 0.001 0.002	200 0.002 0.008	300 0.006 0.018	400 0.010 0.032	500 0.016 0.051	600 0.022 0.073	700 0.031 0.099	800 0.040 0.130	900 0.050 0.164
6x6	**0.25**	**0.19**	Airflow, cfm	19	38	57	76	95	114	133	152	171
			NC	-	-	-	-	-	13	19	25	29
8x6	**0.33**	**0.26**	Airflow, cfm	26	52	78	104	130	156	182	208	234
			NC	-	-	-	-	-	15	20	26	30
10x6	**0.42**	**0.34**	Airflow, cfm	34	68	102	136	170	204	238	272	306
			NC	-	-	-	-	-	16	21	28	32
8x8	**0.44**	**0.37**	Airflow, cfm	37	74	111	148	185	222	259	296	333
			NC	-	-	-	-	-	16	22	28	32
12x6	**0.5**	**0.41**	Airflow, cfm	41	82	123	164	205	246	287	328	369
			NC	-	-	-	-	-	17	22	30	34
14x6	**0.58**	**0.48**	Airflow, cfm	48	96	144	192	240	288	336	384	432
			NC	-	-	-	-	-	18	24	30	34
16x6 **12x8**	**0.67**	**0.57**	Airflow, cfm	57	114	171	228	285	342	399	456	513
			NC	-	-	-	-	10	19	25	30	35
10x10	**0.69**	**0.59**	Airflow, cfm	59	118	177	236	295	354	413	472	531
			NC	-	-	-	-	10	19	25	31	35
18x6	**0.75**	**0.63**	Airflow, cfm	63	126	189	252	315	378	441	504	567
			NC	-	-	-	-	10	19	25	32	35
20x6 **12x10**	**0.83**	**0.72**	Airflow, cfm	72	144	216	288	360	432	504	576	648
			NC	-	-	-	-	11	19	25	30	35
22x6	**0.92**	**0.77**	Airflow, cfm	77	154	231	308	385	462	539	616	693
			NC	-	-	-	-	11	19	25	30	35
24x6 **12x12**	**1**	**0.88**	Airflow, cfm	88	176	264	352	440	528	616	704	792
			NC	-	-	-	-	11	19	25	30	35
30x6 **18x10**	**1.25**	**1.11**	Airflow, cfm	111	222	333	444	555	666	777	888	999
			NC	-	-	-	-	12	20	26	32	35
14x14	**1.36**	**1.22**	Airflow, cfm	122	244	366	488	610	732	854	976	1098
			NC	-	-	-	-	12	20	27	32	35
36x6 **18x12**	**1.5**	**1.35**	Airflow, cfm	135	270	405	540	675	810	945	1080	1215
			NC	-	-	-	-	13	20	27	32	35
22x10	**1.53**	**1.37**	Airflow, cfm	137	274	411	548	685	822	959	1096	1233
			NC	-	-	-	-	13	20	27	32	36
30x8 **24x10**	**1.67**	**1.49**	Airflow, cfm	149	298	447	596	745	894	1043	1192	1341
			NC	-	-	-	-	14	21	27	33	37
42x6 **18x14**	**1.75**	**1.59**	Airflow, cfm	159	318	477	636	795	954	1113	1272	1431
			NC	-	-	-	-	14	21	27	33	37
16x16	**1.78**	**1.62**	Airflow, cfm	162	324	486	648	810	972	1134	1296	1458
			NC	-	-	-	-	14	21	27	33	37
24x12 18x16	**2**	**1.82**	Airflow, cfm	182	364	546	728	910	1092	1274	1456	1638
			NC	-	-	-	-	14	21	28	33	38
18x18	**2.25**	**2.07**	Airflow, cfm	207	414	621	828	1035	1242	1449	1656	1863
			NC	-	-	-	-	14	21	28	33	38
24x14	**2.33**	**2.14**	Airflow, cfm	214	428	642	856	1070	1284	1498	1712	1926
			NC	-	-	-	-	14	22	28	33	38
30x12	**2.5**	**2.29**	Airflow, cfm	229	458	687	916	1145	1374	1603	1832	2061
			NC	-	-	-	-	15	22	28	33	38
24x16	**2.67**	**2.46**	Airflow, cfm	246	492	738	984	1230	1476	1722	1968	2214
			NC	-	-	-	-	15	22	29	34	39
20x20	**2.78**	**2.57**	Airflow, cfm	257	514	771	1028	1285	1542	1799	2056	2313
			NC	-	-	-	-	16	23	29	34	39
36x12	**3**	**2.75**	Airflow, cfm	275	550	825	1100	1375	1650	1925	2200	2475
			NC	-	-	-	-	16	23	29	34	39
30x16 **24x20**	**3.33**	**3.11**	Airflow, cfm	311	622	933	1244	1555	1866	2177	2488	2799
			NC	-	-	-	-	17	24	30	35	40
22x22	**3.36**	**3.14**	Airflow, cfm	314	628	942	1256	1570	1884	2198	2512	2826
			NC	-	-	-	-	17	24	30	35	40
42x12 36x14	**3.5**	**3.22**	Airflow, cfm	322	644	966	1288	1610	1932	2254	2576	2898
			NC	-	-	-	-	17	24	30	36	40
24x22	**3.67**	**3.43**	Airflow, cfm	343	686	1029	1372	1715	2058	2401	2744	3087
			NC	-	-	-	-	17	24	30	36	40
30x18	**3.75**	**3.5**	Airflow, cfm	350	700	1050	1400	1750	2100	2450	2800	3150
			NC	-	-	-	-	17	24	30	36	40

NC-20 — NC-30 — NC-40

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

94A Series: 94A, 94AHOV, 94AT, 94HOV Return Air Grilles & Registers
96AFB Steel Fixed-Bar Filter Grille
Performance based on nominal sizes shown in bold

									NC-20	NC-30		NC-40	
Nominal Duct Size (in.)	**Nominal Duct Area (ft²)**	**Core Area (ft²)**	**Core Velocity Velocity Pressure Neg. Static Pressure**	**100 0.001 0.002**	**200 0.002 0.008**	**300 0.006 0.018**	**400 0.010 0.032**	**500 0.016 0.051**	**600 0.022 0.073**	**700 0.031 0.099**	**800 0.040 0.130**	**900 0.050 0.164**
48x12			Airflow, cfm	375	750	1125	1500	1875	2250	2625	3000	3375
24x24	**4**	**3.75**	NC	-	-	-	-	18	25	37	38	41
			Airflow, cfm	422	844	1266	1688	2110	2532	2954	3376	3798
36x18	**4.5**	**4.22**	NC	-	-	-	-	18	25	31	38	41
36x20			Airflow, cfm	471	942	1413	1884	2355	2826	3297	3768	4239
30x24	**5**	**4.71**	NC	-	-	-	-	18	25	31	38	41
			Airflow, cfm	494	988	1482	1976	2470	2964	3458	3952	4446
42x18	**5.25**	**4.94**	NC	-	-	-	-	18	25	31	38	41
			Airflow, cfm	516	1032	1548	2064	2580	3096	3612	4128	4644
28x28	**5.44**	**5.16**	NC	-	-	-	-	18	25	32	38	41
42x20			Airflow, cfm	551	1102	1653	2204	2755	3306	3857	4408	4959
30x28	**5.83**	**5.51**	NC	-	-	-	-	18	26	32	38	41
48x18			Airflow, cfm	566	1132	1698	2264	2830	3396	3962	4528	5094
36x24	**6**	**5.66**	NC	-	-	-	10	18	26	32	38	41
			Airflow, cfm	594	1188	1782	2376	2970	3564	4158	4752	5346
30x30	**6.25**	**5.94**	NC	-	-	-	10	18	26	32	38	41
42x24			Airflow, cfm	666	1332	1998	2664	3330	3996	4662	5328	5994
36x28	**7**	**6.66**	NC	-	-	-	10	19	26	32	38	41
			Airflow, cfm	668	1336	2004	2672	3340	4008	4676	5344	6012
46x22	**7.03**	**6.68**	NC	-	-	-	10	19	27	32	38	42
			Airflow, cfm	678	1356	2034	2712	3390	4068	4746	5424	6102
32x32	**7.11**	**6.78**	NC	-	-	-	10	19	27	32	38	42
			Airflow, cfm	716	1432	2148	2864	3580	4296	5012	5728	6444
36x30	**7.5**	**7.16**	NC	-	-	-	10	19	27	32	38	42
48x24			Airflow, cfm	763	1526	2289	3052	3815	4578	5341	6104	6867
36x32	**8**	**7.63**	NC	-	-	-	10	19	27	32	38	42
			Airflow, cfm	768	1536	2304	3072	3840	4608	5376	6144	6912
34x34	**8.03**	**7.68**	NC	-	-	-	10	19	27	32	38	42
			Airflow, cfm	814	1628	2442	3256	4070	4884	5698	6512	7326
36x34	**8.5**	**8.14**	NC	-	-	-	11	19	27	32	38	42
			Airflow, cfm	838	1676	2514	3352	4190	5028	5866	6704	7542
42x30	**8.75**	**8.38**	NC	-	-	-	11	20	27	32	38	42
			Airflow, cfm	863	1726	2589	3452	4315	5178	6041	6904	7767
36x36	**9**	**8.63**	NC	-	-	-	11	20	27	33	38	43
42x34			Airflow, cfm	960	1920	2880	3840	4800	5760	6720	7680	8640
48x30	**10**	**9.6**	NC	-	-	-	11	20	27	33	38	43
			Airflow, cfm	964	1928	2892	3856	4820	5784	6748	7712	8676
38x38	**10.03**	**9.64**	NC	-	-	-	11	20	27	33	38	43
			Airflow, cfm	1010	2020	3030	4040	5050	6060	7070	8080	9090
42x36	**10.5**	**10.1**	NC	-	-	-	11	20	27	33	38	43
			Airflow, cfm	1045	2090	3135	4180	5225	6270	7315	8360	9405
46x34	**10.86**	**10.45**	NC	-	-	-	11	20	27	33	38	43
			Airflow, cfm	1067	2134	3201	4268	5335	6402	7469	8536	9603
42x38	**11.08**	**10.67**	NC	-	-	-	11	20	27	33	38	43
			Airflow, cfm	1070	2140	3210	4280	5350	6420	7490	8560	9630
40x40	**11.11**	**10.7**	NC	-	-	-	11	20	27	33	38	43
			Airflow, cfm	1157	2314	3471	4628	5785	6942	8099	9256	10413
48x36	**12**	**11.57**	NC	-	-	-	11	20	27	33	39	44
			Airflow, cfm	1182	2364	3546	4728	5910	7092	8274	9456	10638
42x42	**12.25**	**11.82**	NC	-	-	-	11	20	27	33	39	44
			Airflow, cfm	1299	2598	3897	5196	6495	7794	9093	10392	11691
44x44	**13.44**	**12.99**	NC	-	-	-	12	21	28	34	39	44
			Airflow, cfm	1354	2708	4062	5416	6770	8124	9478	10832	12186
48x42	**14**	**13.54**	NC	-	-	-	12	21	28	34	40	45
			Airflow, cfm	1422	2844	4266	5688	7110	8532	9954	11376	12798
46x46	**14.69**	**14.22**	NC	-	-	-	12	21	28	35	40	45
			Airflow, cfm	1485	2970	4455	5940	7425	8910	10395	11880	13365
48x46	**15.33**	**14.85**	NC	-	-	-	12	22	28	35	40	45
			Airflow, cfm	1550	3100	4650	6200	7750	9300	10850	12400	13950
48x48	**16**	**15.5**	NC	-	-	-	13	22	29	35	40	45

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

Recommended Noise Criteria and Face Velocity Ranges are on page 6

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install confidence.

94A Series: 94A, 94AHOV, 94AT, 94HOV Return Air Grilles & Registers
96AFB Steel Fixed-Bar Filter Grille
Performance based on nominal sizes shown in bold

								NC-10	NC-20		NC-30		NC-40
Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity Velocity Pressure Neg. Static Pressure	300 0.006 0.012	400 0.010 0.022	500 0.016 0.034	600 0.022 0.049	700 0.031 0.067	900 0.050 0.111	1100 0.075 0.165	1300 0.105 0.231	1500 0.140 0.307
6x6	**0.25**	**0.19**	Airflow, cfm	57	76	95	114	133	171	209	247	285
			NC	-	-	-	-	13	20	26	31	35
8x6	**0.33**	**0.26**	Airflow, cfm	78	104	130	156	182	234	286	338	390
			NC	-	-	-	-	14	22	27	32	36
10x6	**0.42**	**0.34**	Airflow, cfm	102	136	170	204	238	306	374	442	510
			NC	-	-	-	11	16	23	28	33	37
8x8	**0.44**	**0.37**	Airflow, cfm	111	148	185	222	259	333	407	481	555
			NC	-	-	-	12	16	23	29	34	38
12x6	**0.5**	**0.41**	Airflow, cfm	123	164	205	246	287	369	451	533	615
			NC	-	-	-	12	16	24	29	34	38
14x6	**0.58**	**0.48**	Airflow, cfm	144	192	240	288	336	432	528	624	720
			NC	-	-	-	13	17	24	30	35	39
16x6 **12x8**	**0.67**	**0.57**	Airflow, cfm	171	228	285	342	399	513	627	741	855
			NC	-	-	-	13	18	25	31	36	40
10x10	**0.69**	**0.59**	Airflow, cfm	177	236	295	354	413	531	649	767	885
			NC	-	-	-	14	18	25	31	36	40
18x6	**0.75**	**0.63**	Airflow, cfm	189	252	315	378	441	567	693	819	945
			NC	-	-	-	14	18	25	31	36	40
20x6 **12x10**	**0.83**	**0.72**	Airflow, cfm	216	288	360	432	504	648	792	936	1080
			NC	-	-	-	14	19	26	32	37	41
22x6	**0.92**	**0.77**	Airflow, cfm	231	308	385	462	539	693	847	1001	1155
			NC	-	-	-	15	19	26	32	37	41
24x6 **12x12**	**1**	**0.88**	Airflow, cfm	264	352	440	528	616	792	968	1144	1320
			NC	-	-	-	15	20	27	33	37	42
30x6 **18x10**	**1.25**	**1.11**	Airflow, cfm	333	444	555	666	777	999	1221	1443	1665
			NC	-	-	11	16	21	28	34	38	43
14x14	**1.36**	**1.22**	Airflow, cfm	366	488	610	732	854	1098	1342	1586	1830
			NC	-	-	11	17	21	28	34	39	43
36x6 **18x12**	**1.5**	**1.35**	Airflow, cfm	405	540	675	810	945	1215	1485	1755	2025
			NC	-	-	12	17	22	29	35	39	43
22x10	**1.53**	**1.37**	Airflow, cfm	411	548	685	822	959	1233	1507	1781	2055
			NC	-	-	12	17	22	29	35	39	43
30x8 **24x10**	**1.67**	**1.49**	Airflow, cfm	447	596	745	894	1043	1341	1639	1937	2235
			NC	-	-	12	18	22	29	35	40	44
42x6 **18x14**	**1.75**	**1.59**	Airflow, cfm	477	636	795	954	1113	1431	1749	2067	2385
			NC	-	-	13	18	22	29	35	40	44
16x16	**1.78**	**1.62**	Airflow, cfm	486	648	810	972	1134	1458	1782	2106	2430
			NC	-	-	13	18	22	30	35	40	44
24x12 18x16	**2**	**1.82**	Airflow, cfm	546	728	910	1092	1274	1638	2002	2366	2730
			NC	-	-	13	18	23	30	36	41	45
18x18	**2.25**	**2.07**	Airflow, cfm	621	828	1035	1242	1449	1863	2277	2691	3105
			NC	-	-	14	19	23	31	36	41	45
24x14	**2.33**	**2.14**	Airflow, cfm	642	856	1070	1284	1498	1926	2354	2782	3210
			NC	-	-	14	19	24	31	37	41	45
30x12	**2.5**	**2.29**	Airflow, cfm	687	916	1145	1374	1603	2061	2519	2977	3435
			NC	-	-	14	19	24	31	37	42	46
24x16	**2.67**	**2.46**	Airflow, cfm	738	984	1230	1476	1722	2214	2706	3198	3690
			NC	-	-	15	20	24	31	37	42	46
20x20	**2.78**	**2.57**	Airflow, cfm	771	1028	1285	1542	1799	2313	2827	3341	3855
			NC	-	-	15	20	24	32	37	42	46
36x12	**3**	**2.75**	Airflow, cfm	825	1100	1375	1650	1925	2475	3025	3575	4125
			NC	-	-	15	20	25	32	38	42	47
30x16 **24x20**	**3.33**	**3.11**	Airflow, cfm	933	1244	1555	1866	2177	2799	3421	4043	4665
			NC	-	-	16	21	25	32	38	43	47
22x22	**3.36**	**3.14**	Airflow, cfm	942	1256	1570	1884	2198	2826	3454	4082	4710
			NC	-	-	16	21	25	32	38	43	47
42x12 36x14	**3.5**	**3.22**	Airflow, cfm	966	1288	1610	1932	2254	2898	3542	4186	4830
			NC	-	-	16	21	25	33	38	43	47
24x22	**3.67**	**3.43**	Airflow, cfm	1029	1372	1715	2058	2401	3087	3773	4459	5145
			NC	-	-	16	21	26	33	39	43	47
30x18	**3.75**	**3.5**	Airflow, cfm	1050	1400	1750	2100	2450	3150	3850	4550	5250
			NC	-	-	16	21	26	33	39	43	48

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

94A Series: 94A, 94AHOV, 94AT, 94HOV Return Air Grilles & Registers
96AFB Steel Fixed-Bar Filter Grille
Performance based on nominal sizes shown in bold

						NC-10		NC-20	NC-30		NC-40		
Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity Velocity Pressure Neg. Static Pressure	300 0.006 0.012	400 0.010 0.022	500 0.016 0.034	600 0.022 0.049	700 0.031 0.067	900 0.050 0.111	1100 0.075 0.165	1300 0.105 0.231	1500 0.140 0.307
48x12			Airflow, cfm	1125	1500	1875	2250	2625	3375	4125	4875	5625
24x24	**4**	**3.75**	NC	-	-	16	22	26	33	39	44	48
			Airflow, cfm	1266	1688	2110	2532	2954	3798	4642	5486	6330
36x18	**4.5**	**4.22**	NC	-	-	17	22	27	34	39	44	48
36x20			Airflow, cfm	1413	1884	2355	2826	3297	4239	5181	6123	7065
30x24	**5**	**4.71**	NC	-	11	17	23	27	34	40	45	49
			Airflow, cfm	1482	1976	2470	2964	3458	4446	5434	6422	7410
42x18	**5.25**	**4.94**	NC	-	11	18	23	27	34	40	45	49
			Airflow, cfm	1548	2064	2580	3096	3612	4644	5676	6708	7740
28x28	**5.44**	**5.16**	NC	-	11	18	23	27	35	40	45	49
42x20			Airflow, cfm	1653	2204	2755	3306	3857	4959	6061	7163	8265
30x28	**5.83**	**5.51**	NC	-	12	18	23	28	35	41	45	50
48x18			Airflow, cfm	1698	2264	2830	3396	3962	5094	6226	7358	8490
36x24	**6**	**5.66**	NC	-	12	18	23	28	35	41	46	50
			Airflow, cfm	1782	2376	2970	3564	4158	5346	6534	7722	8910
30x30	**6.25**	**5.94**	NC	-	12	18	24	28	35	41	46	50
42x24			Airflow, cfm	1998	2664	3330	3996	4662	5994	7326	8658	9990
36x28	**7**	**6.66**	NC	-	12	19	24	28	36	41	46	50
			Airflow, cfm	2004	2672	3340	4008	4676	6012	7348	8684	10020
46x22	**7.03**	**6.68**	NC	-	12	19	24	29	36	41	46	50
			Airflow, cfm	2034	2712	3390	4068	4746	6102	7458	8814	10170
32x32	**7.11**	**6.78**	NC	-	13	19	24	29	36	42	46	50
			Airflow, cfm	2148	2864	3580	4296	5012	6444	7876	9308	10740
36x30	**7.5**	**7.16**	NC	-	13	19	24	29	36	42	47	51
48x24			Airflow, cfm	2289	3052	3815	4578	5341	6867	8393	9919	11445
36x32	**8**	**7.63**	NC	-	13	19	25	29	36	42	47	51
			Airflow, cfm	2304	3072	3840	4608	5376	6912	8448	9984	11520
34x34	**8.03**	**7.68**	NC	-	13	19	25	29	36	42	47	51
			Airflow, cfm	2442	3256	4070	4884	5698	7326	8954	10582	12210
36x34	**8.5**	**8.14**	NC	-	13	20	25	29	37	42	47	51
			Airflow, cfm	2514	3352	4190	5028	5866	7542	9218	10894	12570
42x30	**8.75**	**8.38**	NC	-	13	20	25	29	37	42	47	51
			Airflow, cfm	2589	3452	4315	5178	6041	7767	9493	11219	12945
36x36	**9**	**8.63**	NC	-	14	20	25	30	37	43	47	51
42x34			Airflow, cfm	2880	3840	4800	5760	6720	8640	10560	12480	14400
48x30	**10**	**9.6**	NC	-	14	20	26	30	37	43	48	52
			Airflow, cfm	2892	3856	4820	5784	6748	8676	10604	12532	14460
38x38	**10.03**	**9.64**	NC	-	14	20	26	30	37	43	48	52
			Airflow, cfm	3030	4040	5050	6060	7070	9090	11110	13130	15150
42x36	**10.5**	**10.1**	NC	-	14	21	26	30	38	43	48	52
			Airflow, cfm	3135	4180	5225	6270	7315	9405	11495	13585	15675
46x34	**10.86**	**10.45**	NC	-	14	21	26	30	38	43	48	52
			Airflow, cfm	3201	4268	5335	6402	7469	9603	11737	13871	16005
42x38	**11.08**	**10.67**	NC	-	14	21	26	31	38	44	48	52
			Airflow, cfm	3210	4280	5350	6420	7490	9630	11770	13910	16050
40x40	**11.11**	**10.7**	NC	-	15	21	26	31	38	44	48	52
			Airflow, cfm	3471	4628	5785	6942	8099	10413	12727	15041	17355
48x36	**12**	**11.57**	NC	-	15	21	26	31	38	44	49	53
			Airflow, cfm	3546	4728	5910	7092	8274	10638	13002	15366	17730
42x42	**12.25**	**11.82**	NC	-	15	21	27	31	38	44	49	53
			Airflow, cfm	3897	5196	6495	7794	9093	11691	14289	16887	19485
44x44	**13.44**	**12.99**	NC	-	15	22	27	31	39	44	49	53
			Airflow, cfm	4062	5416	6770	8124	9478	12186	14894	17602	20310
48x42	**14**	**13.54**	NC	-	16	22	27	32	39	45	49	53
			Airflow, cfm	4266	5688	7110	8532	9954	12798	15642	18486	21330
46x46	**14.69**	**14.22**	NC	-	16	22	27	32	39	45	50	54
			Airflow, cfm	4455	5940	7425	8910	10395	13365	16335	19305	22275
48x46	**15.33**	**14.85**	NC	-	16	22	28	32	39	45	50	54
			Airflow, cfm	4650	6200	7750	9300	10850	13950	17050	20150	23250
48x48	**16**	**15.5**	NC	-	16	23	28	32	39	45	50	54

NC-50

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

Recommended Noise Criteria and Face Velocity Ranges are on page 6

HART COOLEY
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PFG Perforated Face Grille

PFG Perforated Face Grille
Return Air Grille Balancing Data
To Determine CFM:
1. Use an ALNOR Velometer with No. 2220 or 2220A Tip or a 4" rotating vane anemometer. If a 4" rotating vane anemometer is used, place dial face against perforated plate, and sample in a random manner for at least 1 minute.
2. Select proper Ak from Table by unit size and instrument used for measuring velocity.
3. Determine CFM by the following equation: CFM = Ak x Average Velocity.
Sample Problem
Determine Return Airflow Rate (CFM) through a 10 x 10, using an ALNOR Velometer with Tip No. 2220 or 2220A.
Solution
1. Assume the average of 6 velocity readings taken with an ALNOR Velometer is 2000 FPM.
2. From Table, the Area Factor for a 10 x 10 using an ALNOR Velometer is Ak = .39 sq. ft.
3. CFM = Ak x Average Velocity = .39 sq. ft. x 2000 FPM = 780 CFM

Neck Velocity			200	300	400	500	600	650	700	750	800	900
S.P. Drop w/OBD			.012	.027	.049	.078	.110	.130	.150	.170	.190	.240
Size	**Ak ALNOR**	**Ak 4" ROT. Vane**	**Air Capacities - CFM**									
10 x 10	.39	.55	140	210	285	350	415	450	485	520	555	625
12 x12	.46	.79	200	300	400	500	600	650	700	750	800	900
14 x 14	.62	1.07	270	410	545	680	815	885	955	1020	1090	1225
10 x 22	.71	1.21	305	460	610	765	915	995	1070	1150	1220	1375
16 x 16	.82	1.40	355	530	710	890	1065	1155	1245	1335	1425	1600
18 x 18	1.05	1.77	450	675	900	1125	1350	1460	1575	1690	1800	2030
20 x 20	1.28	2.25	555	835	1110	1390	1665	1805	1945	2080	2220	2500
22 x 22	1.55	2.70	670	1010	1345	1680	2020	2180	2350	2520	2690	3020

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

H and V Series

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 1.060	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 1.340	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 1.350	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 1.610	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 1.640	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 1.690	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 2.040	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 2.050	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	4451	4940
Ak 2.470	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 9

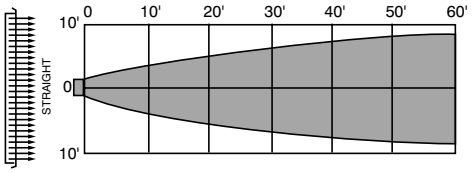
Terminal Velocity of 75 FPM

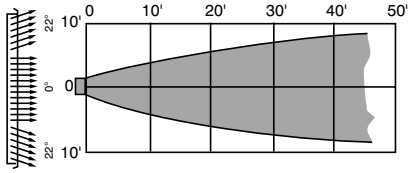
Deflection C

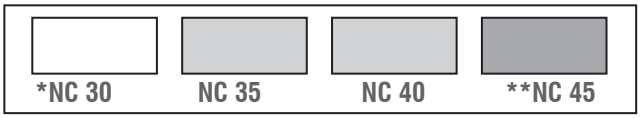
Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	55	70	85	100	115	125	140	155	170	185	195	225	255	280
Ak .141	Throw	5.0	6.5	7.5	9.0	10.0	11.0	13.0	14.0	15.0	17.0	18.0	20.0	23.0	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	33.0	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	13.0	15.0	18.0	20.0	22.0	24.0	26.0	28.0	31.0	35.0	39.0	44.0
20 x 5	CFM	190	235	285	330	380	425	475	520	570	615	665	760	855	950
Ak .474	Throw	9.5	12.0	14.0	16.0	19.0	21.0	23.0	26.0	28.0	30.0	33.0	38.0	42.0	47.0
24 x 5	CFM	230	285	345	400	460	515	570	630	685	745	800	915	1030	1145
Ak .572	Throw	10.0	13.0	15.0	18.0	21.0	23.0	26.0	28.0	33.0	33.0	36.0	41.0	46.0	51.0
20 x 6	CFM	230	290	350	405	465	525	580	640	695	755	815	930	1045	1160
Ak .581	Throw	10.0	13.0	16.0	18.0	21.0	23.0	26.0	29.0	31.0	34.0	36.0	41.0	47.0	52.0
24 x 6	CFM	280	350	420	490	560	630	700	770	840	910	980	1120	1260	1400
Ak .701	Throw	11.0	14.0	17.0	20.0	23.0	26.0	28.0	31.0	34.0	37.0	40.0	45.0	51.0	57.0
20 x 8	CFM	320	400	475	555	635	715	795	875	955	1035	1115	1270	1430	1590
Ak .795	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	61.0
30 x 6	CFM	350	440	530	615	705	790	880	970	1055	1145	1230	1410	1585	1760
Ak .880	Throw	13.0	16.0	19.0	22.0	26.0	29.0	32.0	35.0	38.0	41.0	46.0	51.0	57.0	64.0
24 x 8	CFM	385	480	575	670	765	865	960	1055	1150	1245	1345	1535	1725	1920
Ak .959	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
30 x 8	CFM	480	600	720	840	960	1080	1200	1320	1440	1560	1680	1920	2160	2400
Ak 1.200	Throw	15.0	19.0	22.0	26.0	30.0	33.0	37.0	41.0	45.0	48.0	52.0	60.0	67.0	74.0
24 x 10	CFM	490	610	730	855	975	1100	1220	1340	1465	1585	1710	1950	2200	2440
Ak 1.220	Throw	15.0	19.0	22.0	26.0	30.0	34.0	38.0	41.0	45.0	49.0	53.0	60.0	68.0	75.0
36 x 8	CFM	580	725	870	1015	1160	1305	1450	1595	1740	1885	2030	2320	2610	2900
Ak 1.450	Throw	16.0	20.0	25.0	29.0	33.0	37.0	41.0	45.0	49.0	53.0	57.0	65.0	74.0	82.0
24 x 12	CFM	590	735	880	1030	1175	1325	1470	1615	1765	1910	2060	2350	2645	2940
Ak 1.470	Throw	17.0	21.0	25.0	29.0	33.0	37.0	41.0	45.0	49.0	53.0	58.0	66.0	74.0	82.0
30 x 10	CFM	610	765	920	1070	1225	1375	1530	1685	1835	1990	2140	2450	2755	3060
Ak 1.530	Throw	17.0	21.0	25.0	29.0	34.0	38.0	42.0	46.0	50.0	55.0	59.0	67.0	76.0	84.0
36 x 10	CFM	735	920	1105	1290	1470	1655	1840	2025	2210	2390	2575	2945	3310	3680
Ak 1.840	Throw	18.0	23.0	28.0	32.0	37.0	42.0	46.0	51.0	55.0	60.0	65.0	74.0	83.0	92.0
30 x 12	CFM	740	925	1110	1295	1400	1665	1850	2035	2220	2405	2590	2960	3330	3700
Ak 1.850	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	83.0	93.0
36 x 12	CFM	890	115	1340	1560	1785	2000	2230	2455	2675	2900	3120	3570	4015	4460
Ak 2.230	Throw	20.0	25.0	31.0	36.0	41.0	46.0	51.0	56.0	61.0	66.0	71.0	81.0	92.0	102.0

For sizes not listed and sizing tips see page 9

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

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H and V Series

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 1.090	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 1.110	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 1.320	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 1.340	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 1.390	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 1.670	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 1.680	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 2.030	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 9

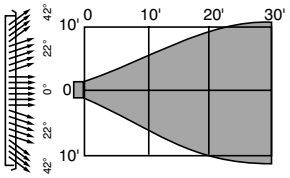
Terminal Velocity of 75 FPM

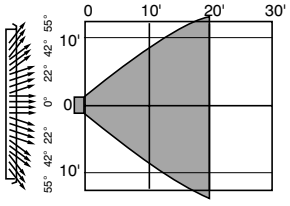
Deflection G

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	670	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	8.5	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	14.0	15.0	16.0	18.0	20.0	23.0
20 x 5	CFM	160	200	240	280	320	355	395	435	475	515	555	635	715	795
Ak .397	Throw	5.0	6.0	7.5	8.5	10.0	11.0	12.0	13.0	15.0	16.0	17.0	19.0	22.0	24.0
24 x 5	CFM	190	240	285	335	380	430	480	525	575	620	670	765	860	955
Ak .478	Throw	5.5	6.5	8.0	9.5	11.0	12.0	13.0	15.0	16.0	17.0	19.0	21.0	24.0	27.0
20 x 6	CFM	195	245	290	340	390	435	485	535	585	630	680	780	875	970
Ak .486	Throw	5.5	7.0	8.0	9.5	11.0	12.0	13.0	15.0	16.0	17.0	19.0	22.0	24.0	27.0
24 x 6	CFM	235	295	350	410	470	525	585	645	705	760	820	940	1055	1170
Ak .586	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	29.0
20 x 8	CFM	265	335	400	465	530	600	665	730	800	865	930	1065	1195	1330
Ak .665	Throw	6.5	8.0	9.5	11.0	13.0	14.0	16.0	17.0	19.0	21.0	22.0	25.0	28.0	32.0
30 x 6	CFM	295	370	440	515	590	660	735	810	885	955	1030	1180	1325	1470
Ak .736	Throw	6.5	8.5	10.0	12.0	13.0	15.0	17.0	18.0	20.0	21.0	23.0	27.0	30.0	33.0
24 x 8	CFM	320	400	480	560	640	720	800	880	960	1045	1125	1285	1445	1605
Ak .802	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	35.0
30 x 8	CFM	405	505	605	705	810	910	1010	1110	1210	1315	1415	1615	1820	2020
Ak 1.010	Throw	8.0	9.5	12.0	14.0	16.0	17.0	19.0	21.0	23.0	25.0	27.0	31.0	35.0	39.0
24 x 10	CFM	410	510	610	715	815	920	1020	1120	1225	1325	1430	1630	1835	2040
Ak 1.020	Throw	8.0	9.5	12.0	14.0	16.0	18.0	19.0	21.0	23.0	25.0	27.0	31.0	35.0	40.0
36 x 8	CFM	485	605	725	845	970	1090	1210	1330	1450	1575	1695	1935	2180	2420
Ak 1.210	Throw	8.5	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	28.0	30.0	34.0	38.0	42.0
24 x 12	CFM	490	615	740	860	985	1105	1230	1355	1475	1600	1720	1970	2215	2460
Ak 1.230	Throw	8.5	11.0	13.0	15.0	17.0	19.0	21.0	24.0	26.0	28.0	30.0	34.0	39.0	43.0
30 x 10	CFM	510	640	770	900	1025	1150	1280	1410	1535	1665	1790	2050	2305	2560
Ak 1.280	Throw	8.5	11.0	13.0	15.0	18.0	20.0	22.0	24.0	26.0	28.0	31.0	35.0	39.0	44.0
36 x 10	CFM	615	770	925	1080	1230	1385	1540	1695	1850	2000	2155	2465	2770	3080
Ak 1.540	Throw	9.5	12.0	14.0	17.0	19.0	22.0	24.0	26.0	29.0	31.0	34.0	38.0	43.0	48.0
30 x 12	CFM	620	775	930	1085	1240	1395	1550	1705	1860	2015	2170	2480	2790	3100
Ak 1.550	Throw	9.5	12.0	14.0	17.0	19.0	22.0	24.0	26.0	29.0	31.0	34.0	38.0	43.0	48.0
36 x 12	CFM	745	930	1115	1300	1490	1675	1860	2045	2230	2420	2605	2975	3350	3720
Ak 1.860	Throw	11.0	13.0	16.0	18.0	21.0	24.0	26.0	29.0	31.0	34.0	37.0	42.0	47.0	52.0

For sizes not listed and sizing tips see page 9

Terminal Velocity of 75 FPM





* less than or equal to ** greater than or equal to

Engineering Data

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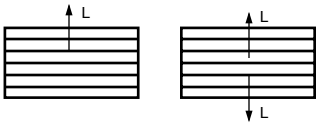
C Series Curved-Blade Diffusers



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

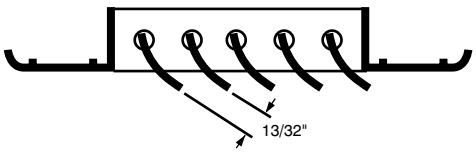
Face Velocity		400	500	600	700	800	900	1000	1100	1200
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090
6 x 6	CFM	35	45	55	65	70	80	90	100	110
Ak .090	Throw 1/2	3.5/2.5	5.0/3.5	6.0/4.0	7.0/5.0	7.5/5.5	8.5/6.0	9.5/7.0	11.0/7.5	11.5/8.5
8 x 6	CFM	40	50	60	70	80	90	100	110	120
Ak .100	Throw 1/2	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

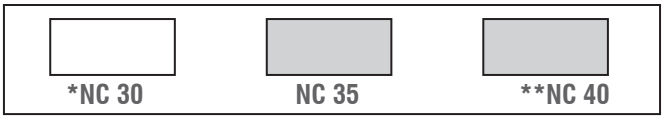
For sizes not listed and sizing tips see page 9

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.





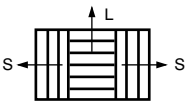
* less than or equal to

** greater than or equal to

Recommended Noise Criteria and Face Velocity Ranges are on page 6

HART COOLEY
install confidence.

C Series Curved-Blade Diffusers

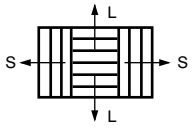


Three-Way

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 9

Terminal Velocity of 75 FPM

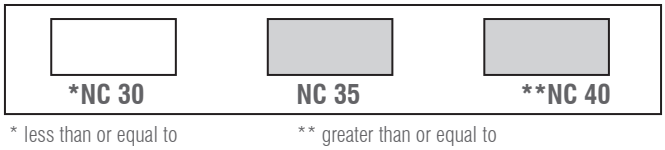


Four-Way

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 9

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

HART COOLEY
install confidence.

RH45, RH45T, RHD45, RHF45, ER45 Registers and Grilles

Face Velocity		400	500	600	700	800	900	1000
6 x 6	CFM	40	60	70	80	90	100	110
Ak .110	Ps	.037	.058	.083	.113	.148	.189	.232
8 x 8	CFM	100	120	140	170	190	220	240
Ak .240	Ps	.032	.050	.072	.098	.128	.163	.200
12 x 6	CFM	110	140	170	190	220	250	280
Ak .280	Ps	.031	.048	.069	.094	.122	.155	.191
14 x 6	CFM	30	170	200	230	270	300	330
Ak .330	Ps	.029	.045	.065	.088	.114	.145	.179
14 x 8	CFM	190	230	280	330	370	420	460
Ak .460	Ps	.025	.039	.055	.075	.097	.123	.152
12 x 12	CFM	250	310	370	430	490	550	610
Ak .610	Ps	.021	.032	.046	.062	.079	.100	.125
24 x 8	CFM	340	420	500	590	670	760	840
Ak .840	Ps	.020	.032	.046	.061	.079	.100	.124
18 x 12	CFM	380	480	570	670	760	860	950
Ak .950	Ps	.020	.032	.046	.061	.080	.101	.124
30 x 8	CFM	430	530	640	750	850	960	1100
Ak 1.070	Ps	.020	.032	.046	.061	.080	.101	.124
24 x 12	CFM	520	650	780	900	1000	1200	1300
Ak 1.290	Ps	.020	.032	.046	.062	.081	.102	.124
18 x 18	CFM	580	730	880	1000	1200	1300	1500
Ak 1.460	Ps	.020	.032	.046	.062	.081	.102	.124
30 x 12	CFM	650	820	980	1100	1300	1500	1600
Ak 1.630	Ps	.021	.032	.046	.062	.082	.103	.124
20 x 20	CFM	730	910	1100	1300	1500	1600	1800
Ak 1.820	Ps	.021	.032	.046	.063	.083	.104	.124
36 x 12	CFM	790	990	1200	1400	1600	1800	2000
Ak 1.980	Ps	.021	.032	.046	.063	.084	.105	.125
24 x 20	CFM	880	1100	1300	1500	1800	2000	2200
Ak 2.210	Ps	.021	.032	.047	.064	.085	.107	.126
30 x 18	CFM	1000	1200	1500	1700	2000	2200	2500
Ak 2.500	Ps	.021	.033	.048	.065	.087	.109	.128
24 x 24	CFM	1100	1300	1600	1900	2100	2400	2700
Ak 2.670	Ps	.022	.033	.048	.066	.088	.110	.130
36 x 18	CFM	1200	1500	1800	2100	2400	2700	3000
Ak 3.020	Ps	.023	.035	.051	.069	.092	.116	.137
30 x 24	CFM	1300	1700	2000	2400	2700	3000	3400
Ak 3.370	Ps	.024	.037	.053	.074	.096	.121	.144
36 x 24	CFM	1600	2000	2400	2900	3300	3700	4100
Ak 4.080	Ps	.027	.040	.058	.080	.105	.132	.158
30 x 30	CFM	1700	2100	2600	3000	3400	3800	4300
Ak 4.260	Ps	.027	.041	.060	.081	.107	.135	.162
36 x 30	CFM	2100	2600	3100	3600	4100	4600	5200
Ak 5.150	Ps	.030	.045	.066	.090	.117	.149	.179
48 x 24	CFM	2200	2800	3300	3900	4400	5000	5500
Ak 5.510	Ps	.031	.047	.069	.093	.122	.154	.186
36 x 36	CFM	2500	3100	3700	4400	5000	5600	6200
Ak 6.240	Ps	.034	.051	.074	.100	.130	.165	.200
48 x 36	CFM	3400	4200	5100	5900	6800	7600	8500
Ak 8.480	Ps	.025	.038	.055	.075	.098	.124	.153
48 x 48	CFM	4600	5800	6900	8100	9200	10000	12000
Ak 11.600	Ps	.022	.034	.048	.066	.086	.109	.134

For sizes not listed and sizing tips see page 9

Recommended Noise Criteria and Face Velocity Ranges are on page 6

HART COOLEY
install confidence.

RH90, RHD90 Registers and Grilles

Face Velocity		400	500	600	700	800	900	1000
6 x 6	CFM	50	63	76	88	101	113	126
Ak .130	Ps	.012	.019	.029	.038	.048	.055	.065
8 x 8	CFM	103	129	155	181	207	233	259
Ak .260	Ps	.011	.018	.028	.037	.046	.053	.063
12 x 6	CFM	119	148	178	208	237	267	297
Ak .300	Ps	.011	.018	.027	.036	.046	.053	.063
14 x 6	CFM	141	177	212	248	283	318	354
Ak .350	Ps	.011	.018	.027	.036	.045	.052	.062
14 x 8	CFM	195	244	292	341	390	438	487
Ak .490	Ps	.011	.018	.026	.035	.044	.051	.061
12 x 12	CFM	256	320	384	448	512	576	640
Ak .640	Ps	.011	.017	.025	.033	.042	.049	.059
24 x 8	CFM	348	435	523	610	697	784	871
Ak .870	Ps	.010	.017	.024	.032	.040	.047	.057
18 x 12	CFM	395	493	592	691	789	888	987
Ak .990	Ps	.010	.016	.023	.031	.039	.046	.056
30 x 8	CFM	441	552	662	772	882	993	1103
Ak 1.100	Ps	.010	.016	.023	.030	.038	.045	.055
24 x 12	CFM	535	668	802	936	1069	1203	1337
Ak 1.340	Ps	.010	.016	.021	.028	.036	.043	.053
18 x 18	CFM	605	756	907	1059	1210	1361	1512
Ak 1.510	Ps	.010	.016	.021	.027	.035	.042	.052
30 x 12	CFM	676	845	1014	1182	1351	1520	1689
Ak 1.690	Ps	.010	.016	.020	.026	.034	.041	.051
20 x 20	CFM	755	943	1132	1321	1509	1698	1887
Ak 1.890	Ps	.010	.016	.019	.026	.033	.040	.050
36 x 12	CFM	818	1023	1227	1432	1636	1841	2045
Ak 2.050	Ps	.010	.015	.019	.025	.032	.039	.049
24 x 20	CFM	914	1142	1370	1599	1827	2055	2284
Ak 2.280	Ps	.010	.015	.018	.024	.031	.038	.048
30 x 18	CFM	1034	1292	1551	1809	2068	2326	2584
Ak 2.580	Ps	.010	.015	.017	.023	.030	.037	.047
24 x 24	CFM	1106	1383	1659	1936	2213	2489	2766
Ak 2.770	Ps	.009	.015	.017	.023	.030	.037	.047
36 x 18	CFM	1252	1565	1878	2191	2505	2818	3131
Ak 3.130	Ps	.009	.015	.016	.022	.029	.036	.046
30 x 24	CFM	1399	1749	2099	2449	2799	3149	3499
Ak 3.500	Ps	.009	.015	.016	.022	.029	.036	.046
36 x 24	CFM	1697	2122	2546	2971	3395	3819	4244
Ak 4.240	Ps	.009	.014	.016	.023	.031	.038	.048
30 x 30	CFM	1773	2216	2659	3102	3546	3989	4432
Ak 4.430	Ps	.009	.014	.016	.023	.031	.038	.048
36 x 30	CFM	2154	2692	3231	3769	4307	4846	5384
Ak 5.380	Ps	.009	.014	.018	.026	.036	.043	.053
48 x 24	CFM	2308	2885	3462	4039	4616	5193	5771
Ak 5.770	Ps	.009	.014	.020	.028	.039	.046	.056
36 x 36	CFM	2621	3276	3931	4587	5242	5897	6552
Ak 6.550	Ps	.009	.014	.023	.033	.045	.052	.062
48 x 36	CFM	3588	4485	5382	6279	7176	8073	8971
Ak 8.970	Ps	.009	.014	.023	.033	.045	.052	.062
48 x 48	CFM	4946	6183	7419	8656	9893	11129	12366
Ak 12.400	Ps	.008	.013	.023	.033	.045	.052	.062

For sizes not listed and sizing tips see page 9

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

RE5, RED5, REF5 Series Return Air Registers and Grilles
Performance based on nominal sizes shown in bold

									NC 20	NC 30		NC 40	
Nominal Duct Size (in.)	**Nominal Duct Area sq. ft**	**Core Area sq. ft**	**Core Velocity Velocity Pressure 1x1x1 Neg. Ps ½x½x½ Neg. Ps**	**300 0.006 0.013 0.013**	**400 0.01 0.024 0.024**	**500 0.016 0.037 0.037**	**600 0.022 0.054 0.053**	**700 0.031 0.073 0.073**	**800 0.04 0.096 0.095**	**1000 0.062 0.15 0.148**	**1200 0.09 0.216 0.213**	**1400 0.122 0.294 0.29**
6x6	0.25	0.19	Airflow, cfm	57	76	95	114	133	152	190	228	266
			NC	-	-	-	10	17	22	31	39	45
8x6	0.33	0.26	Airflow, cfm	78	104	130	156	182	208	260	312	364
			NC	-	-	-	10	17	22	31	39	45
10x6	0.42	0.34	Airflow, cfm	102	136	170	204	238	272	340	408	476
			NC	-	-	-	11	17	23	32	39	46
8x8	0.44	0.37	Airflow, cfm	111	148	185	222	259	296	370	444	518
			NC	-	-	-	11	17	23	32	39	46
12x6	0.50	0.41	Airflow, cfm	123	164	205	246	287	328	410	492	574
			NC	-	-	-	11	18	23	32	40	46
14x6	0.58	0.48	Airflow, cfm	144	192	240	288	336	384	480	576	672
			NC	-	-	-	11	18	23	32	40	46
16x6 **12x8**	0.67	0.57	Airflow, cfm	171	228	285	342	399	456	570	684	798
			NC	-	-	-	12	18	23	32	40	46
10x10	0.69	0.59	Airflow, cfm	177	236	295	354	413	472	590	708	826
			NC	-	-	-	12	18	23	33	40	46
18x6	0.75	0.63	Airflow, cfm	189	252	315	378	441	504	630	756	882
			NC	-	-	-	12	18	24	33	40	46
20x6 **12x10**	0.83	0.72	Airflow, cfm	216	288	360	432	504	576	720	864	1008
			NC	-	-	-	12	18	24	33	40	46
22x6	0.92	0.77	Airflow, cfm	231	308	385	462	539	616	770	924	1078
			NC	-	-	-	12	18	24	33	40	47
24x6 **12x12**	1.00	0.88	Airflow, cfm	264	352	440	528	616	704	880	1056	1232
			NC	-	-	-	12	18	24	33	40	47
30x6 **18x10**	1.25	1.11	Airflow, cfm	333	444	555	666	777	888	1110	1332	1554
			NC	-	-	-	13	19	24	34	41	47
14x14	1.36	1.22	Airflow, cfm	366	488	610	732	854	976	1220	1464	1708
			NC	-	-	-	13	19	24	34	41	47
36x6 **18x12**	1.50	1.35	Airflow, cfm	405	540	675	810	945	1080	1350	1620	1890
			NC	-	-	-	13	19	24	34	41	47
22x10	1.53	1.37	Airflow, cfm	411	548	685	822	959	1096	1370	1644	1918
			NC	-	-	-	13	19	25	34	41	47
30x8 **24x10**	1.67	1.49	Airflow, cfm	447	596	745	894	1043	1192	1490	1788	2086
			NC	-	-	-	13	19	25	34	41	47
42x6 **18x14**	1.75	1.59	Airflow, cfm	477	636	795	954	1113	1272	1590	1908	2226
			NC	-	-	-	13	19	25	34	41	47
16x16	1.78	1.62	Airflow, cfm	486	648	810	972	1134	1296	1620	1944	2268
			NC	-	-	-	13	19	25	34	41	48
24x12 18x16	2.00	1.82	Airflow, cfm	546	728	910	1092	1274	1456	1820	2184	2548
			NC	-	-	-	13	19	25	34	41	48
18x18	2.25	2.07	Airflow, cfm	621	828	1035	1242	1449	1656	2070	2484	2898
			NC	-	-	-	13	19	25	34	41	48
24x14	2.33	2.14	Airflow, cfm	642	856	1070	1284	1498	1712	2140	2568	2996
			NC	-	-	-	13	20	25	34	42	48
30x12	2.50	2.29	Airflow, cfm	687	916	1145	1374	1603	1832	2290	2748	3206
			NC	-	-	-	13	20	25	34	42	48
24x16	2.67	2.46	Airflow, cfm	738	984	1230	1476	1722	1968	2460	2952	3444
			NC	-	-	-	13	20	25	34	42	48
20x20	2.78	2.57	Airflow, cfm	771	1028	1285	1542	1799	2056	2570	3084	3598
			NC	-	-	-	13	20	25	34	42	48
36x12	3.00	2.75	Airflow, cfm	825	1100	1375	1650	1925	2200	2750	3300	3850
			NC	-	-	-	14	20	25	34	42	48
30x16 **24x20**	3.33	3.11	Airflow, cfm	933	1244	1555	1866	2177	2488	3110	3732	4354
			NC	-	-	-	14	20	25	35	42	48
22x22	3.36	3.14	Airflow, cfm	942	1256	1570	1884	2198	2512	3140	3768	4396
			NC	-	-	-	14	20	25	35	42	48
42x12 36x14	3.50	3.22	Airflow, cfm	966	1288	1610	1932	2254	2576	3220	3864	4508
			NC	-	-	-	14	20	26	35	42	48
24x22	3.67	3.43	Airflow, cfm	1029	1372	1715	2058	2401	2744	3430	4116	4802
			NC	-	-	-	14	20	26	35	42	48
30x18	3.75	3.50	Airflow, cfm	1050	1400	1750	2100	2450	2800	3500	4200	4900
			NC	-	-	-	14	20	26	35	42	48

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

Recommended Noise Criteria and Face Velocity Ranges are on page 6

HART COOLEY
install confidence.

RE5, RED5, REF5 Series Return Air Registers and Grilles
Performance based on nominal sizes shown in bold

									NC 20	NC 30	NC 40		
Nominal Duct Size (in.)	**Nominal Duct Area sq. ft**	**Core Area sq. ft**	**Core Velocity Velocity Pressure 1x1x1 Neg. Ps ½x½x½ Neg. Ps**	**300 0.006 0.013 0.013**	**400 0.01 0.024 0.024**	**500 0.016 0.037 0.037**	**600 0.022 0.054 0.053**	**700 0.031 0.073 0.073**	**800 0.04 0.096 0.095**	**1000 0.062 0.15 0.148**	**1200 0.09 0.216 0.213**	**1400 0.122 0.294 0.29**
48x12			Airflow, cfm	1125	1500	1875	2250	2625	3000	3750	4500	5250
24x24	4.00	3.75	NC	-	-	-	14	20	26	35	42	49
			Airflow, cfm	1266	1688	2110	2532	2954	3376	4220	5064	5908
36x18	4.50	4.22	NC	-	-	-	14	20	26	35	42	49
36x20			Airflow, cfm	1413	1884	2355	2826	3297	3768	4710	5652	6594
30x24	5.00	4.71	NC	-	-	-	14	21	26	35	43	49
			Airflow, cfm	1482	1976	2470	2964	3458	3952	4940	5928	6916
42x18	5.25	4.94	NC	-	-	-	14	21	26	35	43	49
			Airflow, cfm	1548	2064	2580	3096	3612	4128	5160	6192	7224
28x28	5.44	5.16	NC	-	-	-	14	21	26	35	43	49
42x20			Airflow, cfm	1653	2204	2755	3306	3857	4408	5510	6612	7714
30x28	5.83	5.51	NC	-	-	-	14	21	26	35	43	49
48x18			Airflow, cfm	1698	2264	2830	3396	3962	4528	5660	6792	7924
36x24	6.00	5.66	NC	-	-	-	14	21	26	35	43	49
			Airflow, cfm	1782	2376	2970	3564	4158	4752	5940	7128	8316
30x30	6.25	5.94	NC	-	-	-	15	21	26	35	43	49
42x24			Airflow, cfm	1998	2664	3330	3996	4662	5328	6660	7992	9324
36x28	7.00	6.66	NC	-	-	-	15	21	26	36	43	49
			Airflow, cfm	2004	2672	3340	4008	4676	5344	6680	8016	9352
46x22	7.03	6.68	NC	-	-	-	15	21	26	36	43	49
			Airflow, cfm	2034	2712	3390	4068	4746	5424	6780	8136	9492
32x32	7.11	6.78	NC	-	-	-	15	21	27	36	43	49
			Airflow, cfm	2148	2864	3580	4296	5012	5728	7160	8592	10024
36x30	7.50	7.16	NC	-	-	-	15	21	27	36	43	49
48x24			Airflow, cfm	2289	3052	3815	4578	5341	6104	7630	9156	10682
36x32	8.00	7.63	NC	-	-	-	15	21	27	36	43	49
			Airflow, cfm	2304	3072	3840	4608	5376	6144	7680	9216	10752
34x34	8.03	7.68	NC	-	-	-	15	21	27	36	43	49
			Airflow, cfm	2442	3256	4070	4884	5698	6512	8140	9768	11396
36x34	8.50	8.14	NC	-	-	-	15	21	27	36	43	50
			Airflow, cfm	2514	3352	4190	5028	5866	6704	8380	10056	11732
42x30	8.75	8.38	NC	-	-	-	15	21	27	36	43	50
			Airflow, cfm	2589	3452	4315	5178	6041	6904	8630	10356	12082
36x36	9.00	8.63	NC	-	-	-	15	21	27	36	43	50
42x34			Airflow, cfm	2880	3840	4800	5760	6720	7680	9600	11520	13440
48x30	10.00	9.60	NC	-	-	-	15	21	27	36	43	50
			Airflow, cfm	2892	3856	4820	5784	6748	7712	9640	11568	13496
38x38	10.03	9.64	NC	-	-	-	15	21	27	36	43	50
			Airflow, cfm	3030	4040	5050	6060	7070	8080	10100	12120	14140
42x36	10.50	10.10	NC	-	-	-	15	22	27	36	44	50
			Airflow, cfm	3135	4180	5225	6270	7315	8360	10450	12540	14630
46x34	10.86	10.45	NC	-	-	-	15	22	27	36	44	50
			Airflow, cfm	3201	4268	5335	6402	7469	8536	10670	12804	14938
42x38	11.08	10.67	NC	-	-	-	15	22	27	36	44	50
			Airflow, cfm	3210	4280	5350	6420	7490	8560	10700	12840	14980
40x40	11.11	10.70	NC	-	-	-	15	22	27	36	44	50
			Airflow, cfm	3471	4628	5785	6942	8099	9256	11570	13884	16198
48x36	12.00	11.57	NC	-	-	-	15	22	27	36	44	50
			Airflow, cfm	3546	4728	5910	7092	8274	9456	11820	14184	16548
42x42	12.25	11.82	NC	-	-	-	15	22	27	36	44	50
			Airflow, cfm	3897	5196	6495	7794	9093	10392	12990	15588	18186
44x44	13.44	12.99	NC	-	-	-	16	22	27	36	44	50
			Airflow, cfm	4062	5416	6770	8124	9478	10832	13540	16248	18956
48x42	14.00	13.54	NC	-	-	-	16	22	27	37	44	50
			Airflow, cfm	4266	5688	7110	8532	9954	11376	14220	17064	19908
46x46	14.69	14.22	NC	-	-	-	16	22	27	37	44	50
			Airflow, cfm	4455	5940	7425	8910	10395	11880	14850	17820	20790
48x46	15.33	14.85	NC	-	-	-	16	22	27	37	44	50
			Airflow, cfm	4650	6200	7750	9300	10850	12400	15500	18600	21700
48x48	16.00	15.50	NC	-	-	-	16	22	28	37	44	50

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

TG, TGF Transfer Grilles

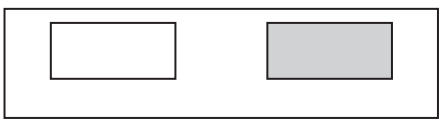
Face Velocity*		500	600	700	800	900	1000	1200	1400	1600	1800	2000	2200	2400	2600
10X6	CFM	145	174	203	232	261	290	348	406	464	522	580	638	696	754
Ak 0.29	Ps	0.2	0.3	0.4	0.5	0.7	0.8	1.1	1.3	1.6	1.8	2.1	2.3	2.6	2.9
8X8	CFM	150	180	210	240	270	300	360	420	480	540	600	660	720	780
Ak 0.3	Ps	0.1	0.3	0.4	0.5	0.6	0.8	1	1.3	1.5	1.7	2	2.2	2.5	2.7
12X6	CFM	170	204	238	272	306	340	408	476	544	612	680	748	816	884
Ak 0.34	Ps	0	0.1	0.2	0.3	0.4	0.6	0.8	1	1.2	1.4	1.6	1.9	2.1	2.3
14X6	CFM	200	240	280	320	360	400	480	560	640	720	800	880	960	1040
Ak 0.4	Ps	0	0.1	0.2	0.3	0.4	0.5	0.7	0.8	1	1.2	1.4	1.6	1.8	1.9
14X8	CFM	265	318	371	424	477	530	636	742	848	954	1060	1166	1272	1378
Ak 0.53	Ps	-0.1	0	0.1	0.2	0.2	0.3	0.5	0.6	0.8	1	1.1	1.3	1.5	1.6
20X6	CFM	285	342	399	456	513	570	684	798	912	1026	1140	1254	1368	1482
Ak 0.57	Ps	-0.1	0	0.1	0.1	0.2	0.3	0.4	0.5	0.7	0.8	0.9	1.1	1.2	1.3
12X12	CFM	345	414	483	552	621	690	828	966	1104	1242	1380	1518	1656	1794
Ak 0.69	Ps	-0.1	-0.1	0	0.1	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1	1.2
30X6	CFM	430	516	602	688	774	860	1032	1204	1376	1548	1720	1892	2064	2236
Ak 0.86	Ps	-0.1	0	0	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
16X12	CFM	460	552	644	736	828	920	1104	1288	1472	1656	1840	2024	2208	2392
Ak 0.92	Ps	-0.1	-0.1	0	0	0	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7
18X12	CFM	515	618	721	824	927	1030	1236	1442	1648	1854	2060	2266	2472	2678
Ak 1.03	Ps	-0.2	-0.1	-0.1	-0.1	0	0	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6
20X12	CFM	575	690	805	920	1035	1150	1380	1610	1840	2070	2300	2530	2760	2990
Ak 1.15	Ps	-0.2	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5

*Velocity measured 1" from face.

20 Round Diffuser

Neck Velocity		400	500	600	700	800	900	1000	1200	1400
6"	CFM	80	100	120	140	160	180	200	235	275
Ak .160	Ps	<.010	<.010	<.010	<.010	0.014	0.02	0.02	0.03	0.03
	Throw	2.00	2.00	2.0	3.0	3.0	4.0	4.0	5.0	6.0
8"	CFM	140	175	210	245	280	315	350	420	490
Ak .280	Ps	<.010	<.010	<.010	<.010	0.01	0.02	0.02	0.03	0.04
	Throw	3.5	3.0	3.0	4.0	4.0	5.0	5.0	7.0	8.0
10"	CFM	218	273	327	382	436	491	545	654	763
Ak .440	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	3.0	3.0	4.0	5.0	5.0	6.0	7.0	8.0	10.0
12"	CFM	315	390	470	550	630	705	785	940	1100
Ak .660	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	3.0	4.0	5.0	6.0	7.0	7.0	8.0	10.0	11.0
14"	CFM	425	530	635	745	850	955	1060	1270	1490
Ak .910	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	4.0	5.0	6.0	7.0	8.0	8.0	9.0	11.0	13.0
16"	CFM	560	700	840	980	1120	1260	1400	1680	1960
Ak 1.200	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	4.0	5.0	7.0	8.0	9.0	10.0	11.0	13.0	15.0
18"	CFM	710	885	1060	1240	1420	1590	1770	2120	2480
Ak 1.500	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	5.0	6.0	7.0	9.0	10.0	11.0	12.0	15.0	17.0

NOTE: The use of a balancing hood is recommended to balance the system.
Ak = Effective Area in square feet
Ps = Static Pressure Loss in inches of water
NC = Noise Criteria, based on a 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 100 fpm
Product tested with core in "out" position.
When diffusers are used on an exposed duct, multiply throw by 0.7



24 Square Ceiling Diffuser

Face Velocity		300	400	500	600	700	800	900	1000
Pressure Loss		.006	.010	.016	.022	.031	.040	.050	.062
Neck Size 6"	CFM	50	65	85	100	115	130	150	165
Ak .165	Throw	3.5	4.5	5.5	6.5	8.0	9.0	10.0	11.0
Neck Size 8"	CFM	85	110	140	170	195	225	250	280
Ak .280	Throw	4.5	5.5	7.0	8.5	10.0	11.0	12.0	14.0
Neck Size 10"	CFM	125	170	210	250	295	335	380	420
Ak .420	Throw	5.0	6.5	8.0	9.5	11.5	13.0	15.0	16.0
Neck Size 12"	CFM	180	240	300	355	415	475	535	595
Ak .595	Throw	6.0	8.0	10.0	11.5	13.5	15.5	17.5	19.0
Neck Size 14"	CFM	245	330	410	490	575	655	740	820
Ak .820	Throw	7.0	9.0	11.5	13.5	16.0	18.0	20.0	22.5
Neck Size 16"	CFM	310	410	515	620	720	825	925	1030
Ak 1.030	Throw	7.5	10.0	12.5	15.0	18.0	20.0	22.0	25.0
Neck Size 18"	CFM	400	530	665	800	930	1065	1200	1330
Ak 1.330	Throw	8.5	11.0	14.0	17.0	20.0	23.0	26.0	28.0
Neck Size 20"	CFM	480	640	800	960	1120	1280	1440	1600
Ak 1.600	Throw	9.5	12.0	16.0	18.0	22.0	25.0	28.0	31.0
Neck Size 22"	CFM	570	760	950	1140	1330	1520	1710	1900
Ak 1.900	Throw	10.5	13.5	17.0	19.0	24.0	27.0	30.0	33.0
Neck Size 24"	CFM	690	920	1150	1380	1610	1840	2070	2300
Ak 2.300	Throw	11.0	14.5	18.5	22.0	26.0	30.0	33.0	36.0

Terminal Velocity of 50 FPM

Recommended Noise Criteria and Face Velocity Ranges are on page 6

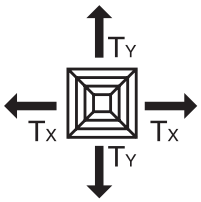
HART COOLEY
install confidence.

AR Series: ARE, ARS, ART
Square & Rectangular Ceiling Diffusers — Steel/Aluminum

Four-Way Square

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6	CFM	50	60	70	80	90	100	120	140	160	180	200
Ak .100	Throw X/Y	2-3/2-3	2-3/2-3	2-4/2-4	2-4/2-4	3-5/3-5	3-5/3-5	4-6/4-6	4-8/4-8	5-8/5-8	5-9/5-9	6-11/6-11
9 x 9	CFM	110	135	155	180	205	225	270	315	360	410	450
Ak .220	Throw X/Y	2-4/2-4	2-4/2-4	3-5/3-5	3-5/3-5	4-6/4-6	5-8/5-8	5-9/5-9	6-11/6-11	6-12/6-12	7-13/7-13	8-14/8-14
12 x 12	CFM	200	240	280	320	360	400	480	560	640	725	800
Ak .400	Throw X/Y	3-5/3-5	4-6/4-6	4-8/4-8	5-8/5-8	5-9/5-9	6-11/6-11	6-12/6-12	7-13/7-13	8-15/8-15	9-17/9-17	10-19/10-19
15 x 15	CFM	310	375	440	500	565	625	750	875	1000	1125	1250
Ak .620	Throw X/Y	4-6/4-6	4-8/4-8	5-9/5-9	6-11/6-11	6-11/6-11	6-12/6-12	8-15/8-15	10-18/10-18	10-19/10-19	12-21/12-21	13-23/13-23
18 x 18	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
Ak .900	Throw X/Y	4-8/4-8	5-9/5-9	5-11/5-11	6-12/6-12	7-13/7-13	8-15/8-15	10-17/10-17	11-20/11-20	13-23/13-23	15-27/15-27	16-30/16-30
21 x 21	CFM	615	740	860	985	1110	1230	1475	1725	1970	2220	2460
Ak 1.230	Throw X/Y	5-9/5-9	6-11/6-11	7-13/7-13	8-14/8-14	9-15/9-15	9-17/9-17	11-21/11-21	13-25/13-25	15-29/15-29	17-31/17-31	19-35/19-35
24 x 24	CFM	800	960	1120	1275	1440	1600	1925	2240	2570	2890	3200
Ak 1.600	Throw X/Y	5-11/5-11	7-13/7-13	7-14/7-14	8-15/8-15	9-17/9-17	10-19/10-19	12-23/12-23	14-29/14-29	16-31/16-31	18-35/18-35	20-39/20-39
27 x 27	CFM	1010	1215	1420	1615	1820	2020	2430	2840	3240	3650	4040
Ak 2.020	Throw X/Y	6-12/6-12	7-13/7-13	8-15/8-15	10-18/10-18	10-19/10-19	12-22/12-22	14-27/14-27	16-32/16-32	18-35/18-35	20-38/20-38	23-42/23-42
33 x 33	CFM	1370	1650	1925	2200	2470	2750	3300	3850	4400	4950	5500
Ak 2.750	Throw X/Y	7-13/7-13	9-16/9-16	10-18/10-18	21-21/12-21	14-24/14-24	16-27/16-27	18-33/18-33	19-37/19-37	23-41/23-41	27-46/27-46	31-50/31-50

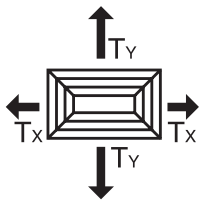
4-WAY SQUARE



Four-Way Rectangular

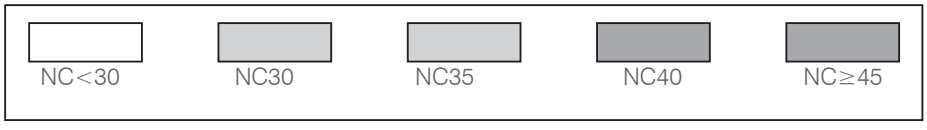
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	75	90	105	120	135	150	180	210	240	270	300
Ak .150	Throw X/Y	1-3/2-4	1-3/3-5	2-4/3-5	2-4/4-6	3-5/4-6	3-5/4-8	4-6/5-9	4-6/5-9	4-8/7-13	5-9/8-15	6-11/8-15
12 x 6	CFM	100	120	140	160	180	200	240	280	320	360	400
Ak .200	Throw X/Y	1-3/3-5	1-3/4-6	2-4/4-8	2-4/4-8	2-4/5-9	3-5/6-11	4-6/7-13	4-8/8-15	4-8/8-15	5-9/10-18	6-11/11-21
12 x 9	CFM	150	180	210	240	270	300	360	420	480	540	600
Ak .300	Throw X/Y	2-4/3-5	2-4/3-5	3-5/4-6	4-6/4-8	4-7/5-10	4-8/6-11	5-9/6-12	6-11/7-13	7-13/9-17	7-13/10-18	8-14/11-19
15 x 9	CFM	185	225	265	300	340	375	450	525	600	675	750
Ak .370	Throw X/Y	2-4/4-6	2-4/4-6	3-5/5-9	4-6/6-11	4-6/6-12	4-8/8-14	5-9/8-15	5-9/9-17	6-12/11-21	7-13/13-25	7-13/13-25
18 x 9	CFM	225	270	315	360	405	450	540	630	720	810	900
Ak .450	Throw X/Y	2-4/4-6	2-4/5-9	3-5/6-11	4-6/6-12	4-6/8-14	4-8/8-15	5-9/10-19	5-10/11-23	6-12/13-25	8-14/15-29	10-17/17-32
21 x 9	CFM	265	320	370	425	475	530	635	740	850	955	1060
Ak .530	Throw X/Y	2-4/5-9	2-4/6-11	3-5/8-14	4-6/8-15	4-8/10-18	4-8/10-19	5-9/11-21	6-17/13-25	8-13/16-31	9-15/19-35	10-17/21-38
15 x 12	CFM	250	300	350	400	450	500	600	700	800	900	1000
Ak .500	Throw X/Y	3-5/4-6	3-5/4-8	4-6/5-9	4-8/6-11	5-9/6-12	6-11/7-13	6-12/8-15	7-13/10-18	8-15/11-21	10-18/13-23	12-21/14-27
18 x 12	CFM	295	355	415	475	535	595	715	835	950	1070	1190
Ak .590	Throw X/Y	2-4/4-8	3-5/5-9	4-6/6-11	4-8/7-13	5-9/8-14	6-11/8-15	6-12/10-18	8-14/11-21	9-16/13-23	10-18/15-27	12-21/17-31
21 x 12	CFM	345	415	485	555	625	690	830	970	1100	1240	1375
Ak .690	Throw X/Y	3-5/5-9	3-5/6-11	4-6/7-13	4-8/8-14	4-8/8-15	5-9/10-18	6-11/11-21	7-13/14-26	8-15/16-29	9-17/17-31	10-19/19-35
24 x 12	CFM	400	480	560	640	720	800	960	1140	1280	1440	1600
Ak .800	Throw X/Y	2-4/6-11	4-6/7-13	4-6/8-14	4-8/9-16	4-8/10-18	5-9/11-21	6-12/14-26	8-14/15-29	9-17/17-31	10-19/19-35	10-19/21-39
18 x 15	CFM	375	450	525	600	675	750	900	1050	1200	1350	1500
Ak .75	Throw X/Y	4-6/4-8	4-8/5-9	5-9/6-11	6-11/6-12	6-12/8-14	7-13/8-15	8-15/10-18	9-17/10-19	10-19/13-23	12-22/15-26	14-25/17-29
24 x 15	CFM	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Ak 1.000	Throw X/Y	4-6/6-11	4-8/6-12	5-9/8-14	6-11/9-17	6-12/10-18	7-13/11-21	8-15/13-25	10-18/15-29	11-21/17-32	13-23/20-36	15-27/22-39
24 x 18	CFM	600	720	840	960	1080	1200	1440	1680	1920	2160	2400
Ak 1.200	Throw X/Y	4-8/6-11	5-9/6-12	6-11/7-14	6-12/8-15	7-14/10-19	8-15/11-21	10-18/13-23	11-21/15-27	13-25/18-34	15-30/21-37	16-32/23-41
33 x 21	CFM	960	1150	1340	1530	1725	1920	2300	2690	3070	3450	3840
Ak 1.920	Throw X/Y	4-8/8-15	6-11/10-18	7-13/12-22	8-14/13-25	8-15/15-29	10-18/17-31	12-21/21-35	14-26/24-39	16-29/26-43	17-31/29-47	21-39/35-56
30 x 24	CFM	1000	1200	1400	1600	1800	2000	2400	2800	3200	3600	4000
Ak 2.000	Throw X/Y	6-11/7-13	6-12/8-15	8-14/10-18	8-15/11-21	10-18/13-23	10-19/14-26	12-23/16-29	15-28/19-35	16-31/21-39	19-35/24-43	22-40/29-51

4-WAY RECTANGULAR



Note 1: The minimum Throw Dimension is based on a terminal velocity of 200 fpm. The maximum Throw Dimension is based on a terminal velocity of 100 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500



Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

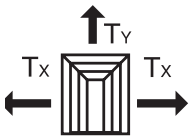
HART COOLEY
install confidence.

AR Series: ARE, ARS, ART
Square & Rectangular Ceiling Diffusers — Aluminum

Three-Way Style 3

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6	CFM	50	60	70	80	90	100	120	140	160	180	200
Ak .100	Throw X/Y	2-4/1-2	2-4/1-2	3-5/2-3	3-5/2-3	4-7/2-4	4-7/2-4	5-9/3-6	6-10/3-6	6-11/4-7	6-11/4-7	7-13/4-8
9 x 9	CFM	110	135	155	180	205	225	270	315	360	410	450
Ak .220	Throw X/Y	2-4/2-3	3-6/2-3	4-7/2-4	4-8/2-4	5-9/3-6	5-9/3-6	6-12/4-7	7-13/5-9	9-15/6-10	10-18/6-11	11-20/7-12
12 x 12	CFM	200	240	280	320	360	400	480	560	640	725	800
Ak .400	Throw X/Y	4-7/2-5	5-9/3-6	6-10/4-7	6-10/4-7	6-11/4-8	7-13/5-9	9-16/6-10	12-21/7-12	13-22/8-13	14-24/8-14	16-27/9-15
15 x 15	CFM	310	375	440	500	565	625	750	875	1000	1125	1250
Ak .620	Throw X/Y	4-8/2-4	6-11/4-7	7-13/4-7	8-14/4-8	8-15/5-9	9-16/6-10	11-19/7-12	13-23/9-15	15-26/10-18	17-29/11-20	19-33/12-21
18 x 18	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
Ak .900	Throw X/Y	4-9/3-5	6-11/4-7	7-13/5-9	9-15/6-10	10-18/6-11	11-20/7-12	13-24/9-15	15-26/10-18	18-32/11-20	20-35/12-22	23-40/14-25
21 x 21	CFM	615	740	860	985	1110	1230	1475	1725	1970	2220	2460
Ak 1.230	Throw X/Y	5-11/3-6	7-13/4-8	11-19/6-11	11-20/7-12	12-21/8-13	13-23-8-14	16-29/10-17	19-34/11-20	21-39/14-23	24-42/16-25	27-45/18-29
24 x 24	CFM	800	960	1120	1275	1440	1600	1925	2240	2570	2890	3200
Ak 1.600	Throw X/Y	7-14/5-9	9-16/6-11	11-19/7-13	13-21/8-14	14-24/9-15	16-27/9-16	17-31/11-19	21-35/14-24	25-39/16-27	28-43/18-31	32-47/20-33
27 x 27	CFM	1010	1215	1420	1615	1820	2020	2430	2840	3240	3650	4040
Ak 2.020	Throw X/Y	7-13/4-9	9-16/6-11	11-20/7-13	13-23/9-15	14-25/9-16	15-27/10-18	18-31/12-21	22-37/14-25	25-41/18-30	28-46/19-33	31-50/21-36

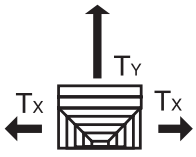
3-WAY STYLE 3



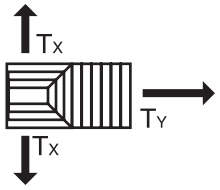
Three-Way Style 31S and Style 31L*

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	75	90	105	120	135	150	180	210	240	270	300
Ak .150	Throw X/Y	2-3/4-7	2-3/4-7	2-3/4-7	2-4/4-8	3-5/5-8	3-6/5-9	4-7/6-11	4-8/7-12	6-10/9-15	6-11/10-17	6-11/11-19
9 x 9*	CFM	115	135	155	180	200	225	270	315	360	405	450
Ak .220	Throw X/Y	1-3/4-7	2-3/5-9	2-3/6-11	2-4/7-12	3-6/8-14	3-6/9-16	4-7/10-18	4-8/12-21	5-9/14-24	6-10/16-28	6-11/18-32
12 x 9	CFM	150	180	210	240	210	300	360	420	480	540	600
Ak .300	Throw X/Y	2-3/4-8	2-4/5-9	3-6/6-10	4-7/7-12	4-8/8-14	4-8/8-14	5-9/9-16	6-10/11-20	7-12/14-24	8-13/15-26	9-15/16-28
12 x 12*	CFM	200	240	280	320	360	400	480	560	640	720	800
Ak .40	Throw X/Y	2-3/5-11	2-4/7-13	3-6/9-15	3-6/10-17	4-7/11-19	4-8/12-21	6-10/15-26	6-11/18-32	7-12/20-34	7-13/21-36	8-14/24-42
15 x 15*	CFM	310	375	440	500	565	625	750	875	1000	1125	1250
Ak .620	Throw X/Y	2-4/7-13	3-6/10-18	4-7/11-20	4-8/12-21	5-9/14-25	5-9/14-25	6-11/19-34	7-13/22-38	8-14/25-43	9-16/27-44	10-18/30-45
18 x 15	CFM	375	450	525	600	675	750	900	1050	1200	1350	1500
Ak .750	Throw X/Y	3-6/7-13	4-7/9-15	4-8/9-16	5-9/11-20	6-10/13-23	6-11/15-26	7-13/17-30	9-16/19-35	10-18/22-39	11-20/27-40	13-25/30-46
21 x 18	CFM	525	630	735	840	945	1050	1260	1475	1680	1890	2100
Ak 1.050	Throw X/Y	4-7/8-14	4-8/10-18	5-9/11-20	6-10/18-23	6-11/14-25	7-12/16-28	9-15/19-34	10-18/22-39	11-20/27-40	13-23/29-46	15-26/33-51
21 x 21*	CFM	615	740	860	985	1110	1230	1475	1725	1970	2210	2460
Ak 1.230	Throw X/Y	3-6/9-17	4-8/12-21	5-9/16-27	6-10/17-30	7-11/19-32	7-12/21-36	9-15/26-40	11-19/30-45	13-22/34-51	15-25/39-56	17-28/43-60
27 x 21	CFM	780	940	1080	1250	1400	1560	1870	2180	2500	2800	3120
Ak 1.560	Throw X/Y	5-9/10-18	5-9/11-20	6-10/13-22	7-12/15-26	8-14/18-32	9-16/21-36	11-19/23-40	13-21/25-43	15-24/29-47	17-29/34-53	19-33/38-59
30 x 24	CFM	1000	1200	1400	1600	1800	2000	2400	2800	3200	3500	4000
Ak 2.000	Throw X/Y	5-9/11-20	6-11/13-23	7-13/16-27	8-14/17-31	9-16/20-35	10-18/22-40	12-21/25-44	14-25/31-48	16-29/34-53	18-32/38-57	20-35/43-61
33 x 27	CFM	1230	1475	1725	1970	2220	2460	2950	3450	3925	4425	4920
Ak 2.460	Throw X/Y	6-10/13-23	7-13/17-28	8-14/19-33	9-16/21-35	11-18/23-39	12-20/25-44	14-25/29-47	16-29/33-51	18-33/37-56	22-37/42-59	25-41/47-64

3-WAY STYLE 31S

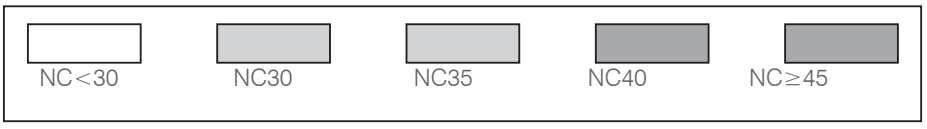


3-WAY STYLE 31L*



Note 2: The minimum Throw Dimension is based on a terminal velocity of 170 fpm. The maximum Throw Dimension is based on a terminal velocity of 85 fpm.
*Style 31L not available in square configuration

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500



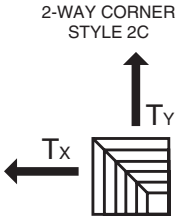
Recommended Noise Criteria and Face Velocity Ranges are on page 6

HART COOLEY
install confidence.

AR Series: ARE, ARS, ART
Square & Rectangular Ceiling Diffusers — Aluminum

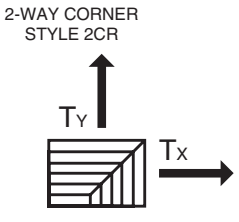
Two-Way Corner Style 2C

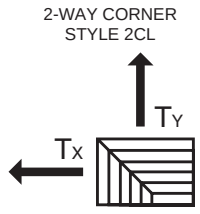
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6	CFM	45	55	60	70	80	90	105	125	140	160	180
Ak .090	Throw X/Y	1-3/1-3	2-5/2-5	2-5/2-5	3-7/3-7	3-7/3-7	5-8/5-8	5-8/5-8	6-11/6-11	7-12/7-12	8-13/8-13	9-14/9-14
9 x 9	CFM	95	115	135	155	175	195	235	275	315	350	390
Ak .190	Throw X/Y	4-6/4-6	4-6/4-6	5-7/5-7	5-8/5-8	6-10/6-10	6-11/6-11	8-13/8-13	9-14/9-14	10-16/10-16	13-20/13-20	14-22/14-22
12 x 12	CFM	175	210	245	280	315	350	420	480	560	635	700
Ak .350	Throw X/Y	5-7/5-7	5-8/5-8	6-11/6-11	8-13/8-13	8-13/8-13	9-14/9-14	10-16/10-16	13-19/13-19	14-22/14-22	16-26/16-26	19-29/19-29
15 x 15	CFM	275	330	385	440	495	550	660	775	885	995	1100
Ak .550	Throw X/Y	5-9/5-9	7-12/7-12	8-13/8-13	9-14/9-14	10-16/10-16	11-18/11-18	13-21/13-21	15-25/15-25	19-29/19-29	21-33/21-33	23-36/23-36
18 x 18	CFM	390	470	545	625	700	780	935	1090	1250	1410	1560
Ak .780	Throw X/Y	7-12/7-12	9-14/9-14	10-15/10-15	10-16/10-16	12-19/12-19	14-22/14-22	16-25/16-25	18-29/18-29	21-33/21-33	25-38/25-38	28-42/28-42
21 x 21	CFM	540	650	760	865	975	1080	1300	1515	1730	1945	2160
Ak 1.080	Throw X/Y	8-13/8-13	10-15/10-15	12-18/12-18	13-21/13-21	15-23/15-23	17-28/17-28	20-32/20-32	22-35/22-35	25-39/25-39	29-43/29-43	32-47/32-47
24 x 24	CFM	705	845	990	1130	1270	1410	1690	1950	2250	2540	2820
Ak 1.410	Throw X/Y	9-16/9-16	11-18/11-18	13-21/13-21	15-24/15-24	17-27/17-27	19-29/19-29	22-34/22-34	25-38/25-38	29-42/29-42	33-47/33-47	37-51/37-51
27 x 27	CFM	880	1055	1230	1410	1585	1760	2110	2470	2820	3170	3520
Ak 1.760	Throw X/Y	10-17/10-17	12-19/12-19	14-22/14-22	16-26/16-26	19-29/19-29	21-33/21-33	24-37/24-37	28-41/28-41	32-46/32-46	35-50/35-50	39-55/39-55



Two-Way Corner Style 2CR

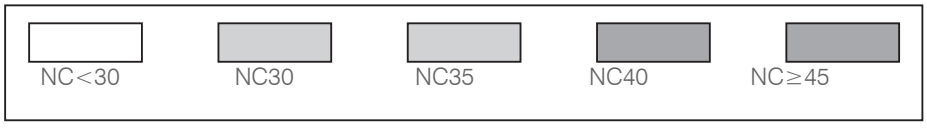
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	260
Ak .130	Throw X/Y	2-4/3-5	3-5/4-7	4-6/5-8	4-6/5-8	5-7/6-11	5-7/6-11	6-9/8-13	6-10/9-14	7-12/11-16	8-13/13-21	10-16/16-25
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw X/Y	2-4/3-6	3-5/5-8	3-5/6-11	4-6/7-12	5-7/8-13	5-7/9-14	5-8/10-15	6-11/13-20	7-12/15-24	8-13/17-26	10-15/19-29
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw X/Y	2-4/5-8	3-5/6-10	3-5/7-12	4-6/8-13	5-7/10-15	5-8/11-17	6-9/13-20	6-10/15-24	8-12/17-27	10-14/20-30	11-17/22-34
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw X/Y	4-6/5-7	4-6/5-8	5-7/6-10	5-8/6-11	6-10/8-12	6-11/9-14	8-13/10-16	11-17/14-21	19-19-16/24	13-20/17-26	14-23/19-30
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw X/Y	4-6/6-10	5-7/6-11	6-8/8-12	6-9/10-14	6-11/10-16	7-12/12-19	9-14/14-22	10-15/16-25	12-17/19-29	13-20/21-33	14-22/23-35
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw X/Y	4-6/6-11	5-7/8-13	5-7/9-14	5-8/10-15	6-10/11-18	7-12/13-21	8-13/16-25	9-15/19-29	11-17/22-33	12-20/23-35	14-22/26-39
21 x 9	CFM	230	275	320	365	410	455	545	635	730	820	910
Ak .450	Throw X/Y	4-6/8-13	5-7/10-15	6-8/11-17	6-9/12-19	6-10/13-21	6-11/15-24	8-13/18-29	10-15/22-34	12-18/24-38	13-21/26-42	15-25/30-47
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw X/Y	5-7/5-8	5-8/6-11	6-10/8-13	7-12/9-14	8-13/10-16	9-14/12-19	11-18/14-22	13-20/16-25	15-24/19-29	16-26/21-32	18-29/24-37
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw X/Y	4-7/6-11	5-8/8-13	6-10/9-14	7-12/11-17	9-14/13-21	10-15/14-22	12-18/17-26	14-20/21-30	16-24/23-34	18-27/27-38	21-31/29-42
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw X/Y	6-10/8-13	6-11/9-14	8-13/11-18	9-14/13-20	10-16/15-24	12-19/16-26	13-21/19-29	15-26/22-33	18-29/25-38	21-33/29-44	25-38/32-49
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw X/Y	4-9/8-14	6-11/10-16	8-13/13-20	9-14/15-24	10-16/16-26	12-19/19-29	14-22/22-34	16-25/25-38	19-29/29-44	21-32/33-48	25-37/37-52
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .980	Throw X/Y	6-11/8-13	8-13/10-15	10-15/11-18	11-17/12-20	12-19/14-22	13-21/16-25	16-26/19-29	19-30/22-34	22-34/26-39	25-38/29-43	27-42/32-48
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.380	Throw X/Y	8-13/10-17	10-15/13-20	12-19/15-24	14-21/17-27	15-23/19-30	16-26/21-33	20-30/25-37	24-36/29-42	28-41/33-46	30-46/37-51	34-51/42-56





Note 3: The minimum Throw Dimension is based on a terminal velocity of 135 fpm. The maximum Throw Dimension is based on a terminal velocity of 65 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500



Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

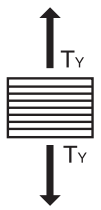
HART COOLEY
install confidence.

AR/SR Series: ARE, ARS, ART, SRE
Square & Rectangular Ceiling Diffusers — Steel/Aluminum

Two-Way Style 2L

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	260
Ak .130	Throw Y	3-5	3-5	5-7	6-8	7-10	7-10	8-12	10-14	11-17	14-20	16-23
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw Y	3-5	5-7	6-8	6-9	7-10	8-12	10-14	12-18	15-21	16-23	17-25
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw Y	4-6	6-8	6-9	7-10	9-13	10-14	10-15	13-19	15-21	18-26	21-30
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw Y	5-7	6-8	6-9	8-12	10-14	10-14	11-17	14-21	16-24	19-27	20-31
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw Y	6-8	7-10	8-12	9-13	10-15	12-18	14-20	16-24	18-26	21-31	24-35
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw Y	6-9	8-12	9-13	10-14	11-17	13-19	15-21	17-25	19-29	22-33	25-39
21 x 9	CFM	230	275	320	365	410	455	545	635	730	820	910
Ak .450	Throw Y	7-10	8-12	9-13	11-16	12-18	14-20	16-24	19-27	22-32	25-36	29-41
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw Y	6-9	8-12	10-14	10-15	12-18	14-20	15-24	18-27	22-32	24-36	28-41
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw Y	7-11	9-13	11-15	12-18	13-19	15-21	18-26	20-29	23-34	27-39	31-42
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw Y	9-13	10-15	12-18	14-20	15-23	17-25	20-30	23-34	27-40	31-44	34-48
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw Y	8-14	11-16	13-19	15-21	17-25	19-29	22-33	25-38	29-42	33-48	38-54
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .910	Throw Y	10-15	11-17	13-19	16-22	19-25	20-28	23-33	26-38	29-42	34-46	38-51
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.300	Throw Y	11-17	14-20	17-24	19-27	21-31	23-35	27-40	34-46	38-51	42-56	47-61

2-WAY STYLE 2L



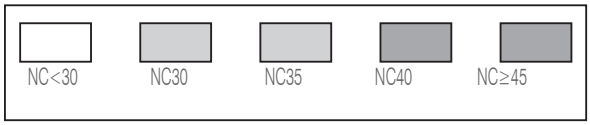
Two-Way Style 2S

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	265
Ak .130	Throw X	3-6	4-7	5-8	6-9	8-12	9-13	10-14	11-17	13-19	15-23	17-26
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw X	4-7	6-8	7-10	8-12	9-13	10-14	11-17	14-20	15-23	17-25	19-29
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw X	5-7	6-9	7-10	9-13	10-15	11-17	13-19	15-23	18-26	21-30	23-34
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw X	6-8	6-9	7-10	9-13	9-13	10-15	13-19	15-21	17-25	19-29	21-31
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw X	7-10	8-12	9-13	10-14	12-18	14-20	16-24	18-26	19-29	23-33	27-39
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw X	7-10	9-13	11-17	12-18	13-19	15-23	18-27	20-30	-22-32	25-38	29-43
21 x 9	CFM	230	275	320	365	410	455	545	635	730	820	910
Ak .450	Throw X	9-13	9-14	10-15	12-18	15-21	16-24	19-29	22-33	26-38	29-42	32-47
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw X	7-10	8-12	10-14	11-17	13-19	15-21	16-24	19-27	22-33	25-38	29-42
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw X	8-11	10-14	10-15	12-18	14-20	15-23	18-27	23-33	-25-37	29-42	32-47
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw X	10-15	11-17	14-20	15-23	18-26	20-29	22-33	26-38	29-42	35-46	39-51
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw X	9-14	11-17	15-21	17-25	19-29	22-32	25-37	28-41	33-45	38-51	43-56
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .910	Throw X	11-17	12-18	14-20	16-24	19-27	20-29	23-34	27-40	32-45	37-49	40-55
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.300	Throw X	12-18	15-21	18-25	21-29	23-33	25-37	29-43	33-48	38-53	43-59	49-63

2-WAY STYLE 2S

Note 3: The minimum Throw Dimension is based on a terminal velocity of 135 fpm. The maximum Throw Dimension is based on a terminal velocity of 65 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500

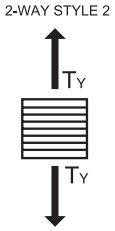


Recommended Noise Criteria and Face Velocity Ranges are on page 6

AR/SR Series: ARE, ARS, ART, SRE
Square & Rectangular Ceiling Diffusers — Steel/Aluminum

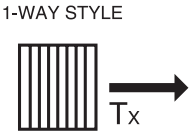
Two-Way Style 2

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		**.020**	**.020**	**.030**	**.040**	**.050**	**.060**	**.090**	**.120**	**.160**	**.200**	**.250**
6 x 6	CFM	45	55	60	70	80	90	105	125	140	160	180
Ak .090	Throw Y	3-5	3-5	4-7	4-7	5-8	5-8	6-9	9-13	10-15	11-17	12-18
9 x 9	CFM	95	115	135	155	175	195	235	275	315	350	390
Ak .190	Throw Y	5-7	6-8	6-8	6-9	8-12	9-13	11-17	12-18	14-20	16-24	18-26
12 x 12	CFM	175	210	245	280	315	350	420	480	560	635	700
Ak .350	Throw Y	4-7	6-9	9-13	10-15	11-17	12-18	14-20	17-23	18-27	21-31	23-35
15 x 15	CFM	275	330	385	440	495	550	660	775	885	995	1100
Ak .550	Throw Y	8-12	10-14	10-15	12-18	14-20	15-23	18-27	22-32	24-36	26-39	29-43
18 x 18	CFM	390	470	545	625	700	780	935	1090	1250	1410	1560
Ak .780	Throw Y	9-15	11-17	12-18	14-20	15-23	18-26	20-30	-24-36	27-42	31-45	36-51
21 x 21	CFM	540	650	760	865	975	1080	1300	1515	1730	1945	2160
Ak 1.080	Throw Y	11-17	14-20	15-23	18-26	19-29	23-35	26-40	29-44	34-49	38-54	43-59
24 x 24	CFM	705	845	990	1130	1270	1410	1690	1950	2250	2540	2820
Ak 1.410	Throw Y	12-19	14-22	17-25	20-30	21-33	23-35	27-40	34-46	39-51	42-56	46-60
27 x 27	CFM	880	1055	1230	1410	1585	1760	2110	2470	2820	3170	3520
Ak 1.760	Throw Y	12-20	15-23	18-26	21-31	24-36	26-40	30-45	35-50	39-56	43-61	48-66



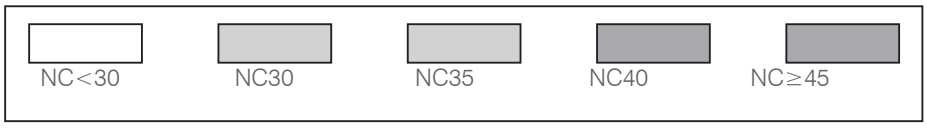
One-Way Style

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		**.020**	**.020**	**.030**	**.040**	**.050**	**.060**	**.090**	**.120**	**.160**	**.200**	**.250**
6 x 6	CFM	45	55	60	70	80	90	105	125	140	160	180
Ak .090	Throw	3-5	4-7	5-8	6-9	8-10	9-12	10-14	12-18	14-20	15-22	16-24
9 x 9	CFM	95	115	135	155	175	195	235	275	315	350	390
Ak .190	Throw	6-9	7-10	9-13	10-14	11-17	13-19	15-21	18-26	19-29	22-33	25-38
12 x 12	CFM	175	210	245	280	315	350	420	480	560	635	700
Ak .350	Throw	8-12	10-14	12-18	13-19	15-21	18-26	21-31	24-36	27-40	30-43	33-45
15 x 15	CFM	275	330	385	440	495	550	660	775	885	995	1100
Ak .550	Throw	10-16	13-19	14-22	18-26	19-29	21-31	25-37	30-43	35-46	38-50	42-56
18 x 18	CFM	390	470	545	625	700	780	935	1090	1250	1410	1560
Ak .780	Throw	13-21	15-23	18-26	19-29	22-33	25-38	29-42	35-46	42-49	44-52	49-56
21 x 21	CFM	540	650	760	865	975	1080	1300	1515	1730	1945	2160
Ak 1.080	Throw	14-23	17-25	21-30	24-36	27-40	30-43	34-48	39-54	44-60	48-64	53-68
24 x 24	CFM	705	845	990	1130	1270	1410	1690	1950	2250	2540	2820
Ak 1.410	Throw	20-29	23-33	24-36	27-40	30-44	35-48	39-54	43-60	48-65	52-69	56-74
27 x 27	CFM	880	1055	1230	1410	1585	1760	2110	2470	2820	3170	3520
Ak 1.760	Throw	19-27	22-31	25-38	28-42	33-47	36-53	43-58	49-63	54-68	60-73	65-77



Note 3: The minimum Throw Dimension is based on a terminal velocity of 135 fpm. The maximum Throw Dimension is based on a terminal velocity of 65 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500



Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

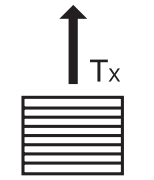
HART COOLEY
install confidence.

AR/SR Series: ARE, ARS, ART, SRE
Square & Rectangular Ceiling Diffusers — Steel/Aluminum

One-Way Style 1L

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	265
Ak .130	Throw	5-8	6-9	7-11	8-12	9-13	10-15	12-18	15-21	16-24	19-29	21-32
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw	5-8	6-9	6-13	9-14	10-15	12-18	14-20	17-25	18-27	20-30	23-35
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw	5-8	7-10	9-13	10-15	12-18	14-20	16-24	18-27	21-31	24-36	28-41
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw	7-10	8-12	10-14	11-17	12-18	14-20	17-25	19-29	22-23	25-37	28-41
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw	9-13	10-14	11-17	12-18	15-23	17-25	20-30	22-33	25-37	29-42	32-45
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw	9-13	10-15	12-18	14-20	16-24	18-26	20-30	25-37	27-40	31-44	36-48
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw	10-14	11-17	13-19	15-23	18-26	19-29	22-32	26-39	30-43	35-48	39-54
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw	10-15	12-18	14-20	17-25	19-27	21-30	25-36	28-41	32-45	36-49	42-54
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw	13-19	15-21	18-26	19-29	22-34	25-38	29-42	34-46	38-51	43-56	48-61
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw	14-22	16-24	18-27	21-31	24-36	27-40	30-43	35-47	41-52	46-57	53-61
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .910	Throw	14-20	16-24	19-29	22-32	24-36	26-39	30-43	35-47	41-51	45-56	49-62
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.380	Throw	17-27	19-29	23-35	26-40	30-45	34-49	38-54	43-60	48-67	54-72	59-80

1-WAY STYLE 1L



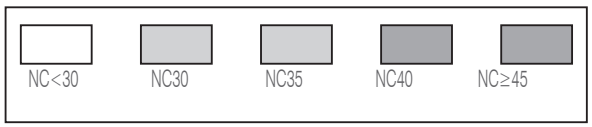
One-Way Style 1S

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	265
Ak .130	Throw	4-7	5-9	7-11	9-13	11-17	13-19	15-21	16-24	18-27	21-32	23-35
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw	6-10	8-12	10-15	12-17	14-19	15-21	17-25	21-31	23-35	25-37	29-44
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw	9-12	10-14	12-18	14-20	16-24	18-26	21-31	23-35	27-40	31-45	35-51
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw	8-12	10-14	10-15	12-18	14-20	16-24	18-27	23-33	24-37	28-42	30-44
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw	10-15	12-18	13-19	15-21	18-26	22-32	23-35	26-39	30-43	35-46	38-47
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw	11-17	13-19	15-23	17-25	20-30	22-33	25-38	31-44	34-45	38-47	42-51
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw	11-16	12-18	15-21	17-25	19-29	22-32	25-38	28-44	33-45	36-49	42-54
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw	12-18	14-20	16-24	19-27	21-31	22-33	27-40	32-45	37-47	42-50	45-56
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw	14-20	16-24	19-29	22-32	24-37	28-41	33-45	39-48	43-52	48-58	54-63
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw	16-23	18-26	22-32	25-37	28-41	32-45	37-47	44-54	49-59	54-66	59-71
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .910	Throw	18-24	18-26	21-31	24-33	26-38	28-41	33-47	39-53	44-58	48-63	54-69
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.380	Throw	19-29	21-32	25-38	31-44	37-49	40-51	42-55	46-61	51-66	56-71	61-77

1-WAY STYLE 1S

Note 3: The minimum Throw Dimension is based on a terminal velocity of 135 fpm. The maximum Throw Dimension is based on a terminal velocity of 65 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500

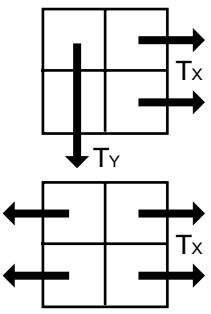


Recommended Noise Criteria and Face Velocity Ranges are on page 6

MCD, MCDD, MCDS, MCDSD, MCDST, MCDSDT
Modular Ceiling Diffuser — Aluminum

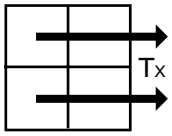
Two Way

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6 Ak .090	CFM	45	55	65	70	80	90	110	125	145	160	180
	Throw X/Y	2-5/2-5	3-5/3-5	3-6/3-6	3-6/3-6	5-8/5-8	5-9/5-9	5-11/5-11	6-12/6-12	6-14/6-14	8-15/8-15	9-17/9-17
	NC	<20	<20	<20	<20	<20	<20	21	24	28	31	34
8 x 8 Ak .150	CFM	80	95	110	130	145	160	190	225	255	290	320
	Throw X/Y	3-6/3-6	3-6/3-6	5-8/5-8	5-9/5-9	5-11/5-11	6-11/6-11	6-14/6-14	8-15/8-15	9-17/9-17	11-18/11-18	11-20/11-20
	NC	<20	<20	<20	<20	<20	<20	22	26	29	32	35
10 x 10 Ak .250	CFM	130	155	180	210	235	260	310	365	415	470	520
	Throw X/Y	3-8/3-8	5-9/5-9	5-11/5-11	6-11/6-11	6-12/6-12	8-12/8-12	9-15/9-15	11-17/11-17	12-20/12-20	14-21/14-21	15-23/15-23
	NC	<20	<20	<20	<20	<20	<20	23	27	30	33	36
12 x 12 Ak .370	CFM	190	230	265	305	340	380	455	530	610	685	760
	Throw X/Y	5-9/5-9	5-11/5-11	6-12/6-12	8-14/8-14	8-15/8-15	9-17/9-17	11-18/11-18	12-21/12-21	14-23/14-23	15-24/15-24	17-26/17-26
	NC	<20	<20	<20	<20	<20	20	24	28	31	35	37
14 x 14 Ak .520	CFM	260	310	365	415	470	520	625	730	830	935	1040
	Throw X/Y	5-11/5-11	6-12/6-12	8-14/8-14	8-17/8-17	9-18/9-18	11-20/11-20	12-21/12-21	14-23/14-23	17-24/17-24	18-27/18-27	20-29/20-29
	NC	<20	<20	<20	<20	<20	20	25	29	32	35	38
16 x 16 Ak .700	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
	Throw X/Y	6-12/6-12	8-14/8-14	8-17/8-17	9-18/9-18	11-21/11-21	12-23/12-23	14-26/14-26	17-29/17-29	18-30/18-30	21-32/21-32	24-33/24-33
	NC	<20	<20	<20	<20	<20	21	26	30	33	36	39
18 x 18 Ak .900	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
	Throw X/Y	6-14/6-14	8-17/8-17	9-18/9-18	11-21/11-21	12-23/12-23	14-24/14-24	17-27/17-27	18-30/18-30	21-33/21-33	24-35/24-35	27-36/27-36
	NC	<20	<20	<20	<20	20	22	27	31	34	37	40
20 x 20 Ak 1.100	CFM	555	665	775	890	1000	1110	1330	1555	1775	2000	2220
	Throw X/Y	8-15/8-15	9-18/9-18	11-21/11-21	12-24/12-24	14-26/14-26	15-29/15-29	18-32/18-32	21-35/21-35	24-38/24-38	27-39/27-39	30-41/30-41
	NC	<20	<20	<20	<20	21	24	28	32	36	39	42
22 x 22 Ak 1.330	CFM	665	800	930	1065	1195	1330	1595	1860	2130	2395	2660
	Throw X/Y	8-17/8-17	9-20/9-20	12-23/12-23	14-26/14-26	15-27/15-27	17-30/17-30	20-35/20-35	23-38/23-38	27-41/27-41	29-44/29-44	33-45/33-45
	NC	<20	<20	<20	22	25	28	32	36	40	43	46



One-Way

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6 Ak .090	CFM	45	55	65	70	80	90	110	125	145	160	180
	Throw	2-6	4-6	4-8	4-8	6-10	6-12	6-14	8-16	8-18	10-20	12-22
	NC	<20	<20	<20	<20	<20	<20	21	24	28	31	34
8 x 8 Ak .150	CFM	80	95	110	130	145	160	190	225	255	290	320
	Throw	4-8	4-8	6-10	6-12	6-14	8-14	8-18	10-20	12-22	14-24	14-26
	NC	<20	<20	<20	<20	<20	<20	22	26	29	32	35
10 x 10 Ak .250	CFM	130	155	180	210	235	260	310	365	415	470	520
	Throw	4-10	6-12	6-14	8-14	8-16	10-16	12-20	14-22	16-26	18-28	20-30
	NC	<20	<20	<20	<20	<20	<20	23	27	30	33	36
12 x 12 Ak .370	CFM	190	230	265	305	340	380	455	530	610	685	760
	Throw	6-12	6-14	8-16	10-18	10-20	12-20	12-22	14-24	16-28	18-30	20-30
	NC	<20	<20	<20	<20	<20	20	24	28	31	35	37
14 x 14 Ak .520	CFM	260	310	365	415	470	520	625	730	830	935	1040
	Throw	6-14	8-16	10-18	10-22	12-24	14-26	16-28	18-30	22-32	24-36	26-38
	NC	<20	<20	<20	<20	<20	20	25	29	32	35	38
16 x 16 Ak .700	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
	Throw	8-16	10-18	10-22	12-24	14-28	16-30	18-34	22-38	24-40	28-42	32-44
	NC	<20	<20	<20	<20	<20	21	26	30	33	36	39
18 x 18 Ak .900	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
	Throw	8-18	10-22	12-24	14-28	16-30	18-36	22-36	24-40	28-44	32-46	35-48
	NC	<20	<20	<20	<20	20	22	27	31	34	37	40
20 x 20 Ak 1.100	CFM	555	665	775	890	1000	1110	1330	1555	1775	2000	2220
	Throw	10-20	12-24	14-28	16-32	18-34	20-38	24-42	28-46	32-50	36-52	40-54
	NC	<20	<20	<20	<20	21	24	28	32	36	39	42
22 x 22 Ak 1.330	CFM	665	800	930	1065	1195	1330	1595	1860	2130	2395	2660
	Throw	10-22	12-26	16-30	18-34	20-36	22-40	26-46	30-50	36-54	38-58	44-60
	NC	<20	<20	<20	20	23	26	30	34	38	41	44



NOTES: The minimum Throw Dimension is based on a terminal velocity of 250 FPM. The maximum Throw Dimension is based on a terminal velocity of 125 FPM.
NC re 10db room Attenuation ($LW10^{-12}W$)

Recommended Noise Criteria and Face Velocity Ranges are on page 6

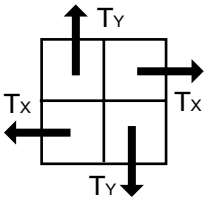
Engineering Data

HART COOLEY
install confidence.

MCD, MCDD, MCDS, MCDSD, MCDST, MCDSDT
Modular Ceiling Diffuser — Aluminum

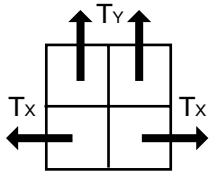
Four-Way

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6 Ak .090	CFM	45	55	65	70	80	90	110	125	145	160	180
	Throw X/Y	1-3/1-3	2-3/2-3	2-4/2-4	2-4/2-4	3-5/3-5	3-6/3-6	3-7/3-7	4-8/4-8	4-9/4-9	5-10/5-10	6-11/6-11
	NC	<20	<20	<20	<20	<20	<20	21	24	28	31	34
8 x 8 Ak .150	CFM	80	95	110	130	145	160	190	225	255	290	320
	Throw X/Y	2-4/2-4	2-4/2-4	3-5/3-5	3-6/3-6	3-7/3-7	4-7/4-7	4-9/4-9	5-10/5-10	6-11/6-11	7-12/7-12	7-13/7-13
	NC	<20	<20	<20	<20	<20	<20	22	26	29	32	35
10 x 10 Ak .250	CFM	130	155	180	210	235	260	310	365	415	470	520
	Throw X/Y	2-5/2-5	3-6/3-6	3-7/3-7	4-7/4-7	4-8/4-8	5-8/5-8	6-10/6-10	7-11/7-11	8-13/8-13	9-14/9-14	10-15/10-15
	NC	<20	<20	<20	<20	<20	<20	23	27	30	33	36
12 x 12 Ak .370	CFM	190	230	265	305	340	380	455	530	610	685	760
	Throw X/Y	3-6/3-6	3-7/3-7	4-8/4-8	5-9/5-9	5-10/5-10	6-11/6-11	7-12/7-12	8-14/8-14	8-15/8-15	10-16/10-16	11-17/11-17
	NC	<20	<20	<20	<20	<20	20	24	28	31	35	37
14 x 14 Ak .520	CFM	260	310	365	415	470	520	625	730	830	935	1040
	Throw X/Y	3-7/3-7	4-8/4-8	5-9/5-9	5-11/5-11	6-12/6-12	7-13/7-13	8-14/8-14	9-15/9-15	11-16/11-16	12-18/12-18	13-19/13-19
	NC	<20	<20	<20	<20	<20	20	25	29	32	35	38
16 x 16 Ak .700	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
	Throw X/Y	4-8/4-8	5-9/5-9	5-11/5-11	6-12/6-12	7-14/7-14	8-15/8-15	9-17/9-17	11-19/11-19	12-20/12-20	14-21/14-21	16-22/16-22
	NC	<20	<20	<20	<20	<20	21	26	30	33	36	39
18 x 18 Ak .900	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
	Throw X/Y	4-9/4-9	5-11/5-11	6-12/6-12	7-14/7-14	8-15/8-15	9-16/9-16	11-18/11-18	12-20/12-20	14-22/14-22	16-23/16-23	18-24/18-24
	NC	<20	<20	<20	<20	20	22	27	31	34	37	40
20 x 20 Ak 1.100	CFM	555	665	775	890	1000	1110	1330	1555	1775	2000	2220
	Throw X/Y	5-10/5-10	6-12/6-12	7-14/7-14	8-16/8-16	9-17/9-17	10-19/10-19	12-21/12-21	14-23/14-23	16-25/16-25	18-26/18-26	20-27/20-27
	NC	<20	<20	<20	<20	21	24	28	32	36	39	42
22 x 22 Ak 1.330	CFM	665	800	930	1065	1195	1330	1595	1860	2130	2395	2660
	Throw X/Y	5-11/5-11	6-13/6-13	8-15/8-15	9-17/9-17	10-18/10-18	11-20/11-20	13-23/13-23	15-25/15-25	18-27/18-27	19-29/19-29	22-30/22-30
	NC	<20	<20	<20	20	23	26	30	34	38	41	44



Three-Way

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6 Ak .090	CFM	45	55	65	70	80	90	110	125	145	160	180
	Throw	1-3/2-5	2-3/3-5	2-4/3-6	2-4/3-6	3-5/5-8	3-6/5-9	3-7/5-11	4-8/6-12	4-9/6-14	5-10/8-15	6-11/9-17
	NC	<20	<20	<20	<20	<20	<20	21	24	28	31	34
8 x 8 Ak .150	CFM	80	95	110	130	145	160	190	225	255	290	320
	Throw	2-4/3-6	2-4/3-6	3-5/5-8	3-6/5-9	3-7/5-11	4-7/6-11	4-9/6-14	5-10/8-15	6-11/9-17	7-12/11-18	7-13/11-20
	NC	<20	<20	<20	<20	<20	<20	<20	22	26	29	32	35
10 x 10 Ak .250	CFM	130	155	180	210	235	260	310	365	415	470	520
	Throw	2-5/3-8	3-6/5-9	3-7/5-11	4-7/6-11	4-8/6-12	5-8/8-12	6-10/9-15	7-11/11-17	8-13/12-20	9-14/14-21	10-15/15-23
	NC	<20	<20	<20	<20	<20	<20	23	27	30	33	36
12 x 12 Ak .370	CFM	190	230	265	305	340	380	455	530	610	685	760
	Throw	3-6/5-9	3-7/5-11	4-8/6-12	5-9/8-14	5-10/8-15	6-11/9-17	7-12/11-18	8-14/12-21	9-15/14-23	10-16/15-24	11-17/17-26
	NC	<20	<20	<20	<20	<20	20	24	28	31	35	37
14 x 14 Ak .520	CFM	260	310	365	415	470	520	625	730	830	935	1040
	Throw	3-7/5-11	4-8/6-12	5-9/8-14	5-11/8-17	6-12/9-18	7-13/11-20	8-14/12-21	9-15/14-23	11-16/17-24	12-18/18-27	13-19/20-29
	NC	<20	<20	<20	<20	<20	20	25	29	32	35	38
16 x 16 Ak .700	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
	Throw	4-8/6-12	5-9/8-14	5-11/8-17	6-12/9-18	7-14/11-21	8-15/12-23	9-17/14-26	11-19/17-29	12-20/18-30	14-21/21-32	16-22/24-33
	NC	<20	<20	<20	<20	<20	21	26	30	33	36	39
18 x 18 Ak .900	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
	Throw	4-9/6-14	5-11/8-17	6-12/9-18	7-14/11-21	8-15/12-23	9-16/14-24	11-18/17-27	12-20/18-30	14-22/21-33	16-23/24-35	18-24/27-36
	NC	<20	<20	<20	<20	20	22	27	31	34	37	40
20 x 20 Ak 1.100	CFM	555	665	775	890	1000	1110	1330	1555	1775	2000	2220
	Throw	5-10/8-15	6-12/9-18	7-14/11-21	8-16/12-24	9-17/14-26	10-19/15-29	12-21/18-32	14-23/21-35	16-25/24-38	18-26/27-39	20-27/30-41
	NC	<20	<20	<20	<20	21	24	28	32	36	39	42
22 x 22 Ak 1.330	CFM	665	800	930	1065	1195	1330	1595	1860	2130	2395	2660
	Throw	5-11/8-17	6-113/9-20	8-15/12-23	9-17/14-26	10-18/15-27	11-20/17-30	13-23/20-35	15-25/23-38	18-27/27-41	19-29/29-44	22-30/33-45
	NC	<20	<20	<20	20	23	26	30	34	38	41	44

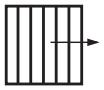


NOTES: The minimum Throw Dimension is based on a terminal velocity of 250 FPM. The maximum Throw Dimension is based on a terminal velocity of 125 FPM.
NC re 10db room Attenuation ($LW10^{-12}W$)

Recommended Noise Criteria and Face Velocity Ranges are on page 6

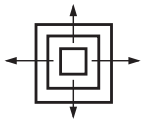
A500 Series

A501MS/A501OB
One-Way Diffuser



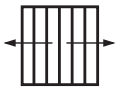
Face Velocity		400	500	600	700	900	1100	1500
Pressure Loss		.010	.016	.022	.031	.050	.075	.140
6 x 6	CFM	55	65	75	90	120	140	195
Ak .13	Throw	5.0	6.0	7.0	8.0	10.0	12.0	15.0
8 x 8	CFM	75	90	105	120	150	180	240
Ak .20	Throw	6.0	7.0	8.0	10.0	12.0	15.0	18.0
10 x 10	CFM	115	135	155	175	235	290	395
Ak .29	Throw	7.0	8.0	10.0	12.0	15.0	19.0	24.0
12 x 12	CFM	170	210	255	300	380	470	610
Ak .42	Throw	8.0	10.0	12.0	15.0	19.0	24.0	29.0
14 x 14	CFM	250	305	360	410	505	610	800
Ak .59	Throw	11.0	13.0	15.0	18.0	24.0	30.0	35.0

A504MS/A504OB
Four-Way Diffuser



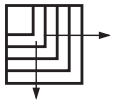
Face Velocity		400	500	600	700	900	1100	1500
Pressure Loss		.010	.016	.022	.031	.050	.075	.140
6 x 6	CFM	55	65	75	90	120	140	195
Ak .13	Throw	2.0	3.0	4.0	5.0	6.0	7.0	9.0
8 x 8	CFM	75	90	105	120	150	180	240
Ak .20	Throw	3.0	4.0	5.0	6.0	8.0	10.0	13.0
10 x 10	CFM	115	135	155	175	235	290	395
Ak .29	Throw	4.0	5.0	6.0	7.0	9.0	12.0	14.0
12 x 12	CFM	170	210	255	300	380	470	610
Ak .42	Throw	5.0	6.0	7.0	8.0	10.0	12.0	15.0
14 x 14	CFM	250	305	360	410	505	610	800
Ak .59	Throw	6.0	7.0	8.0	9.0	11.0	14.0	18.0

A502MS/A502OB
Two-Way Diffuser



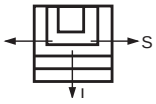
Face Velocity		400	500	600	700	900	1100	1500
Pressure Loss		.010	.016	.022	.031	.050	.075	.140
6 x 6	CFM	55	65	75	90	120	140	195
Ak .13	Throw	3.0	4.0	5.0	6.0	7.0	9.0	12.0
8 x 8	CFM	75	90	105	120	150	180	240
Ak .20	Throw	4.0	5.0	6.0	7.0	9.0	12.0	16.0
10 x 10	CFM	115	135	155	175	235	290	395
Ak .29	Throw	5.0	6.0	7.0	8.0	10.0	14.0	20.0
12 x 12	CFM	170	210	255	300	380	470	610
Ak .42	Throw	6.0	7.0	8.0	10.0	13.0	17.0	23.0
14 x 14	CFM	250	305	360	410	505	610	800
Ak .59	Throw	7.0	9.0	11.0	13.0	16.0	19.0	27.0

A505MS/A505OB
Two-Way Corner Diffuser

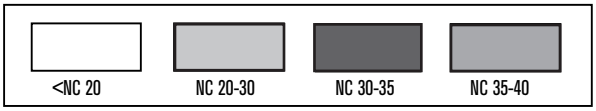


Face Velocity		400	500	600	700	900	1100	1500
Pressure Loss		.010	.016	.022	.031	.050	.075	.140
6 x 6	CFM	55	65	75	90	120	140	195
Ak .13	Throw	3.0	4.0	5.0	6.0	7.0	9.0	12.0
8 x 8	CFM	75	90	105	120	150	180	240
Ak .20	Throw	4.0	5.0	6.0	7.0	9.0	12.0	16.0
10 x 10	CFM	115	135	155	175	235	290	395
Ak .29	Throw	5.0	6.0	7.0	8.0	10.0	14.0	20.0
12 x 12	CFM	170	210	255	300	380	470	610
Ak .42	Throw	6.0	7.0	8.0	10.0	13.0	17.0	23.0
14 x 14	CFM	250	305	360	410	505	610	800
Ak .59	Throw	7.0	9.0	11.0	13.0	16.0	19.0	27.0

A503MS/A503OB
Three-Way Diffuser



Face Velocity		400	500	600	700	900	1100	1500
Pressure Loss		.010	.016	.022	.031	.050	.075	.140
6 x 6	CFM	55	65	75	90	120	140	195
Ak .13	Throw L/S	3.5/2.5	4.0/3.0	5.0/3.5	5.5/4.0	7.0/5.0	9.0/6.0	12.0/9.0
8 x 8	CFM	75	90	105	120	150	180	240
Ak .20	Throw L/S	4.0/2.0	5.0/2.5	6.0/3.5	7.0/4.0	8.0/4.5	10.0/5.5	12.0/7.0
10 x 10	CFM	115	135	155	175	235	290	395
Ak .29	Throw L/S	5.0/3.0	7.0/4.0	8.0/4.5	10.0/5.5	12.0/7.0	14.0/8.5	18.0/10.5
12 x 12	CFM	170	210	255	300	380	470	610
Ak .42	Throw L/S	7.0/4.0	8.5/4.5	10.0/5.5	12.0/6.5	15.0/8.5	18.0/10.0	23.0/14.0
14 x 14	CFM	250	305	360	410	505	610	800
Ak .59	Throw L/S	8.0/5.5	10.0/6.0	11.5/7.0	13.0/7.5	15.5/9.0	20.0/11.0	27.0/16.0



Terminal velocity of FPM
NC Noise criteria rating. NC is based on 10db room absorption (ref. 10^{-12} watts).
Tested in accordance with ASHRAE 36-72, ADC 1062: GRD84 and ISO 3741.

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

SV and SVH Spiral Diffusers
USV, USVH Universal Spiral Diffusers

See page 38 for min. duct diameter.

Face Velocity		300	400	500	600	700	800	1000	1200
Total Pressure		.016	.029	.046	.066	.090	.117	.183	.263
10 x 3 Ak .14	CFM	42	56	70	84	98	112	140	168
	Horizontal Throw	7-3	8-4	9-5	10-6	11-7	12-8	13-9	14-10
	Noise Criteria	-	-	-	-	-	23	29	35
12 x 3 Ak .18	CFM	54	72	90	108	126	144	180	216
	Horizontal Throw	8-5	9-6	10-7	11-8	12-8	13-9	14-10	16-11
	Noise Criteria	-	-	-	-	20	24	31	36
10 x 4 14 x 3 Ak .21	CFM	63	84	105	126	147	168	210	252
	Horizontal Throw	8-5	10-7	11-8	12-8	13-9	14-10	16-11	17-12
	Noise Criteria	-	-	-	-	21	25	31	37
16 x 3 12 x 4 Ak .25	CFM	75	100	125	150	175	200	250	300
	Horizontal Throw	9-5	11-7	12-8	13-9	14-10	15-11	17-12	19-13
	Noise Criteria	-	-	-	-	21	25	32	37
24 x 3 12 x 6 Ak .39	CFM	117	156	195	234	273	312	390	468
	Horizontal Throw	12-7	13-9	15-10	17-11	18-12	19-13	21-15	24-16
	Noise Criteria	-	-	-	-	23	27	34	39
24 x 4 16 x 6 Ak .52	CFM	156	208	260	312	364	416	520	624
	Horizontal Throw	13-8	16-11	18-12	19-13	21-14	22-15	25-17	27-19
	Noise Criteria	-	-	-	20	24	28	35	40
14 x 8 18 x 6 Ak .63	CFM	189	252	315	378	441	504	630	756
	Horizontal Throw	15-8	17-12	19-13	21-14	23-16	24-17	27-19	30-20
	Noise Criteria	-	-	-	20	25	29	36	41
20 x 6 Ak .66	CFM	198	264	330	396	462	528	660	792
	Horizontal Throw	15-9	18-12	20-13	22-15	24-16	25-17	28-19	31-21
	Noise Criteria	-	-	-	21	25	29	36	41
16 x 8 Ak .71	CFM	213	284	355	426	497	568	710	852
	Horizontal Throw	16-9	18-13	20-14	23-15	24-17	26-18	30-20	35-22
	Noise Criteria	-	-	-	21	26	30	36	42
24 x 6 18 x 8 Ak .88	CFM	264	352	440	528	616	704	880	1056
	Horizontal Throw	18-10	20-14	23-16	25-17	27-18	29-20	32-22	36-24
	Noise Criteria	-	-	-	22	26	30	37	43
20 x 8 16 x 10 Ak .98	CFM	294	392	490	588	686	784	980	1176
	Horizontal Throw	19-10	21-15	24-17	26-18	28-19	30-21	34-23	38-25
	Noise Criteria	-	-	-	23	27	31	38	44
18 x 10 Ak 1.11	CFM	333	444	555	666	777	888	1110	1332
	Horizontal Throw	20-11	23-16	25-18	28-19	30-21	32-22	36-25	40-27
	Noise Criteria	-	-	-	23	27	31	38	44
36 x 6 18 x 12 Ak 1.35	CFM	405	540	675	810	945	1080	1350	1620
	Horizontal Throw	22-12	25-17	28-19	31-21	34-23	36-24	40-27	44-30
	Noise Criteria	-	-	-	24	28	32	39	44
24 x 10 20 x 12 Ak 1.49	CFM	447	596	745	894	1043	1192	1490	1788
	Horizontal Throw	23-13	26-18	30-20	32-22	35-24	37-26	42-29	46-31
	Noise Criteria	-	-	-	24	29	33	39	45
24 x 12 Ak 1.82	CFM	546	728	910	1092	1274	1456	1820	2184
	Horizontal Throw	25-14	30-20	33-22	36-25	39-27	42-28	47-32	51-35
	Noise Criteria	-	-	-	25	30	34	40	46
36 x 10 30 x 12 Ak 2.29	CFM	687	916	1145	1374	1603	1832	2290	2748
	Horizontal Throw	29-16	33-22	37-25	41-28	44-30	47-32	53-36	61-42
	Noise Criteria	-	-	20	26	30	34	41	47
36 x 12 Ak 2.75	CFM	825	1100	1375	1650	1925	2200	2750	3300
	Horizontal Throw	31-18	36-25	41-28	44-30	48-33	51-35	57-39	63-43
	Noise Criteria	-	-	21	27	31	35	42	47

Terminal Velocity of 75 and 150 FPM, respectively

NOTES:
1. Total Pressure in inches water column.
2. Throw data are in feet at terminal velocities of 75 and 150 FPM, respectively.
3. Noice Criteria based on a 10 dB room attenuation (Re: 10^{-12} watts).

Recommended Noise Criteria and Face Velocity Ranges are on page 6

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L Series

NOTES:

1. Table 1 based on up to 4-foot grille length. For longer lengths, correct throw and NC per **Table 2**.
2. When using continuous grille lengths with alternate active and inactive sections, a reduction in throw can be obtained by omitting the factors contained in **Table 2**.
3. Bar style 30 and 0
   Increase **Table 1** NC + 5 NC
4. Supply air temperature effect on horizontal throw is shown in Table 3. vertical down-throw at varying supply temperatures is shown in Table 4.
5. When spreading the air path with a horizontal deflection of 22^0 per side in grille lengths up to 4 feet:
   Multiply **Table 1** Throw x .75
   Increase **Table 1** NC + 5 NC
   Multiply **Table 1** P_S x 1.20
   Multiply **Table 5** A_k x .90
6. Terminal velocities (V_t) at the minimum and maximum throw (T) values are rated at 125 FPM and 75 FPM respectively with corresponding room velocities (V_r) of 50 FPM and 35 FPM.

Table 1 - Supply Air

CFM/Ft of total Linear length	Listed Width in Inches	Min. P_s in H_20		Face Velocity (V_k) FPM		Throw (T) in Feet		Minimum Ceiling Height in Feet		
		Bar Style		Bar Style		Sidewall	Sill/Floor			
		00 and 15	30 and 01	00 and 15	30 and 01	Min.-Max.	Min.-Max.	@ -18F T	@ -25F T	NC
20	1½	.01	.01	500	575	6-9	1-2	8	9	<20
30	1½	.03	.04	750	865	7-10	2-3	9	10	25
	2	.01	.01	475	545	6-9	1-2			20
40	1½	.05	.07	1000	1150	9-13	3-5			30
	2	.02	.03	635	730	8-11	2-4	9	11	25
	2½	.01	.01	460	530	7-10	2-3			20
50	1½	.03	.12	1250	1440	11-16	4-9			30
	2	.03	.04	790	910	10-14	3-7	9½	11	25
	2½	.02	.03	575	660	9-13	2-6			20
	3	<.01	.01	440	505	8-12	2-5			<20
60	2	.05	.07	950	1090	12-18	5-11			30
	2½	.02	.03	690	795	11-16	4-9	9½	12	25
	3	.01	.01	530	610	10-14	3-7			20
	4	<.01	.01	370	425	8-12	2-5			<20
70	2	.06	.08	1110	1275	14-20	7-13			30
	2½	.03	.04	810	935	13-19	6-12	10	12	30
	3	.02	.03	660	760	11-16	4-9			25
	4	<.01	.01	435	500	10-14	3-7			<20
80	2	.08	.10	1275	1450	16-23	9-16			30
	2½	.04	.05	920	1060	15-21	8-14	10½	12½	30
	3	.03	.04	700	805	13-18	6-11			25
	4	.01	.01	495	570	11-16	4-9			20
90	2½	.05	.07	1030	1185	17-24	10-17			30
	3	.04	.05	785	905	15-21	8-14	11	13	30
	4	.01	.02	550	635	13-18	6-11			25
	5	<.01	.01	450	520	11-16	4-9			20
100	2½	.06	.08	1150	1325	19-27	12-20			30
	3	.04	.05	875	1010	16-23	9-16	11	13	30
	4	.02	.03	620	715	14-20	7-13			25
	5	.01	.01	500	575	12-18	5-11			20
120	3	.06	.08	1050	1210	19-28	11-20			30
	4	.03	.04	745	855	17-24	9-16	11½	13	30
	5	.02	.03	600	680	15-22	7-14			25
	6	<.01	.01	480	550	13-19	5-11			20
140	3	.08	.11	1220	1410	22-32	14-24			35
	4	.04	.05	870	1000	19-28	11-20	11½	14	30
	5	.02	.03	700	810	17-25	9-17			25
	6	.01	.01	560	645	15-22	7-14			20
160	4	.05	.07	990	1140	22-32	13-23			35
	5	.03	.04	800	925	19-29	10-20	12	15	30
	6	.02	.03	640	735	18-26	9-17			25
	8	.01	.01	460	530	15-22	6-13			20
180	4	.07	.09	1110	1275	25-36	16-27			35
	5	.04	.05	900	1035	22-33	13-24	12	15	30
	6	.03	.04	725	835	20-30	11-21			25
	8	.02	.03	520	600	17-25	8-16			20
200	4	.08	.11	1240	1425	28-41	-			40
	5	.05	.07	1000	1150	24-36	-	12	15	35
	6	.04	.05	800	925	23-33	-			30
	8	.02	.03	575	665	20-28	-			25
250	5	.08	.11	1250	1440	30-46	-			40
	6	.05	.07	1000	1150	27-39	-	13	15	35
	8	.03	.04	720	830	25-35	-			30
	10	.01	.01	550	625	21-32	-			25
300	6	.07	.09	1200	1375	33-48	-			40
	8	.04	.05	865	1000	29-42	-	13	15	35
	10	.02	.03	665	765	25-39	-			30
	12	.01	.01	545	630	23-33	-			25
350	8	.05	.08	1020	1175	34-48	-			40
	10	.03	.04	780	900	29-45	-	13	15	35
	12	.02	.03	640	735	26-38	-			30
400	8	.08	.11	1170	1350	40-55	-			45
	10	.04	.05	890	1025	33-50	-	14	16	40
	12	.03	.04	730	845	33-44	-			35

Symbols:

V_t Terminal Velocity in FPM
V_r Room Velocity in FPM
V_k Face Velocity in FPM
A_k Outlet Area in Square Feet
A_n Neck Area in Square Feet
P_S Static Pressure in H2O
NC 18dB Room Attenuation
T Throw in Feet: see Note 6.
ΔT Temperature Differential

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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Table 2 - Continuous Grille Length Factors

Modify **Table 1** by listed values for grille lengths above 4 feet.			
Grille Length in Feet	**Throw (T)**		
	Sidewall Min.-Max.	**Sill/Floor Min.-Max.**	**NC**
4-6	No Change		+0
7-20	T x 1.10		+5
21-100	T x 1.15		+10

Table 3 - Supply Air Temperature Factors

Multiply Throw in **Table 1** (or factor in **Table 2** if used) by listed value.			
Sidewall Sill/Floor	**@-20F T**	**@ 0F T**	**@+25F T**
	T x 1.00	T x 1.10	T x 1.20

Table 4 - Vertical Down-Throw and Supply Air Temperature Factors

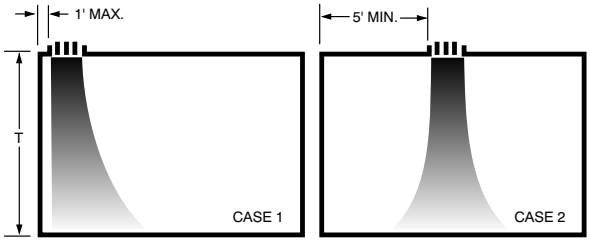
Multiply Throw-Sidewall in **Table 1** (or factor in **Table 2** if used) by listed value.			
Case	**@-20F T Cooling**	**@ 0F T Ventilating**	**@+25F T Heating**
Case 1	T x 1.00	T x .90	T x .60
Case 2	T x .70	T x .60	T x .40

Table 5 - Supply Grille Areas (per foot of length)

	Listed Width in Inches																
	1½	**2**	**2½**	**3**	**4**	**5**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**	**30**	**36**
A_n	.13	.17	.21	.25	.33	.42	.50	.67	.84	1.00	1.20	1.30	1.50	1.70	2.00	2.50	3.00

	00 and 15 Bar Styles															
A_k	.04	.06	.09	.11	.16	.20	.25	.35	.45	.55	.68	.79	.90	1.00	1.30	1.60	2.10

	30 and 01 Bar Styles															
A_k	.03	.05	.08	.09	.14	.17	.21	.30	.38	.47	.58	.67	.77	.85	1.10	1.40	1.80



Return Air CFM per Foot of Length

Listed Width in Inches	A_k Area	Bar Style	NC 20-25 Nonducted		NC 30 Ducted		NC 35-40 Ducted	
			-.02" P_s CFM	-.03" P_s CFM	-.08" P_s CFM	-.10" P_s CFM	-.15" P_s CFM	-.20" P_s CFM
1½	.13	00 and 15	20	25	40	45	55	65
	.12	01 and 30	15	20	35	40	45	55
2	.18	00 and 15	30	40	65	70	90	100
	.17	01 and 30	25	35	55	60	75	85
2½	.23	00 and 15	45	50	85	95	115	135
	.22	01 and 30	35	45	70	80	100	115
3	.27	00 and 15	55	65	105	120	145	165
	.25	01 and 30	45	55	90	100	120	140
4	.34	00 and 15	75	90	150	165	205	235
	.33	01 and 30	60	75	125	140	170	195
5	.41	00 and 15	95	120	190	215	260	305
	.39	01 and 30	80	100	160	180	220	255
6	.46	00 and 15	120	145	240	265	325	375
	.44	01 and 30	100	120	200	220	270	315
8	.57	00 and 15	160	200	325	360	445	515
	.54	01 and 30	135	165	270	305	370	430
10	.68	00 and 15	210	255	415	465	570	655
	.64	01 and 30	175	215	350	390	475	550
12	.76	00 and 15	255	310	510	565	695	800
	.72	01 and 30	210	260	425	475	580	670
16	.93	00 and 15	350	430	700	785	960	1100
	.86	01 and 30	285	350	570	635	780	900
20	1.10	00 and 15	445	545	885	990	1220	1410
	1.00	01 and 30	365	445	730	815	1000	1160
24	1.25	00 and 15	540	660	1080	1210	1475	1710
	1.15	01 and 30	440	540	880	985	1200	1390

Recommended Noise Criteria and Face Velocity Ranges are on page 6

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S Series

IP/METRIC DATA: 1/2" SLOT WIDTH, CONTINUOUS SLOT

	IP Data					Metric Data										
	Air Flow	Press Ps	1-Way Throw	2-Way Throw	NC	Air Flow	Press Ps	1-Way Throw	2-Way Throw	Octave Band, dB					
	CFM/ft	"WG	ft	ft		L/s/m	Pa	m	m	2	3	4	5	6	7
1 Slot	5	0.004	1 - 2 - 7		-	8	1.1	0.2 - 0.6 - 2.2		37	24	24	12	-	-
	13	0.030	6 - 9 - 18		**26**	20	7.4	1.7 - 2.8 - 5.4		48	44	42	33	26	23
	17	0.051	8 - 12 - 20		**32**	26	12.7	2.5 - 3.7 - 6.2		51	49	47	39	32	28
	21	0.078	10 - 15 - 23		**36**	33	19.3	3.0 - 4.5 - 6.8		53	53	51	44	37	32
	29	0.148	14 - 19 - 26		**43**	45	36.9	4.2 - 5.7 - 8.0		57	60	57	51	44	38
2 Slots	10	0.004	2 - 4 - 12	1 - 3 - 8	**10**	15	1.1	0.5 - 1.2 - 3.5	0.4 - 0.9 - 2.5	40	27	27	15	-	-
	22	0.021	9 - 13 - 23	6 - 9 - 16	**26**	34	5.3	2.6 - 3.9 - 7.0	1.8 - 2.8 - 5.0	49	43	42	33	25	23
	28	0.035	11 - 16 - 26	8 - 12 - 18	**31**	43	8.6	3.3 - 5.0 - 7.9	2.3 - 3.5 - 5.6	51	48	46	38	31	27
	34	0.051	13 - 20 - 29	9 - 14 - 20	**35**	53	12.7	4.0 - 6.0 - 8.7	2.8 - 4.3 - 6.2	54	52	50	42	35	31
	46	0.093	18 - 24 - 33	13 - 17 - 24	**41**	71	23.2	5.4 - 7.2 - 10.1	3.8 - 5.1 - 7.2	57	58	55	49	42	36
3 Slots	15	0.004	3 - 6 - 15		**12**	23	1.1	0.8 - 1.8 - 4.6		37	21	21	-	-	-
	31	0.019	10 - 16 - 27		**27**	48	4.7	3.2 - 4.8 - 8.3		50	44	42	33	25	23
	39	0.030	13 - 20 - 31		**31**	60	7.4	4.0 - 6.0 - 9.3		52	48	46	38	31	28
	47	0.043	16 - 24 - 34		**35**	73	10.8	4.8 - 7.2 - 10.2		54	52	50	42	35	31
	63	0.078	21 - 28 - 39		**41**	98	19.3	6.5 - 8.4 - 11.9		58	58	55	49	42	36
4 Slots	20	0.004	3 - 8 - 18	2 - 5 - 13	**13**	31	1.1	1.0 - 2.3 - 5.5	0.7 - 1.6 - 3.9	43	30	30	18	-	11
	40	0.018	12 - 18 - 31	9 - 13 - 22	**27**	62	4.4	3.7 - 5.5 - 9.4	2.6 - 3.9 - 6.7	51	44	43	34	26	24
	50	0.028	15 - 23 - 35	11 - 16 - 25	**32**	77	6.9	4.6 - 6.9 - 10.6	3.3 - 4.9 - 7.5	53	49	47	39	31	28
	60	0.040	18 - 27 - 38	13 - 19 - 27	**36**	93	9.9	5.5 - 8.2 - 11.6	3.9 - 5.8 - 8.2	55	52	50	43	35	32
	80	0.070	24 - 31 - 44	17 - 22 - 31	**41**	124	17.5	7.4 - 9.4 - 13.4	5.2 - 6.7 - 9.4	58	58	56	49	42	37
5 Slots	25	0.004	4 - 9 - 21		**14**	39	1.1	1.2 - 2.8 - 6.3		44	31	31	19	11	12
	49	0.017	14 - 20 - 34		**28**	76	4.2	4.1 - 6.2 - 10.5		51	45	43	34	26	25
	61	0.026	17 - 25 - 38		**32**	94	6.5	5.1 - 7.7 - 11.7		54	49	47	39	31	29
	73	0.038	20 - 30 - 42		**36**	113	9.4	6.1 - 9.0 - 12.8		56	53	51	43	36	32
	97	0.066	27 - 34 - 48		**42**	150	16.5	8.1 - 10.4 - 14.7		59	59	56	49	42	37
6 Slots	30	0.004	5 - 10 - 23	3 - 7 - 16	**15**	46	1.1	1.4 - 3.2 - 7.0	1.0 - 2.2 - 5.0	45	32	32	20	12	13
	58	0.016	15 - 22 - 37	10 - 16 - 26	**28**	90	4.1	4.5 - 6.8 - 11.4	3.2 - 4.8 - 8.0	52	45	44	35	27	25
	72	0.025	18 - 28 - 42	13 - 20 - 29	**33**	111	6.3	5.6 - 8.4 - 12.7	4.0 - 5.9 - 9.0	54	50	48	39	32	29
	86	0.036	22 - 32 - 46	16 - 23 - 32	**37**	133	9.0	6.7 - 9.8 - 13.9	4.7 - 6.9 - 9.8	56	53	51	43	36	32
	114	0.064	29 - 37 - 52	21 - 26 - 37	**42**	177	15.8	8.9 - 11.3 - 16.0	6.3 - 8.0 - 11.3	60	59	57	50	42	38
7 Slots	35	0.004	5 - 12 - 25		**16**	54	1.1	1.6 - 3.5 - 7.6		44	29	29	17	-	11
	65	0.015	16 - 23 - 40		**28**	101	3.8	4.7 - 7.1 - 12.0		52	45	44	34	27	25
	80	0.023	19 - 29 - 44		**33**	124	5.7	5.8 - 8.7 - 13.4		55	49	48	39	31	29
	95	0.032	23 - 34 - 48		**36**	147	8.1	6.9 - 10.3 - 14.6		57	53	51	43	35	32
	125	0.056	30 - 39 - 55		**42**	194	14.0	9.1 - 11.8 - 16.7		60	58	56	49	42	37
8 Slots	40	0.004	6 - 13 - 27	4 - 9 - 19	**16**	62	1.1	1.7 - 3.9 - 8.2	1.2 - 2.7 - 5.8	46	33	33	21	13	14
	74	0.015	17 - 25 - 42	12 - 18 - 30	**29**	115	3.8	5.1 - 7.6 - 12.9	3.6 - 5.4 - 9.1	53	46	44	35	27	26
	91	0.023	21 - 31 - 47	15 - 22 - 33	**33**	141	5.7	6.3 - 9.4 - 14.3	4.4 - 6.6 - 10.1	55	50	48	39	32	29
	108	0.032	24 - 36 - 51	17 - 26 - 36	**37**	167	8.0	7.4 - 11.0 - 15.5	5.2 - 7.8 - 11.0	57	53	51	43	36	33
	142	0.056	32 - 41 - 59	23 - 29 - 41	**42**	220	13.8	9.8 - 12.6 - 17.8	6.9 - 8.9 - 12.6	60	59	57	49	42	38

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. Odd numbered slots for 2-Way data have been intentionally left blank. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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S Series

IP/METRIC DATA: 1/2" SLOT WIDTH, CONTINUOUS SLOT

	IP Data				Metric Data									
	Air Flow	Press Ps	Vertical Throw	NC	Air Flow	Press Ps	Vertical Throw	Octave Band, dB						
	CFM/ft	"WG	ft		L/s/m	Pa	m	2	3	4	5	6	7
1 Slot	5	0.003	1 - 2 - 5	-	8	0.6	0.3 - 0.6 - 1.5	-	-	-	-	-	-
	35	0.127	12 - 14 - 20	**15**	54	31.5	3.5 - 4.3 - 6.1	43	39	30	16	11	-
	50	0.259	14 - 17 - 24	**24**	78	64.4	4.2 - 5.2 - 7.3	50	46	39	22	17	-
	65	0.437	16 - 19 - 27	**30**	101	108.8	4.8 - 5.9 - 8.3	54	52	45	27	21	14
	95	0.933	19 - 23 - 33	**40**	147	232.4	5.8 - 7.1 - 10.0	61	60	54	34	27	20
2 Slots	10	0.003	1 - 3 - 7	-	16	0.6	0.4 - 1.0 - 2.3	-	-	-	-	-	-
	60	0.093	15 - 19 - 26	**14**	93	23.2	4.5 - 5.6 - 8.0	43	38	30	16	12	-
	85	0.187	18 - 22 - 31	**23**	132	46.5	5.5 - 6.7 - 9.5	50	46	38	23	17	-
	110	0.313	21 - 25 - 36	**30**	171	77.9	6.2 - 7.6 - 10.8	54	51	44	27	21	14
	160	0.662	25 - 30 - 43	**39**	248	164.8	7.5 - 9.2 - 13.0	61	59	53	34	27	20
3 Slots	15	0.003	2 - 4 - 9	-	23	0.6	0.5 - 1.2 - 2.8	-	-	-	-	-	-
	85	0.083	17 - 22 - 31	**15**	132	20.7	5.3 - 6.7 - 9.5	44	39	30	17	13	-
	120	0.165	21 - 26 - 37	**24**	186	41.2	6.5 - 8.0 - 11.3	50	46	38	23	18	11
	155	0.276	24 - 30 - 42	**30**	241	68.7	7.4 - 9.1 - 12.8	55	52	44	28	22	15
	225	0.582	29 - 36 - 51	**39**	349	144.8	8.9 - 10.9 - 15.5	62	59	53	34	28	21
4 Slots	20	0.003	2 - 5 - 11	-	31	0.6	0.6 - 1.4 - 3.2	13	-	-	-	-	-
	110	0.078	20 - 25 - 36	**16**	171	19.5	6.0 - 7.6 - 10.8	45	39	31	18	13	-
	155	0.155	24 - 30 - 42	**24**	241	38.7	7.4 - 9.1 - 12.8	51	47	39	24	19	12
	200	0.259	28 - 34 - 48	**31**	310	64.4	8.4 - 10.3 - 14.6	56	52	45	28	23	16
	290	0.544	33 - 41 - 58	**40**	450	135.3	10.1 - 12.4 - 17.6	62	60	53	35	28	21
5 Slots	25	0.003	2 - 5 - 12	-	39	0.6	0.7 - 1.6 - 3.6	14	-	-	-	-	-
	125	0.065	20 - 27 - 38	**15**	194	16.1	6.1 - 8.1 - 11.5	44	38	30	17	13	-
	175	0.127	26 - 32 - 45	**23**	272	31.5	7.9 - 9.6 - 13.6	50	46	37	23	18	11
	225	0.209	29 - 36 - 51	**29**	349	52.1	8.9 - 10.9 - 15.5	55	51	43	28	22	15
	325	0.437	35 - 43 - 61	**39**	505	108.8	10.7 - 13.1 - 18.6	61	59	52	34	28	21
6 Slots	30	0.003	3 - 6 - 13	-	47	0.6	0.8 - 1.8 - 4.0	15	-	-	-	-	-
	150	0.065	22 - 29 - 42	**16**	233	16.1	6.7 - 8.9 - 12.6	45	39	30	18	14	-
	210	0.127	28 - 35 - 49	**24**	326	31.5	8.6 - 10.6 - 14.9	51	46	38	24	19	12
	270	0.209	32 - 39 - 56	**30**	419	52.1	9.8 - 12.0 - 16.9	55	52	44	28	23	16
	390	0.437	39 - 47 - 67	**39**	605	108.8	11.8 - 14.4 - 20.4	62	59	53	35	29	22
7 Slots	35	0.003	3 - 6 - 14	-	54	0.6	0.9 - 1.9 - 4.3	13	-	-	-	-	-
	185	0.072	25 - 33 - 46	**18**	287	18.0	7.6 - 9.9 - 14.0	46	41	32	19	15	-
	260	0.143	32 - 39 - 55	**26**	404	35.5	9.6 - 11.8 - 16.6	53	48	40	26	21	14
	335	0.237	36 - 44 - 62	**33**	520	59.0	10.9 - 13.3 - 18.9	57	54	46	30	24	17
	485	0.496	43 - 53 - 75	**42**	753	123.6	13.1 - 16.0 - 22.7	64	61	55	37	30	23
8 Slots	40	0.003	3 - 7 - 15	-	62	0.6	0.9 - 2.1 - 4.6	16	-	-	-	-	-
	200	0.065	25 - 34 - 48	**17**	310	16.1	7.7 - 10.3 - 14.6	46	40	32	19	15	-
	280	0.127	33 - 40 - 57	**25**	435	31.5	10.0 - 12.2 - 17.2	52	48	40	25	20	13
	360	0.209	37 - 45 - 64	**32**	559	52.1	11.3 - 13.8 - 19.6	57	53	45	30	24	17
	520	0.437	45 - 55 - 77	**41**	807	108.8	13.6 - 16.6 - 23.5	63	61	54	36	30	23

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

S Series

IP/METRIC DATA: 1/2" SLOT WIDTH, CONTINUOUS SLOT

	IP Data				Metric Data									
	Air Flow	Press Ps	Vertical Throw	NC	Air Flow	Press Ps	Vertical Throw	Octave Band, dB						
	CFM/ft	"WG	ft		L/s/m	Pa	m	2	3	4	5	6	7
1 Slot	5	0.001	0 - 1 - 3	-	8	0.3	0.1 - 0.3 - 1.0	-	-	-	-	-	-
	55	0.162	11 - 14 - 20	18	85	40.3	3.5 - 4.2 - 6.0	48	38	34	20	-	-
	80	0.342	14 - 17 - 24	26	124	85.2	4.2 - 5.1 - 7.2	55	45	41	26	15	-
	105	0.590	16 - 19 - 27	32	163	146.8	4.8 - 5.8 - 8.3	60	49	46	30	19	11
	155	1.285	19 - 23 - 33	41	240	320.0	5.8 - 7.1 - 10.0	67	56	53	36	25	17
2 Slots	10	0.001	1 - 2 - 5	-	15	0.3	0.2 - 0.5 - 1.6	-	-	-	-	-	-
	90	0.108	15 - 18 - 25	17	139	27.0	4.4 - 5.4 - 7.7	48	38	34	20	-	-
	130	0.226	17 - 21 - 30	25	201	56.3	5.3 - 6.5 - 9.2	54	44	40	26	15	-
	170	0.386	20 - 24 - 35	31	263	96.2	6.1 - 7.4 - 10.5	59	49	45	30	19	12
	250	0.836	24 - 30 - 42	40	387	208.1	7.4 - 9.0 - 12.8	66	55	52	36	24	17
3 Slots	15	0.001	1 - 2 - 7	-	23	0.3	0.3 - 0.7 - 2.1	-	-	-	-	-	-
	115	0.079	16 - 20 - 28	16	178	19.6	5.0 - 6.1 - 8.7	47	37	33	19	-	-
	165	0.162	20 - 24 - 34	24	255	40.3	6.0 - 7.3 - 10.4	53	43	39	25	14	-
	215	0.275	22 - 28 - 39	30	333	68.4	6.8 - 8.4 - 11.8	58	48	44	29	18	11
	315	0.590	27 - 33 - 47	39	488	146.8	8.3 - 10.1 - 14.3	65	54	51	35	24	16
4 Slots	20	0.001	1 - 3 - 8	-	31	0.3	0.4 - 0.8 - 2.4	11	-	-	-	-	-
	150	0.075	19 - 23 - 33	17	232	18.7	5.7 - 7.0 - 9.9	47	38	33	20	-	-
	215	0.155	22 - 28 - 39	25	333	38.5	6.8 - 8.4 - 11.8	54	44	40	26	15	-
	280	0.262	26 - 31 - 44	31	434	65.3	7.8 - 9.5 - 13.5	59	49	45	30	19	12
	410	0.562	31 - 38 - 54	40	635	139.9	9.4 - 11.6 - 16.3	66	55	52	36	25	17
5 Slots	25	0.001	1 - 3 - 9	-	39	0.3	0.4 - 1.0 - 2.7	12	-	-	-	-	-
	185	0.073	21 - 26 - 36	18	286	18.2	6.3 - 7.8 - 11.0	48	39	34	21	11	-
	265	0.150	25 - 31 - 43	26	410	37.4	7.6 - 9.3 - 13.1	55	45	41	26	16	-
	345	0.255	28 - 35 - 49	32	534	63.4	8.7 - 10.6 - 15.0	59	49	45	31	20	13
	505	0.546	34 - 42 - 60	40	782	135.9	10.5 - 12.8 - 18.1	66	56	52	36	25	18
6 Slots	30	0.001	2 - 4 - 10	-	46	0.3	0.5 - 1.1 - 3.0	13	-	-	-	-	-
	210	0.066	22 - 27 - 38	18	325	16.3	6.8 - 8.3 - 11.7	48	39	34	21	11	-
	300	0.134	27 - 33 - 46	25	465	33.3	8.1 - 9.9 - 14.0	54	45	40	26	16	-
	390	0.226	30 - 37 - 52	31	604	56.3	9.2 - 11.3 - 15.9	59	49	45	30	20	13
	570	0.483	37 - 45 - 63	40	883	120.2	11.1 - 13.6 - 19.3	66	55	52	36	25	18
7 Slots	35	0.001	2 - 4 - 11	-	54	0.3	0.5 - 1.2 - 3.3	11	-	-	-	-	-
	235	0.060	23 - 29 - 41	18	364	15.0	7.1 - 8.7 - 12.4	48	39	34	21	11	-
	335	0.123	28 - 34 - 49	25	519	30.5	8.5 - 10.4 - 14.8	54	45	40	26	16	-
	435	0.207	32 - 39 - 55	31	674	51.4	9.7 - 11.9 - 16.8	59	49	45	30	20	13
	635	0.440	39 - 47 - 67	40	983	109.6	11.7 - 14.4 - 20.3	66	55	52	36	25	18
8 Slots	40	0.001	2 - 4 - 12	-	62	0.3	0.6 - 1.3 - 3.5	14	-	-	-	-	-
	260	0.057	25 - 30 - 43	18	403	14.1	7.5 - 9.2 - 13.0	48	39	34	21	11	-
	370	0.114	29 - 36 - 51	25	573	28.5	9.0 - 11.0 - 15.5	54	45	40	26	16	-
	480	0.193	34 - 41 - 58	31	743	47.9	10.2 - 12.5 - 17.7	59	49	45	30	20	13
	700	0.410	41 - 50 - 70	40	1084	102.0	12.3 - 15.1 - 21.3	66	55	52	36	25	18

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

S Series

IP/METRIC DATA: 3/4" SLOT WIDTH, CONTINUOUS SLOT

	IP Data					Metric Data										
	Air Flow	Press Ps	1-Way Throw	2-Way Throw	NC	Air Flow	Press Ps	1-Way Throw	2-Way Throw	Octave Band, dB					
	CFM/ft	"WG	ft	ft		L/s/m	Pa	m	m	2	3	4	5	6	7
1 Slot	5	0.003	1 - 1 - 6		-	8	0.8	0.2 - 0.4 - 1.7		26	12	-	-	-	-
	15	0.030	6 - 10 - 19		14	23	7.4	1.7 - 3.0 - 5.8		40	34	31	19	-	-
	20	0.053	9 - 13 - 22		21	31	13.2	2.6 - 4.0 - 6.7		43	40	37	28	19	14
	25	0.083	11 - 16 - 25		27	39	20.7	3.3 - 4.9 - 7.5		46	45	43	34	26	19
	35	0.163	15 - 21 - 29		35	54	40.5	4.6 - 6.2 - 8.8		50	52	50	44	36	27
2 Slots	10	0.003	1 - 3 - 10	1 - 2 - 7	-	16	0.8	0.4 - 0.9 - 3.2	0.3 - 0.6 - 2.2	29	15	-	-	-	-
	30	0.030	10 - 16 - 27	7 - 11 - 19	17	47	7.4	3.2 - 4.7 - 8.2	2.2 - 3.4 - 5.8	43	37	34	22	13	11
	40	0.053	14 - 21 - 31	10 - 15 - 22	25	62	13.2	4.2 - 6.3 - 9.4	3.0 - 4.5 - 6.7	46	43	40	31	22	17
	50	0.083	17 - 25 - 35	12 - 17 - 25	30	78	20.7	5.3 - 7.5 - 10.6	3.7 - 5.3 - 7.5	49	48	46	37	29	22
	70	0.163	24 - 29 - 41	17 - 21 - 29	39	109	40.5	7.2 - 8.8 - 12.5	5.1 - 6.2 - 8.8	53	55	53	47	39	30
3 Slots	15	0.003	2 - 4 - 13		-	23	0.8	0.6 - 1.2 - 4.1		26	-	-	-	-	-
	45	0.030	13 - 20 - 33		19	70	7.4	4.1 - 6.1 - 10.0		45	39	36	24	15	12
	60	0.053	18 - 27 - 38		27	93	13.2	5.4 - 8.1 - 11.6		48	45	42	33	24	19
	75	0.083	22 - 30 - 43		32	116	20.7	6.8 - 9.1 - 12.9		51	50	47	39	31	24
	105	0.163	29 - 36 - 50		41	163	40.5	8.8 - 10.8 - 15.3		55	56	55	49	41	32
4 Slots	20	0.003	2 - 5 - 16	2 - 4 - 11	-	31	0.8	0.7 - 1.6 - 4.8	0.5 - 1.1 - 3.4	32	18	12	-	-	-
	60	0.030	16 - 24 - 38	11 - 17 - 27	21	93	7.4	4.8 - 7.2 - 11.6	3.4 - 5.1 - 8.2	46	40	37	25	17	14
	80	0.053	21 - 31 - 44	15 - 22 - 31	28	124	13.2	6.4 - 9.4 - 13.4	4.6 - 6.7 - 9.4	49	46	43	34	25	20
	100	0.083	26 - 35 - 49	19 - 25 - 35	34	155	20.7	8.0 - 10.6 - 14.9	5.7 - 7.5 - 10.6	52	51	49	40	32	25
	140	0.163	34 - 41 - 58	24 - 29 - 41	42	217	40.5	10.2 - 12.5 - 17.7	7.2 - 8.8 - 12.5	56	58	56	50	42	33
5 Slots	25	0.003	3 - 6 - 18		-	39	0.8	0.8 - 1.8 - 5.5		33	19	13	-	-	-
	75	0.030	18 - 27 - 43		22	116	7.4	5.5 - 8.2 - 12.9		47	41	38	26	17	15
	100	0.053	24 - 35 - 49		29	155	13.2	7.3 - 10.6 - 14.9		50	47	44	35	26	21
	125	0.083	30 - 39 - 55		35	194	20.7	9.1 - 11.8 - 16.7		53	52	50	41	33	26
	175	0.163	38 - 46 - 65		43	272	40.5	11.4 - 14.0 - 19.8		57	59	57	51	43	34
6 Slots	30	0.003	3 - 7 - 20	2 - 5 - 14	-	47	0.8	0.9 - 2.1 - 6.1	0.7 - 1.5 - 4.3	34	19	13	-	-	-
	90	0.030	20 - 30 - 47	14 - 21 - 33	23	140	7.4	6.1 - 9.1 - 14.2	4.3 - 6.4 - 10.0	48	42	39	27	18	15
	120	0.053	27 - 38 - 54	19 - 27 - 38	30	186	13.2	8.1 - 11.6 - 16.4	5.7 - 8.2 - 11.6	51	48	45	36	27	22
	150	0.083	33 - 43 - 60	24 - 30 - 43	35	233	20.7	10.1 - 12.9 - 18.3	7.2 - 9.1 - 12.9	54	53	50	42	34	27
	210	0.163	41 - 50 - 71	29 - 36 - 50	44	326	40.5	12.5 - 15.3 - 21.6	8.8 - 10.8 - 15.3	58	59	58	52	44	35
7 Slots	35	0.003	3 - 8 - 22		-	54	0.8	1.0 - 2.3 - 6.6		33	17	-	-	-	-
	101	0.028	21 - 31 - 49		22	157	6.9	6.4 - 9.6 - 15.0		48	42	38	27	18	15
	134	0.049	28 - 40 - 57		30	208	12.1	8.5 - 12.2 - 17.3		51	48	45	35	26	22
	167	0.076	35 - 45 - 64		35	259	18.8	10.5 - 13.7 - 19.3		54	52	50	41	33	27
	233	0.147	43 - 53 - 75		43	362	36.6	13.2 - 16.1 - 22.8		58	59	58	51	43	34
8 Slots	40	0.003	4 - 8 - 23	3 - 6 - 17	-	62	0.8	1.1 - 2.5 - 7.1	0.8 - 1.8 - 5.0	35	21	15	-	-	-
	112	0.026	22 - 33 - 52	15 - 23 - 37	22	174	6.5	6.6 - 10.0 - 15.8	4.7 - 7.1 - 11.2	48	42	38	26	17	15
	148	0.045	29 - 42 - 60	20 - 30 - 42	29	230	11.3	8.8 - 12.9 - 18.2	6.2 - 9.1 - 12.8	51	48	45	35	26	21
	184	0.070	36 - 47 - 67	25 - 33 - 47	35	286	17.5	10.9 - 14.3 - 20.3	7.7 - 10.1 - 14.3	54	52	50	41	32	26
	256	0.136	45 - 56 - 79	32 - 39 - 56	43	397	33.8	13.8 - 16.9 - 23.9	9.8 - 11.9 - 16.9	58	59	57	50	42	34

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. Odd numbered slots for 2-Way data have been intentionally left blank. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

S Series

IP/METRIC DATA: 3/4" SLOT WIDTH, CONTINUOUS SLOT

	IP Data				Metric Data									
	Air Flow	Press Ps	Vertical Throw	NC	Air Flow	Press Ps	Vertical Throw	Octave Band, dB						
	CFM/ft	"WG	ft		L/s/m	Pa	m	2	3	4	5	6	7
1 Slot	20	0.032	6 - 10 - 15	-	31	8.1	1.9 - 2.9 - 4.6	28	23	18	12	-	-
	70	0.397	16 - 20 - 28	22	109	99.0	5.0 - 6.1 - 8.6	50	45	37	28	21	14
	95	0.732	19 - 23 - 33	28	147	182.3	5.8 - 7.1 - 10.0	55	50	42	32	24	18
	120	1.168	21 - 26 - 37	33	186	290.8	6.5 - 8.0 - 11.3	59	54	46	35	27	20
	170	2.344	26 - 31 - 44	40	264	583.7	7.8 - 9.5 - 13.4	65	60	51	40	31	24
2 Slots	30	0.018	7 - 10 - 19	-	47	4.5	2.1 - 3.1 - 5.6	26	21	16	11	-	-
	110	0.245	21 - 25 - 36	21	171	61.1	6.2 - 7.6 - 10.8	48	43	37	28	21	14
	150	0.456	24 - 29 - 42	27	233	113.6	7.3 - 8.9 - 12.6	54	49	42	32	24	18
	190	0.732	27 - 33 - 47	32	295	182.3	8.2 - 10.0 - 14.2	58	53	45	35	27	21
	270	1.478	32 - 39 - 56	39	419	368.1	9.8 - 12.0 - 16.9	64	59	51	40	31	25
3 Slots	40	0.014	8 - 11 - 21	-	62	3.6	2.3 - 3.5 - 6.5	21	15	11	-	-	-
	160	0.231	25 - 30 - 43	22	248	57.5	7.5 - 9.2 - 13.0	50	45	38	29	22	16
	220	0.436	29 - 36 - 50	28	342	108.6	8.8 - 10.8 - 15.3	55	50	43	34	26	19
	280	0.707	33 - 40 - 57	33	435	175.9	10.0 - 12.2 - 17.2	59	54	47	37	29	22
	400	1.442	39 - 48 - 68	41	621	359.1	11.9 - 14.6 - 20.6	65	61	52	42	33	26
4 Slots	50	0.013	8 - 12 - 24	-	78	3.2	2.5 - 3.8 - 7.3	26	21	16	11	-	-
	200	0.203	28 - 34 - 48	22	310	50.5	8.4 - 10.3 - 14.6	50	45	38	30	23	16
	275	0.383	32 - 40 - 56	29	427	95.5	9.9 - 12.1 - 17.1	55	50	43	34	26	20
	350	0.621	37 - 45 - 63	34	543	154.6	11.1 - 13.6 - 19.3	59	54	47	37	29	23
	500	1.267	44 - 54 - 76	41	776	315.6	13.3 - 16.3 - 23.0	66	61	53	42	33	27
5 Slots	60	0.018	9 - 13 - 26	-	93	4.5	2.7 - 4.0 - 8.0	26	21	17	12	-	-
	240	0.292	30 - 37 - 53	23	373	72.7	9.2 - 11.3 - 16.0	50	45	38	30	23	17
	330	0.552	36 - 44 - 62	29	512	137.5	10.8 - 13.2 - 18.7	56	51	44	34	27	20
	420	0.894	40 - 49 - 69	34	652	222.7	12.2 - 14.9 - 21.1	60	55	47	38	30	23
	600	1.825	48 - 59 - 83	41	931	454.4	14.6 - 17.9 - 25.2	66	61	53	42	34	27
6 Slots	70	0.011	9 - 14 - 28	-	109	2.8	2.9 - 4.3 - 8.6	26	21	17	12	-	-
	270	0.164	32 - 39 - 56	22	419	40.9	9.8 - 12.0 - 16.9	50	45	38	30	23	17
	370	0.308	38 - 46 - 65	28	574	76.8	11.4 - 14.0 - 19.8	55	50	43	34	27	20
	470	0.498	42 - 52 - 74	33	730	123.9	12.9 - 15.8 - 22.3	59	54	47	38	30	23
	670	1.011	51 - 62 - 88	41	1040	251.9	15.4 - 18.9 - 26.7	65	60	53	42	34	27
7 Slots	80	0.011	10 - 15 - 30	-	124	2.6	3.0 - 4.6 - 9.1	24	19	15	11	-	-
	310	0.159	34 - 42 - 60	23	481	39.6	10.5 - 12.8 - 18.1	50	45	39	31	24	17
	425	0.299	40 - 49 - 70	29	660	74.5	12.3 - 15.0 - 21.2	56	51	44	35	27	21
	540	0.483	45 - 56 - 79	34	838	120.2	13.8 - 16.9 - 24.0	60	55	47	38	30	24
	770	0.982	54 - 67 - 94	41	1195	244.4	16.5 - 20.2 - 28.6	66	61	53	43	34	28
8 Slots	90	0.010	11 - 16 - 32	-	140	2.6	3.2 - 4.8 - 9.6	27	22	18	13	-	-
	330	0.138	36 - 44 - 62	22	512	34.4	10.8 - 13.2 - 18.7	49	44	38	30	24	17
	450	0.257	42 - 51 - 72	28	699	63.9	12.6 - 15.5 - 21.9	55	50	43	34	27	21
	570	0.412	47 - 57 - 81	33	885	102.5	14.2 - 17.4 - 24.6	59	54	47	38	30	23
	810	0.832	56 - 68 - 96	40	1257	207.1	16.9 - 20.7 - 29.3	65	60	52	42	34	27

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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S Series

IP/METRIC DATA: 3/4" SLOT WIDTH, CONTINUOUS SLOT

	IP Data				Metric Data									
	Air Flow	Press Ps	Vertical Throw	NC	Air Flow	Press Ps	Vertical Throw	Octave Band, dB						
	CFM/ft	"WG	ft		L/s/m	Pa	m	2	3	4	5	6	7
1 Slot	10	0.002	1 - 1 - 5	-	16	0.5	0.2 - 0.4 - 1.5	-	-	-	-	-	-
	70	0.100	12 - 16 - 22	**16**	109	25.0	3.6 - 4.8 - 6.8	46	37	32	25	17	-
	100	0.205	15 - 19 - 27	**23**	155	51.1	4.7 - 5.7 - 8.1	53	44	38	30	20	11
	130	0.347	17 - 21 - 30	**30**	202	86.3	5.3 - 6.5 - 9.2	58	49	42	33	23	14
	190	0.740	21 - 26 - 37	**39**	295	184.3	6.4 - 7.9 - 11.1	65	56	49	38	27	18
2 Slots	20	0.002	1 - 3 - 8	-	31	0.5	0.4 - 1.0 - 2.5	13	-	-	-	-	-
	130	0.087	17 - 21 - 30	**18**	202	21.6	5.3 - 6.5 - 9.2	48	39	34	27	19	-
	185	0.175	21 - 26 - 36	**25**	287	43.7	6.3 - 7.8 - 11.0	55	46	40	32	23	13
	240	0.295	24 - 29 - 41	**32**	373	73.5	7.2 - 8.8 - 12.5	59	50	44	35	25	16
	350	0.628	29 - 35 - 50	**41**	543	156.4	8.7 - 10.7 - 15.1	66	57	50	40	29	20
3 Slots	30	0.002	2 - 5 - 11	-	47	0.5	0.6 - 1.4 - 3.3	-	-	-	-	-	-
	180	0.074	21 - 25 - 36	**18**	279	18.4	6.3 - 7.7 - 10.8	48	39	35	28	20	-
	255	0.148	24 - 30 - 42	**26**	396	36.9	7.4 - 9.1 - 12.9	55	46	40	32	23	14
	330	0.248	28 - 34 - 48	**32**	512	61.8	8.5 - 10.4 - 14.7	60	50	44	36	26	17
	480	0.525	34 - 41 - 58	**41**	745	130.7	10.2 - 12.5 - 17.7	66	57	51	41	30	21
4 Slots	40	0.002	3 - 6 - 13	-	62	0.5	0.8 - 1.8 - 3.9	16	-	-	-	-	-
	210	0.057	22 - 27 - 38	**17**	326	14.1	6.8 - 8.3 - 11.7	47	38	34	27	20	-
	295	0.112	26 - 32 - 46	**24**	458	27.8	8.0 - 9.8 - 13.9	53	44	39	32	23	14
	380	0.185	30 - 37 - 52	**30**	590	46.1	9.1 - 11.1 - 15.7	58	49	43	35	26	17
	550	0.388	36 - 44 - 62	**39**	854	96.5	10.9 - 13.4 - 18.9	65	56	49	40	30	21
5 Slots	50	0.002	3 - 7 - 15	-	78	0.5	0.9 - 2.1 - 4.5	17	-	-	-	-	-
	270	0.060	25 - 31 - 44	**19**	419	14.9	7.7 - 9.4 - 13.3	49	40	35	28	21	11
	380	0.118	30 - 37 - 52	**26**	590	29.5	9.1 - 11.1 - 15.7	55	46	41	33	24	15
	490	0.197	34 - 42 - 59	**32**	761	49.0	10.3 - 12.6 - 17.9	60	51	45	36	27	18
	710	0.413	41 - 50 - 71	**41**	1102	103.0	12.4 - 15.2 - 21.5	66	57	51	41	31	22
6 Slots	60	0.002	4 - 8 - 16	-	93	0.5	1.1 - 2.4 - 5.0	18	-	-	-	-	-
	300	0.051	27 - 33 - 46	**18**	466	12.8	8.1 - 9.9 - 14.0	48	39	35	28	21	11
	420	0.100	31 - 38 - 54	**25**	652	25.0	9.5 - 11.7 - 16.5	54	45	40	33	24	15
	540	0.166	36 - 44 - 62	**31**	838	41.4	10.8 - 13.3 - 18.8	59	50	44	36	27	18
	780	0.347	43 - 52 - 74	**40**	1211	86.3	13.0 - 15.9 - 22.5	66	56	50	41	31	22
7 Slots	70	0.002	4 - 9 - 18	-	109	0.5	1.2 - 2.7 - 5.4	16	-	-	-	-	-
	350	0.051	29 - 35 - 50	**19**	543	12.8	8.7 - 10.7 - 15.1	49	40	35	29	21	12
	490	0.100	34 - 42 - 59	**26**	761	25.0	10.3 - 12.6 - 17.9	55	46	41	33	25	16
	630	0.166	38 - 47 - 67	**32**	978	41.4	11.7 - 14.3 - 20.3	59	50	45	37	28	18
	910	0.347	46 - 57 - 80	**40**	1413	86.3	14.1 - 17.2 - 24.3	66	57	51	41	32	22
8 Slots	80	0.002	4 - 10 - 19	-	124	0.5	1.3 - 2.9 - 5.9	19	11	-	-	-	-
	380	0.046	30 - 37 - 52	**19**	590	11.5	9.1 - 11.1 - 15.7	48	39	35	29	21	12
	530	0.090	35 - 43 - 61	**25**	823	22.4	10.7 - 13.1 - 18.6	54	46	41	33	25	16
	680	0.148	40 - 49 - 69	**31**	1056	36.9	12.1 - 14.9 - 21.0	59	50	45	36	28	18
	980	0.308	48 - 59 - 83	**40**	1521	76.6	14.6 - 17.9 - 25.3	66	57	50	41	32	22

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

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S Series

IP/METRIC DATA: 1" SLOT WIDTH, CONTINUOUS SLOT

	IP Data					Metric Data										
	Air Flow	Press Ps	1-Way Throw	2-Way Throw	NC	Air Flow	Press Ps	1-Way Throw	2-Way Throw	Octave Band, dB					
	CFM/ft	"WG	ft	ft		L/s/m	Pa	m	m	2	3	4	5	6	7
1 Slot	5	0.003	0 - 1 - 4		-	8	0.7	0.1 - 0.3 - 1.3		17	-	-	-	-	-
	25	0.066	10 - 15 - 25		17	39	16.3	3.0 - 4.6 - 7.5		40	36	33	24	14	-
	35	0.129	14 - 21 - 29		25	54	32.0	4.3 - 6.2 - 8.8		44	42	41	33	24	16
	45	0.213	18 - 23 - 33		31	70	52.9	5.5 - 7.1 - 10.0		48	47	46	39	32	23
	65	0.444	23 - 28 - 40		40	101	110.4	7.0 - 8.5 - 12.0		53	55	55	49	43	33
2 Slots	10	0.003	1 - 2 - 9	1 - 2 - 6	-	16	0.7	0.3 - 0.7 - 2.6	0.2 - 0.5 - 1.9	20	-	-	-	-	-
	44	0.051	14 - 21 - 33	10 - 15 - 23	17	68	12.7	4.2 - 6.3 - 9.9	3.0 - 4.5 - 7.0	41	36	33	23	13	-
	61	0.098	19 - 27 - 38	14 - 19 - 27	25	95	24.3	5.8 - 8.3 - 11.7	4.1 - 5.8 - 8.2	46	43	41	32	23	16
	78	0.160	25 - 31 - 43	17 - 22 - 31	31	121	39.8	7.5 - 9.3 - 13.2	5.3 - 6.6 - 9.3	49	47	46	38	31	22
	112	0.329	30 - 37 - 52	21 - 26 - 37	40	174	82.0	9.1 - 11.2 - 15.8	6.5 - 7.9 - 11.2	54	55	54	48	42	32
3 Slots	15	0.003	1 - 3 - 12		-	23	0.7	0.4 - 0.9 - 3.6		17	-	-	-	-	-
	65	0.049	17 - 26 - 40		18	101	12.3	5.3 - 7.9 - 12.0		43	37	34	24	15	-
	90	0.094	24 - 33 - 47		26	140	23.5	7.3 - 10.0 - 14.2		47	44	42	33	24	17
	115	0.154	30 - 37 - 53		32	179	38.4	9.2 - 11.3 - 16.0		50	49	48	40	32	24
	165	0.318	36 - 45 - 63		41	256	79.1	11.1 - 13.6 - 19.2		55	56	56	49	43	33
4 Slots	20	0.003	2 - 4 - 14	1 - 3 - 10	-	31	0.7	0.5 - 1.1 - 4.3	0.4 - 0.8 - 3.1	23	-	-	-	-	-
	80	0.042	19 - 28 - 44	13 - 20 - 31	18	124	10.5	5.8 - 8.7 - 13.4	4.1 - 6.1 - 9.4	43	37	34	24	13	-
	110	0.079	26 - 36 - 52	18 - 26 - 36	25	171	19.8	7.9 - 11.1 - 15.7	5.6 - 7.8 - 11.1	47	43	41	32	23	16
	140	0.129	33 - 41 - 58	23 - 29 - 41	31	217	32.0	10.1 - 12.5 - 17.7	7.1 - 8.8 - 12.5	50	48	47	39	30	23
	200	0.262	40 - 49 - 69	28 - 35 - 49	40	310	65.3	12.2 - 14.9 - 21.1	8.6 - 10.6 - 14.9	55	55	55	48	41	32
5 Slots	25	0.003	2 - 4 - 16		-	39	0.7	0.6 - 1.3 - 4.9		24	-	-	-	-	-
	95	0.038	20 - 31 - 48		17	147	9.4	6.2 - 9.3 - 14.6		43	37	34	23	13	-
	130	0.071	28 - 40 - 56		25	202	17.7	8.5 - 12.0 - 17.0		47	43	41	32	22	16
	165	0.114	36 - 45 - 63		31	256	28.5	10.8 - 13.6 - 19.2		51	48	46	38	30	22
	235	0.232	43 - 53 - 75		40	365	57.7	13.2 - 16.2 - 22.9		56	55	54	47	40	31
6 Slots	30	0.003	2 - 5 - 18	2 - 3 - 13	-	47	0.7	0.7 - 1.5 - 5.4	0.5 - 1.0 - 3.8	25	11	-	-	-	-
	110	0.035	22 - 33 - 52	15 - 23 - 36	17	171	8.8	6.6 - 9.9 - 15.7	4.7 - 7.0 - 11.1	43	37	34	23	13	-
	150	0.066	30 - 43 - 60	21 - 30 - 43	25	233	16.3	9.0 - 12.9 - 18.3	6.4 - 9.1 - 12.9	48	43	41	31	22	15
	190	0.105	38 - 48 - 68	27 - 34 - 48	31	295	26.2	11.5 - 14.6 - 20.6	8.1 - 10.3 - 14.6	51	48	46	38	29	22
	270	0.213	47 - 57 - 81	33 - 40 - 57	40	419	52.9	14.2 - 17.4 - 24.5	10.0 - 12.3 - 17.4	56	55	54	47	40	31
7 Slots	35	0.003	2 - 5 - 19		-	54	0.7	0.7 - 1.6 - 5.9		24	-	-	-	-	-
	125	0.033	23 - 35 - 55		17	194	8.3	7.0 - 10.5 - 16.7		44	37	34	23	12	-
	170	0.062	31 - 45 - 64		25	264	15.4	9.6 - 13.8 - 19.5		48	43	41	31	22	15
	215	0.099	40 - 51 - 72		31	334	24.7	12.1 - 15.5 - 21.9		51	48	46	38	29	21
	305	0.199	50 - 61 - 86		40	473	49.6	15.1 - 18.4 - 26.1		56	55	54	47	39	31
8 Slots	40	0.003	3 - 6 - 21	2 - 4 - 15	-	62	0.7	0.8 - 1.8 - 6.3	0.6 - 1.2 - 4.5	26	12	-	-	-	-
	140	0.032	24 - 37 - 58	17 - 26 - 41	18	217	8.0	7.4 - 11.1 - 17.7	5.2 - 7.8 - 12.5	44	37	34	23	12	-
	190	0.059	33 - 48 - 68	23 - 34 - 48	25	295	14.7	10.0 - 14.6 - 20.6	7.1 - 10.3 - 14.6	48	44	41	31	22	15
	240	0.094	42 - 54 - 76	29 - 38 - 54	31	373	23.5	12.7 - 16.4 - 23.1	9.0 - 11.6 - 16.4	51	48	46	37	29	21
	340	0.190	52 - 64 - 91	37 - 45 - 64	40	528	47.2	15.9 - 19.5 - 27.5	11.2 - 13.8 - 19.5	56	55	54	47	39	31

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. Odd numbered slots for 2-Way data have been intentionally left blank. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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S Series

IP/METRIC DATA: 1" SLOT WIDTH, CONTINUOUS SLOT

	IP Data				Metric Data									
	Air Flow	Press Ps	Vertical Throw	NC	Air Flow	Press Ps	Vertical Throw	Octave Band, dB						
	CFM/ft	"WG	ft		L/s/m	Pa	m	2	3	4	5	6	7
1 Slot	5	0.002	1 - 1 - 4	-	8	0.4	0.2 - 0.4 - 1.4	-	-	-	-	-	-
	75	0.339	17 - 21 - 29	19	116	84.4	5.2 - 6.3 - 8.9	47	41	36	29	22	12
	110	0.729	21 - 25 - 36	26	171	181.5	6.2 - 7.6 - 10.8	54	48	42	34	26	17
	145	1.266	24 - 29 - 41	32	225	315.3	7.2 - 8.8 - 12.4	59	53	46	38	29	20
	215	2.784	29 - 35 - 50	40	334	693.3	8.7 - 10.7 - 15.1	66	60	52	43	34	24
2 Slots	10	0.002	1 - 2 - 6	-	16	0.4	0.3 - 0.6 - 2.0	-	-	-	-	-	-
	130	0.254	22 - 27 - 39	20	202	63.4	6.8 - 8.3 - 11.8	47	41	36	30	23	14
	190	0.544	27 - 33 - 47	27	295	135.4	8.2 - 10.0 - 14.2	54	48	42	35	28	18
	250	0.941	31 - 38 - 54	32	388	234.3	9.4 - 11.5 - 16.3	59	53	47	39	31	21
	370	2.061	38 - 46 - 65	40	574	513.3	11.4 - 14.0 - 19.8	66	60	53	44	35	26
3 Slots	15	0.002	1 - 3 - 8	-	23	0.4	0.4 - 0.8 - 2.4	-	-	-	-	-	-
	175	0.205	26 - 32 - 45	20	272	51.0	7.9 - 9.6 - 13.6	47	41	36	31	24	14
	255	0.435	31 - 38 - 54	27	396	108.4	9.5 - 11.6 - 16.5	54	48	42	36	28	18
	335	0.751	36 - 44 - 62	32	520	187.0	10.9 - 13.3 - 18.9	59	53	47	39	31	21
	495	1.640	44 - 53 - 75	40	768	408.3	13.2 - 16.2 - 22.9	66	60	53	44	36	26
4 Slots	20	0.002	1 - 3 - 9	-	31	0.4	0.4 - 0.9 - 2.8	-	-	-	-	-	-
	220	0.182	29 - 36 - 50	20	342	45.4	8.8 - 10.8 - 15.3	47	41	37	31	24	15
	320	0.385	35 - 43 - 61	27	497	96.0	10.6 - 13.0 - 18.4	54	48	43	36	29	19
	420	0.664	40 - 49 - 69	32	652	165.3	12.2 - 14.9 - 21.1	59	53	47	40	32	22
	620	1.447	49 - 60 - 84	40	963	360.3	14.8 - 18.1 - 25.7	66	60	53	45	36	27
5 Slots	25	0.002	2 - 3 - 10	-	39	0.4	0.5 - 1.1 - 3.2	-	-	-	-	-	-
	265	0.169	32 - 39 - 55	21	411	42.1	9.7 - 11.9 - 16.8	47	42	37	32	25	15
	385	0.357	38 - 47 - 67	27	598	88.9	11.7 - 14.3 - 20.2	54	48	43	37	29	19
	505	0.614	44 - 54 - 76	32	784	153.0	13.4 - 16.4 - 23.2	59	53	47	40	32	23
	745	1.337	53 - 65 - 93	40	1157	333.0	16.2 - 19.9 - 28.1	66	60	53	45	37	27
6 Slots	30	0.002	2 - 4 - 11	-	47	0.4	0.5 - 1.2 - 3.5	-	-	-	-	-	-
	300	0.151	34 - 42 - 59	21	466	37.5	10.3 - 12.6 - 17.9	47	41	37	32	25	15
	435	0.317	41 - 50 - 71	27	675	78.8	12.4 - 15.2 - 21.5	54	48	43	37	29	20
	570	0.544	47 - 57 - 81	32	885	135.4	14.2 - 17.4 - 24.6	59	53	47	40	32	23
	840	1.181	57 - 69 - 98	40	1304	293.9	17.2 - 21.1 - 29.9	66	60	53	45	37	27
7 Slots	35	0.002	2 - 4 - 12	-	54	0.4	0.6 - 1.3 - 3.8	-	-	-	-	-	-
	345	0.146	36 - 45 - 63	21	536	36.4	11.1 - 13.5 - 19.1	48	42	37	32	25	16
	500	0.307	44 - 54 - 76	28	776	76.5	13.3 - 16.3 - 23.0	54	48	43	37	30	20
	655	0.527	50 - 61 - 87	32	1017	131.3	15.2 - 18.7 - 26.4	59	53	47	41	33	23
	965	1.145	61 - 74 - 105	40	1498	285.0	18.5 - 22.6 - 32.0	66	60	54	46	37	28
8 Slots	40	0.002	2 - 4 - 13	-	62	0.4	0.6 - 1.4 - 4.0	-	-	-	-	-	-
	380	0.136	38 - 47 - 66	21	590	33.8	11.6 - 14.2 - 20.1	47	42	37	32	26	16
	550	0.285	46 - 56 - 80	28	854	70.9	14.0 - 17.1 - 24.2	54	48	43	37	30	20
	720	0.488	53 - 64 - 91	32	1118	121.5	16.0 - 19.6 - 27.7	59	53	47	41	33	23
	1060	1.057	64 - 78 - 110	40	1646	263.3	19.4 - 23.7 - 33.6	66	60	54	46	37	28

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

S Series

IP/METRIC DATA: 1" SLOT WIDTH, CONTINUOUS SLOT

	IP Data				Metric Data									
	Air Flow	Press Ps	Vertical Throw	NC	Air Flow	Press Ps	Vertical Throw	Octave Band, dB						
	CFM/ft	"WG	ft		L/s/m	Pa	m	2	3	4	5	6	7
1 Slot	5	0.000	0 - 0 - 1	-	8	0.1	0.0 - 0.1 - 0.4	-	-	-	-	-	-
	85	0.082	14 - 17 - 24	15	132	20.5	4.2 - 5.1 - 7.2	46	37	32	23	13	-
	125	0.178	17 - 20 - 29	23	194	44.3	5.0 - 6.2 - 8.7	53	44	37	29	17	-
	165	0.310	19 - 23 - 33	30	256	77.2	5.8 - 7.1 - 10.0	58	49	42	32	20	11
	245	0.684	23 - 28 - 40	39	380	170.2	7.1 - 8.7 - 12.2	65	56	48	38	24	15
2 Slots	10	0.000	0 - 1 - 3	-	16	0.1	0.1 - 0.2 - 0.9	-	-	-	-	-	-
	150	0.064	18 - 22 - 31	16	233	16.0	5.5 - 6.8 - 9.6	47	38	33	25	14	-
	220	0.138	22 - 27 - 38	24	342	34.3	6.7 - 8.2 - 11.6	54	45	38	30	19	-
	290	0.239	25 - 31 - 44	31	450	59.6	7.7 - 9.4 - 13.3	59	49	43	34	22	12
	430	0.527	31 - 38 - 53	40	668	131.1	9.4 - 11.5 - 16.2	66	56	49	39	26	16
3 Slots	15	0.000	1 - 1 - 5	-	23	0.1	0.2 - 0.4 - 1.5	-	-	-	-	-	-
	205	0.053	21 - 26 - 37	17	318	13.2	6.5 - 7.9 - 11.2	47	38	33	25	15	-
	300	0.114	26 - 31 - 45	24	466	28.4	7.8 - 9.6 - 13.5	54	45	39	30	19	-
	395	0.197	30 - 36 - 51	31	613	49.2	9.0 - 11.0 - 15.5	59	49	43	34	22	13
	585	0.433	36 - 44 - 62	40	908	107.8	10.9 - 13.4 - 18.9	66	56	49	40	27	17
4 Slots	20	0.000	1 - 2 - 6	-	31	0.1	0.2 - 0.5 - 2.0	-	-	-	-	-	-
	260	0.048	24 - 29 - 41	17	404	12.0	7.3 - 8.9 - 12.6	47	38	34	26	16	-
	380	0.103	29 - 35 - 50	25	590	25.6	8.8 - 10.8 - 15.2	54	45	39	31	20	-
	500	0.178	33 - 41 - 58	31	776	44.3	10.1 - 12.4 - 17.5	59	50	43	35	23	13
	740	0.390	40 - 49 - 70	40	1149	97.1	12.3 - 15.0 - 21.3	66	57	49	40	27	18
5 Slots	25	0.000	1 - 2 - 8	-	39	0.1	0.3 - 0.6 - 2.4	-	-	-	-	-	-
	305	0.042	26 - 32 - 45	17	473	10.6	7.9 - 9.7 - 13.7	47	38	34	26	16	-
	445	0.090	31 - 38 - 54	24	691	22.5	9.5 - 11.7 - 16.5	54	45	39	31	20	11
	585	0.156	36 - 44 - 62	31	908	38.8	10.9 - 13.4 - 18.9	59	50	43	35	23	14
	865	0.341	44 - 53 - 76	40	1343	84.9	13.3 - 16.3 - 23.0	66	56	49	40	27	18
6 Slots	30	0.000	1 - 2 - 9	-	47	0.1	0.3 - 0.7 - 2.8	-	-	-	-	-	-
	350	0.039	28 - 34 - 48	17	543	9.7	8.4 - 10.3 - 14.6	47	38	34	26	16	-
	510	0.082	34 - 41 - 58	24	792	20.5	10.2 - 12.5 - 17.7	54	45	39	31	21	11
	670	0.142	38 - 47 - 67	31	1040	35.4	11.7 - 14.3 - 20.2	59	50	43	35	23	14
	990	0.310	47 - 57 - 81	40	1537	77.2	14.2 - 17.4 - 24.6	66	56	49	40	28	18
7 Slots	35	0.000	1 - 3 - 10	-	54	0.1	0.3 - 0.8 - 3.1	-	-	-	-	-	-
	395	0.036	30 - 36 - 51	17	613	9.0	9.0 - 11.0 - 15.5	47	38	34	26	17	-
	575	0.077	36 - 44 - 62	24	893	19.1	10.8 - 13.3 - 18.7	54	45	39	31	21	11
	755	0.133	41 - 50 - 71	31	1172	33.0	12.4 - 15.2 - 21.5	59	50	44	35	24	14
	1115	0.289	50 - 61 - 86	40	1731	72.0	15.1 - 18.5 - 26.1	66	56	50	40	28	19
8 Slots	40	0.000	1 - 3 - 11	-	62	0.1	0.4 - 0.9 - 3.5	-	-	-	-	-	-
	440	0.034	31 - 38 - 54	18	683	8.6	9.5 - 11.6 - 16.4	47	38	34	26	17	-
	640	0.073	38 - 46 - 65	24	994	18.2	11.4 - 14.0 - 19.8	54	45	40	32	21	12
	840	0.126	43 - 53 - 75	31	1304	31.3	13.1 - 16.0 - 22.7	59	50	44	35	24	15
	1240	0.274	52 - 64 - 91	40	1925	68.1	15.9 - 19.5 - 27.5	66	57	50	41	28	19

NOTES: Throw values are given for terminal velocities of 150, 100, and 50 FPM (0.75, 0.50, and 0.25 m/s). Throw values are given for isothermal conditions and a 4' (1219) length. For other lengths, see correction charts below. NC values are based on octave band 2 - 7 sound power levels minus a room absorption of 10dB, re10^{-12} Watts. Dash in space denotes a NC or dB value of less than 10. Data was obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70, ISO Standard 5219, and ISO Standard 3741. Pressures are for diffuser section only. Plenums will add to the sound level and pressure drop. Keep inlet velocities below 800 FPM to reduce plenum generated sound levels and pressure drop. See selection software for performance data not shown, including octave band data.

NC Addition For Length					
Length, ft	2	4	6	8	10
Length, m	0.6	1.2	1.8	2.4	3.0
Supply	-2	0	+2	+3	+5
Return with Blades	0	+3	+5	+6	+8

Throw Multiplier for Length					
Length, ft	2	4	8	10	12
Length, m	0.6	1.2	2.4	3.0	3.6
Correction	0.7	0	1.5	1.7	1.8

Recommended Noise Criteria and Face Velocity Ranges are on page 6

DL Drum Louver

6-Inch

Size (H x W)	A_k Area	Neck Area (Ft^2)	Outlet* Velocity	800	1000	1200	1400	1600	1800	2100
			Static Pressure	.007	.010	.015	.025	.030	.040	.052
			Total Pressure	.039	.065	.100	.147	.194	.254	.330
6 x 9	.16	.375	CFM	128	160	192	224	256	228	336
			Throw	6-7-13	8-11-14	10-14-23	12-17-26	4-19-29	16-21-32	17-23-35
6 x 12	.21	.500	CFM	168	210	252	294	336	378	441
			Throw	8-10-18	10-15-24	12-17-27	14-18-30	15-20-33	17-22-37	18-23-41
6 x 18	.32	.750	CFM	256	320	384	448	512	576	672
			Throw	10-14-23	13-18-30	15-20-34	18-23-38	20-26-43	23-30-48	25-32-52
6 x 24	.41	1.000	CFM	328	410	492	574	656	738	861
			Throw	12-17-28	16-21-35	19-25-40	22-29-45	24-33-51	27-36-56	30-38-61
6 x 30	.52	1.250	CFM	416	520	624	728	832	936	1092
			Throw	15-20-33	18-24-39	22-28-44	25-32-50	27-37-56	30-40-61	33-43-66
6 x 36	.62	1.500	CFM	496	620	744	868	992	1116	1302
			Throw	17-23-37	20-26-43	24-30-47	28-35-54	31-40-60	34-44-65	37-46-72
6 x 48	.83	2.000	CFM	664	830	996	1162	1328	1494	1743
			Throw	20-26-41	23-29-47	26-35-55	32-41-62	36-45-66	40-49-72	44-53-78
6 x 60	1.05	2.500	CFM	840	1000	1260	1470	1680	1890	2205
			Throw	22-29-45	25-32-52	29-39-61	36-46-70	41-50-79	46-54-86	49-59-96

Data based on 8dB room atenuation

10-Inch

Size (H x W)	A_k Area	Neck Area (Ft^2)	Outlet* Velocity	800	1000	1200	1400	1600	1800	2100
			Static Pressure	.007	.010	.015	.025	.030	.040	.052
			Total Pressure	.039	.065	.100	.147	.194	.254	.330
10 x 10	.60	1.390	CFM	480	600	720	840	960	1080	1260
			Throw	19-23-33	23-27-40	26-31-46	29-35-53	32-39-58	35-42-64	38-46-69
10 x 25	.75	1.740	CFM	600	750	900	1050	1200	1350	1575
			Throw	21-24-38	25-29-46	28-34-53	32-38-60	35-42-66	38-46-73	41-50-79
10 x 30	.90	1.080	CFM	720	900	1080	1260	1440	1620	1890
			Throw	22-25-41	27-31-51	31-36-58	35-41-66	39-46-74	42-50-81	46-54-88
10 x 35	1.05	2.440	CFM	840	1050	1260	1470	1680	1890	2205
			Throw	22-27-43	27-33-53	32-39-62	37-45-71	41-50-81	45-54-89	49-59-98
10 x 40	1.20	2.780	CFM	960	1200	1440	1680	1920	2160	2520
			Throw	23-28-47	28-34-58	34-41-59	39-48-79	44-59-88	48-59-96	53-65-105
10 x 50	1.50	3.470	CFM	1200	1500	1800	2100	2400	2700	3150
			Throw	25-31-52	31-39-63	37-46-74	44-53-82	48-59-91	54-65-100	60-72-110
10 x 60	1.85	4.170	CFM	1480	1850	2220	2590	2960	3330	3885
			Throw	25-33-59	33-42-73	40-50-84	47-58-95	54-55-108	61-74-118	68-81-128
10 x 70	2.15	4.860	CFM	1720	2150	2580	3010	3440	3870	4515
			Throw	28-36-62	35-46-78	43-54-93	50-63-108	58-71-123	65-79-135	72-87-147

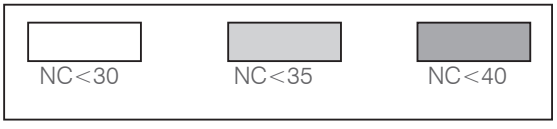
Data based on 8dB room atenuation

*Outlet velocity and Ak based on 15° deflection

Throw data is based on Terminal Velocities of 150 FPM, 100 FPM, and 50 FPM respectively.

THROW-NC-TOTAL PRESSURE are based on 15° blade deflection. For 0° or 30° deflection the following correction factors should be applied to the table values.

	Throw	Total Pressure	NC
0°	1.2	0.795	-4
30°	0.8	1.430	+5



Recommended Noise Criteria and Face Velocity Ranges are on page 6

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DL Drum Louver

12-Inch

Size (H x W)	A_k Area	Neck Area (Ft^2)	Outlet* Velocity	800	1000	1200	1400	1600	1800	2100
			Static Pressure	.007	.010	.015	.025	.030	.040	.052
			Total Pressure	.039	.065	.100	.147	.194	.254	.330
12 x 20	.70	1.670	CFM	560	700	840	980	1120	1260	1470
			Throw	10-20-35	18-25-43	23-31-51	26-35-58	29-39-64	33-44-71	36-49-78
12 x 30	1.05	2.500	CFM	840	1050	1260	1470	1680	1890	2205
			Throw	17-25-42	24-32-53	28-38-63	33-43-72	38-49-81	43-55-90	48-60-99
12 x 40	1.40	3.330	CFM	1120	1400	1680	1960	2240	2520	2940
			Throw	20-28-49	27-36-62	32-43-74	38-50-86	44-57-97	49-64-107	55-61-120
12 x 50	1.75	4.160	CFM	1400	1750	2100	2450	2800	3150	3675
			Throw	22-29-56	29-39-71	37-48-85	44-56-99	51-64-117	58-73-127	64-81-138
12 x 60	2.15	5.000	CFM	1720	2150	2580	3010	3440	3870	4515
			Throw	25-33-61	33-44-78	42-53-94	49-63-110	58-74-125	66-83-140	75-92-155
12 x 70	2.50	5.830	CFM	2000	2500	3000	3500	4000	4500	5250
			Throw	28-37-68	37-49-87	47-61-107	57-73-125	67-86-142	76-97-160	86-110-180

Data based on 8dB room atenuation

15-Inch

Size (H x W)	A_k Area	Neck Area (Ft^2)	Outlet* Velocity	800	1000	1200	1400	1600	1800	2100
			Static Pressure	.007	.010	.015	.025	.030	.040	.052
			Total Pressure	.039	.065	.100	.147	.194	.254	.330
15 x 15	.75	1.560	CFM	600	750	900	1050	1200	1350	1575
			Throw	3-10-28	9-18-36	14-24-36	21-27-50	24-30-56	25-32-58	29-38-69
15 x 20	1.00	2.080	CFM	800	1000	1200	1400	1600	1800	2100
			Throw	9-17-35	17-24-43	22-28-52	25-32-60	29-37-68	31-40-72	35-44-80
15 x 25	1.25	2.600	CFM	1000	1250	1500	1750	2000	2250	2625
			Throw	13-21-38	21-26-48	25-32-58	29-38-68	34-43-77	38-48-86	42-54-95
15 x 30	1.55	3.120	CFM	1240	1550	1860	2170	2480	2790	3255
			Throw	14-23-42	22-28-54	27-35-65	32-41-76	37-47-86	41-54-97	46-59-107
15 x 40	2.05	4.170	CFM	1640	2050	2460	2870	3280	3690	4305
			Throw	19-25-48	27-35-66	35-43-79	39-50-93	45-58-105	51-65-118	57-72-130
15 x 50	2.55	5.210	CFM	2040	2550	3060	3570	4080	4590	5355
			Throw	24-30-61	31-40-78	38-48-96	45-58-114	52-66-130	58-75-145	65-83-163
15 x 60	3.00	6.250	CFM	2400	3000	3600	4200	4800	5400	6300
			Throw	27-34-68	35-46-88	43-58-106	52-68-125	60-79-143	68-89-160	76-100-176
15 x 70	3.50	7.300	CFM	2800	3500	4200	4900	5600	6300	7350
			Throw	29-38-72	40-51-95	50-64-118	60-76-140	71-89-160	81-101-184	90-112-195

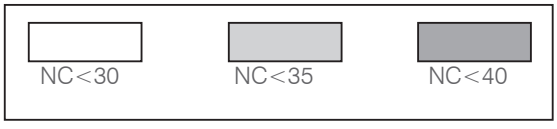
Data based on 8dB room atenuation

*Outlet velocity and Ak based on 15° deflection

Throw data is based on Terminal Velocities of 150 FPM, 100 FPM, and 50 FPM respectively.

THROW-NC-TOTAL PRESSURE are based on 15° blade deflection. For 0° or 30° deflection the following correction factors should be applied to the table values.

	Throw	Total Pressure	NC
0°	1.2	0.795	-4
30°	0.8	1.430	+5



Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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Stationary Louvers

1530ZC, 1530ZF

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.37	0.58	0.80	0.98	1.19	1.41	1.62	1.80	2.02	2.23	2.45	2.63	2.84	3.06	3.27
18	0.60	0.96	1.31	1.60	1.96	2.31	2.66	2.95	3.31	3.66	4.01	4.31	4.66	5.01	5.37
24	0.84	1.33	1.82	2.23	2.72	3.21	3.70	4.11	4.60	5.09	5.58	5.99	6.48	6.97	7.46
30	1.07	1.70	2.33	2.85	3.48	4.11	4.73	5.26	5.89	6.51	7.14	7.66	8.29	8.92	9.55
36	1.31	2.07	2.84	3.48	4.24	5.01	5.77	6.41	7.18	7.94	8.71	9.34	10.11	10.87	11.64
42	1.54	2.45	3.35	4.10	5.00	5.91	6.81	7.56	8.46	9.37	10.27	11.02	11.92	12.83	13.73
48	1.78	2.82	3.86	4.72	5.77	6.81	7.85	8.71	9.75	10.79	11.83	12.70	13.74	14.78	15.82
54	2.01	3.19	4.37	5.35	6.53	7.70	8.88	9.86	11.04	12.22	13.40	14.38	15.56	16.74	17.91
60	2.25	3.56	4.88	5.97	7.29	8.60	9.92	11.02	12.33	13.65	14.96	16.06	17.37	18.69	20.00
66	2.48	3.93	5.39	6.60	8.05	9.50	10.96	12.17	13.62	15.07	16.53	17.74	19.19	20.64	22.10
72	2.72	4.31	5.90	7.22	8.81	10.40	11.99	13.32	14.91	16.50	18.09	19.42	21.01	22.60	24.19
78	2.95	4.68	6.41	7.85	9.58	11.30	13.03	14.47	16.20	17.93	19.65	21.09	22.82	24.55	26.28
84	3.19	5.05	6.92	8.47	10.34	12.20	14.07	15.62	17.49	19.35	21.22	22.77	24.64	26.50	28.37
90	3.42	5.42	7.43	9.10	11.10	13.10	15.10	16.77	18.78	20.78	22.78	24.45	26.45	28.46	30.46

245ZC, 245ZF

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.26	0.41	0.56	0.71	0.86	1.01	1.16	1.31	1.46	1.61	1.76	1.91	2.06	2.21	2.36
18	0.45	0.71	0.96	1.22	1.48	1.73	1.99	2.25	2.50	2.76	3.02	3.27	3.53	3.79	4.05
24	0.76	1.20	1.63	2.07	2.50	2.94	3.37	3.81	4.24	4.68	5.11	5.55	5.98	6.42	6.86
30	0.95	1.49	2.03	2.57	3.12	3.66	4.20	4.74	5.29	5.83	6.37	6.91	7.45	8.00	8.54
36	1.14	1.78	2.43	3.08	3.73	4.38	5.03	5.68	6.33	6.98	7.62	8.27	8.92	9.57	10.22
42	1.32	2.08	2.83	3.59	4.35	5.10	5.86	6.61	7.37	8.12	8.88	9.64	10.39	11.15	11.90
48	1.51	2.37	3.23	4.10	4.96	5.82	6.69	7.55	8.41	9.27	10.14	11.00	11.86	12.72	13.59
54	1.70	2.67	3.64	4.60	5.57	6.54	7.51	8.48	9.45	10.42	11.39	12.36	13.33	14.30	15.27
60	1.88	2.96	4.04	5.11	6.19	7.26	8.34	9.42	10.49	11.57	12.65	13.72	14.80	15.87	16.95
66	2.20	3.45	4.71	5.96	7.21	8.47	9.72	10.98	12.23	13.49	14.74	16.00	17.25	18.51	19.76
72	2.38	3.74	5.11	6.47	7.83	9.19	10.55	11.91	13.27	14.64	16.00	17.36	18.72	20.08	21.44
78	2.57	4.04	5.51	6.97	8.44	9.91	11.38	12.85	14.32	15.78	17.25	18.72	20.19	21.66	23.13
84	2.76	4.33	5.91	7.48	9.06	10.63	12.21	13.78	15.36	16.93	18.51	20.08	21.66	23.23	24.81
90	2.94	4.63	6.31	7.99	9.67	11.35	13.04	14.72	16.40	18.08	19.76	21.45	23.13	24.81	26.49

1545ZC, 1545ZF

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.30	0.47	0.64	0.79	0.96	1.14	1.31	1.45	1.63	1.80	1.97	2.12	2.29	2.47	2.64
18	0.50	0.79	1.08	1.32	1.61	1.90	2.20	2.44	2.73	3.02	3.31	3.55	3.85	4.14	4.43
24	0.70	1.11	1.52	1.86	2.26	2.67	3.08	3.42	3.83	4.24	4.65	4.99	5.40	5.81	6.21
30	0.90	1.42	1.95	2.39	2.92	3.44	3.97	4.41	4.93	5.46	5.98	6.42	6.95	7.48	8.00
36	1.10	1.74	2.39	2.92	3.57	4.21	4.85	5.39	6.03	6.68	7.32	7.86	8.50	9.14	9.79
42	1.30	2.06	2.82	3.46	4.22	4.98	5.74	6.37	7.14	7.90	8.66	9.29	10.05	10.81	11.58
48	1.50	2.38	3.26	3.99	4.87	5.75	6.63	7.36	8.24	9.12	9.99	10.73	11.61	12.48	13.36
54	1.70	2.70	3.69	4.52	5.52	6.52	7.51	8.34	9.34	10.33	11.33	12.16	13.16	14.15	15.15
60	1.90	3.02	4.13	5.06	6.17	7.28	8.40	9.33	10.44	11.55	12.67	13.60	14.71	15.82	16.94
66	2.10	3.33	4.57	5.59	6.82	8.05	9.28	10.31	11.54	12.77	14.00	15.03	16.26	17.49	18.72
72	2.30	3.65	5.00	6.13	7.47	8.82	10.17	11.29	12.64	13.99	15.34	16.46	17.81	19.16	20.51
78	2.50	3.97	5.44	6.66	8.12	9.59	11.06	12.28	13.74	15.21	16.68	17.90	19.37	20.83	22.30
84	2.71	4.29	5.87	7.19	8.78	10.36	11.94	13.26	14.85	16.43	18.01	19.33	20.92	22.50	24.08
90	2.91	4.61	6.31	7.73	9.43	11.13	12.83	14.25	15.95	17.65	19.35	20.77	22.47	24.17	25.87

445ZC, 445ZF

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.33	0.53	0.73	0.93	1.13	1.34	1.54	1.74	1.94	2.07	2.28	2.48	2.68	2.88	3.08
18	0.55	0.89	1.22	1.56	1.90	2.23	2.57	2.91	3.25	3.47	3.81	4.25	4.48	4.82	5.16
24	0.82	1.32	1.82	2.32	2.82	3.32	3.82	4.32	4.83	5.16	5.66	6.16	6.66	7.16	7.67
30	1.04	1.67	2.31	2.95	3.58	4.22	4.86	5.49	6.13	6.56	7.19	7.83	8.47	9.10	9.74
36	1.30	2.10	2.90	3.71	4.51	5.31	6.11	6.91	7.71	8.24	9.05	9.85	10.65	11.45	12.25
42	1.52	2.46	3.40	4.33	5.27	6.21	7.14	8.08	9.02	9.64	10.58	11.51	12.45	13.39	14.32
48	1.79	2.89	3.99	5.09	6.19	7.29	8.39	9.49	10.60	11.33	12.43	13.53	14.63	15.73	16.83
54	2.01	3.25	4.48	5.72	6.96	8.19	9.43	10.66	11.90	12.73	13.96	15.20	16.45	17.67	18.91
60	2.28	3.68	5.08	6.48	7.88	9.28	10.68	12.08	13.48	14.41	15.81	17.22	18.62	20.02	21.42
66	2.50	4.03	5.57	7.10	8.64	10.18	11.71	13.25	14.79	15.81	17.35	18.88	20.42	21.95	23.49
72	2.76	4.46	6.16	7.86	9.56	11.26	12.97	14.67	16.37	17.50	19.20	20.99	22.60	24.30	26.00
78	2.98	4.82	6.66	8.49	10.33	12.16	14.00	15.84	17.67	18.90	20.73	22.57	24.40	26.24	28.07
84	3.25	5.25	7.25	9.25	11.25	13.25	15.25	17.25	19.25	20.58	22.58	24.48	26.58	28.58	30.58
90	3.47	5.61	7.74	9.88	12.01	14.15	16.28	18.42	20.56	21.98	24.12	26.25	28.39	30.52	32.66

Adjustable Louvers

4ABC

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.24	0.38	0.53	0.67	0.82	0.96	1.11	1.25	1.40	1.54	1.68	1.83	1.97	2.12	2.26
18	0.42	0.68	0.93	1.19	1.45	1.17	1.96	2.22	2.48	2.73	2.99	3.25	3.51	3.76	4.02
24	0.55	0.88	1.22	1.55	1.88	2.22	2.55	2.89	3.22	3.56	3.89	4.23	4.56	4.89	5.23
30	0.76	1.23	1.69	2.16	2.62	3.09	3.55	4.02	4.48	4.95	5.41	5.88	6.34	6.81	7.27
36	0.93	1.49	2.06	2.62	3.19	3.76	4.32	4.89	5.45	6.02	6.58	7.15	7.72	8.28	8.85
42	1.11	1.79	2.47	3.15	3.83	4.51	5.19	5.87	6.55	7.23	7.91	8.59	9.27	9.95	10.63
48	1.30	2.09	2.88	3.67	4.46	5.26	6.05	6.84	7.63	8.42	9.22	10.01	10.80	11.59	12.38
54	1.42	2.29	3.16	4.03	4.90	5.77	6.64	7.51	8.38	9.25	10.11	10.98	11.85	12.73	13.59
60	1.64	2.64	3.64	4.64	5.64	6.64	7.64	8.64	9.64	10.64	11.64	12.64	13.64	14.64	15.64
66	1.80	2.90	4.00	5.10	6.20	7.30	8.40	9.51	10.61	11.71	12.81	13.91	15.01	16.11	17.21
72	1.99	3.20	4.42	5.63	6.84	8.06	9.27	10.49	11.70	12.92	14.15	15.34	16.56	17.77	18.99
78	2.17	3.50	4.82	6.15	7.48	8.80	10.13	11.46	12.78	14.11	15.44	16.76	18.09	19.42	20.74
84	2.30	3.70	5.11	6.51	7.91	9.32	10.72	12.13	13.53	14.93	16.34	17.74	19.14	20.55	21.95
90	2.51	4.05	5.58	7.12	8.65	10.19	11.72	13.25	14.79	16.32	17.86	19.39	20.93	22.46	24.00
96	2.68	4.31	5.95	7.58	9.22	10.85	12.49	14.12	15.76	17.39	19.03	20.67	22.30	23.94	25.57

645ZC, 6545ZF

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.13	0.21	0.29	0.37	0.45	0.53	0.61	0.69	0.76	0.84	0.92	1.00	1.08	1.16	1.24
18	0.39	0.63	0.86	1.10	1.33	1.57	1.80	2.04	2.27	2.51	2.74	2.98	3.22	3.45	3.96
24	0.65	1.04	1.44	1.83	2.22	2.61	3.00	3.39	3.78	4.18	4.57	4.96	5.35	5.74	6.13
30	0.91	1.46	2.01	2.56	3.10	3.65	4.20	4.75	5.29	5.84	6.39	6.94	7.48	8.03	8.58
36	1.17	1.88	2.58	3.28	3.99	4.69	5.40	6.10	6.80	7.51	8.21	8.91	9.62	10.32	11.03
42	1.43	2.29	3.15	4.01	4.87	5.73	6.59	7.45	8.31	9.17	10.03	10.89	11.75	12.61	13.47
48	1.69	2.71	3.73	4.74	5.76	6.77	7.79	8.81	9.82	10.84	11.85	12.87	13.89	14.90	15.92
54	1.95	3.13	4.30	5.47	6.64	7.82	8.99	10.16	11.33	12.50	13.68	14.85	16.02	17.19	18.37
60	2.21	3.53	4.87	6.20	7.53	8.86	10.18	11.51	12.84	14.17	15.50	16.83	18.16	19.48	20.81
66	2.47	3.96	5.44	6.93	8.41	9.90	11.38	12.87	14.35	15.84	17.32	18.80	20.29	21.77	23.26
72	2.73	4.38	6.02	7.66	9.30	10.94	12.58	14.22	15.86	17.50	19.14	20.78	22.42	24.06	25.71
78	2.99	4.79	6.59	8.39	10.18	11.98	13.78	15.57	17.37	19.17	20.96	22.76	24.56	26.35	28.15
84	3.26	5.21	7.16	9.11	11.07	13.02	14.97	16.93	18.88	20.83	22.79	24.74	26.69	28.65	30.60
90	3.52	5.62	7.73	9.84	11.95	14.06	16.17	18.26	20.39	22.50	24.61	26.72	28.83	30.94	33.04
96	3.78	6.04	8.31	10.57	12.84	15.10	17.37	19.63	21.90	25.16	26.43	28.70	30.96	33.23	35.49

Recommended Velocity:
Exhaust: 400-500 fpm
Intake: 300-400 fpm
CFM=Free area (ft^2) x Velocity (FPM)

Recommended Noise Criteria and Face Velocity Ranges are on page 6

4-Way Rezzin TBar Diffuser

		Neck Velocity FPM									
		400	500	600	700	800	900	1000	1200	1400	1600
6"	CFM	79	98	118	137	157	177	196	236	275	314
	Static Pressure	.003	.005	.006	.008	.011	.013	.016	.023	.031	.041
	Total Pressure	.015	.024	.034	.046	.060	.076	.094	.134	.183	.238
	NC	-	-	-	-	-	-	15	22	26	31
8"	CFM	140	175	209	244	279	314	349	419	489	559
	Static Pressure	.009	.014	.021	.028	.037	.046	.057	.082	.111	.145
	Total Pressure	.019	.030	.043	.058	.076	.096	.118	.170	.231	.301
	NC	-	-	-	-	-	18	22	23	31	35	39
10"	CFM	218	273	327	382	436	491	545	654	764	873
	Static Pressure	.009	.014	.021	.028	.037	.047	.058	.083	.113	.148
	Total Pressure	.019	.029	.042	.058	.075	.095	.117	.169	.230	.300
	NC	-	-	-	-	18	22	26	31	36	40
12"	CFM	314	393	471	550	628	707	785	942	1100	1257
	Static Pressure	.015	.022	.032	.044	.059	.076	.095	.142	.198	.264
	Total Pressure	.025	.038	.054	.074	.098	.126	.157	.231	.319	.422
	NC	-	-	-	18	20	26	29	36	41	45
14"	CFM	428	535	641	748	855	962	1069	1283	1497	1710
	Static Pressure	.015	.023	.033	.044	.057	.072	.089	.128	.175	.228
	Total Pressure	.025	.037	.053	.072	.094	.119	.146	.211	.287	.375
	NC	-	-	-	15	21	25	29	35	40	44

Throw Data - Terminal Velocity of 75 FPM

Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
CFM	79	98	118	137	157	177	196	236	275	314
6"	3.1	3.9	4.6	5.4	6.2	7.0	7.7	9.3	10.8	12.4
CFM	140	175	209	244	279	314	349	419	489	559
8"	5.3	6.7	8.0	9.3	10.7	12.0	13.3	16.0	18.7	21.3
CFM	218	273	327	382	436	491	545	654	764	873
10"	6.3	7.9	9.4	11.0	12.6	14.1	15.7	18.8	22.0	25.1
CFM	314	393	471	550	628	707	785	942	1100	1257
12"	7.1	8.8	10.6	12.4	14.2	15.9	17.7	21.2	24.8	28.3
CFM	428	535	641	748	855	962	1069	1283	1497	1710
14"	9.1	11.3	13.6	15.9	18.1	20.4	22.7	27.2	31.8	36.3

Throw Data - Terminal Velocity of 150 FPM

Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
CFM	79	98	118	137	157	177	196	236	275	314
6"	1.3	1.7	2.0	2.4	2.7	3.0	3.4	4.0	4.7	5.4
CFM	140	175	209	244	279	314	349	419	489	559
8"	2.2	2.7	3.3	3.8	4.4	4.9	5.5	6.6	7.7	8.8
CFM	218	273	327	382	436	491	545	654	764	873
10"	2.5	3.1	3.7	4.4	5.0	5.6	6.2	7.5	8.7	10.0
CFM	314	393	471	550	628	707	785	942	1100	1257
12"	3.8	4.8	5.8	6.7	7.7	8.6	9.6	11.5	13.4	15.3
CFM	428	535	641	748	855	962	1069	1283	1497	1710
14"	4.2	5.2	6.3	7.3	8.3	9.4	10.4	12.5	14.6	16.7

Rezzin Modular Core Tbar Diffuser

		Neck Velocity FPM									
		400	500	600	700	800	900	1000	1200	1400	1600
6"	CFM	79	98	118	137	157	177	196	236	275	314
	Static Pressure	.003	.005	.007	.010	.013	.017	.021	.030	.041	.054
	Total Pressure	.018	.023	.026	.035	.043	.067	.086	.120	.166	.209
	NC	-	-	-	-	-	16	20	24	30	34
8"	CFM	140	175	209	244	279	314	349	419	489	559
	Static Pressure	.004	.006	.008	.011	.014	.017	.020	.028	.036	.045
	Total Pressure	.013	.021	.030	.041	.053	.066	.081	.115	.155	.201
	NC	-	-	-	-	17	22	24	34	37	41
10"	CFM	218	273	327	382	436	491	545	654	764	873
	Static Pressure	.004	.007	.010	.013	.017	.022	.027	.039	.053	.069
	Total Pressure	.014	.021	.031	.042	.055	.070	.086	.124	.170	.222
	NC	-	-	-	17	22	26	34	42	44	48
12"	CFM	314	393	471	550	628	707	785	942	1100	1257
	Static Pressure	.006	.009	.012	.017	.022	.028	.034	.048	.065	.084
	Total Pressure	.015	.024	.035	.047	.061	.077	.095	.137	.186	.242
	NC	-	-	-	20	24	27	35	40	45	49
14"	CFM	428	535	641	748	855	962	1069	1283	1497	1710
	Static Pressure	.008	.013	.018	.024	.031	.040	.048	.069	.093	.120
	Total Pressure	.017	.030	.041	.056	.071	.090	.114	.144	.200	.278
	NC	-	-	15	23	27	34	39	44	48	51
16"	CFM	559	698	838	977	1117	1257	1396	1676	1955	2234
	Static Pressure	.012	.019	.028	.037	.048	.061	.075	.107	.145	.189
	Total Pressure	.022	.034	.049	.066	.086	.108	.134	.192	.260	.339
	NC	-	-	24	27	31	38	40	45	49	51

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

Rezzin Modular Core Tbar Diffuser

Throw Data - Terminal Velocity of 75 FPM

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	79	98	118	137	157	177	196	236	275	314
6"	1-direction	3.5	4.4	5.3	6.2	7.1	7.9	8.8	10.6	12.4	14.1
	2-direction	4.5	5.6	6.8	7.9	9.0	10.2	11.3	13.6	15.8	18.1
	3-direction Short	0.9	1.1	1.3	1.5	1.7	2.0	2.2	2.6	3.0	3.5
	3-direction Long	1.2	1.5	1.8	2.1	2.5	2.8	3.1	3.7	4.3	4.9
	4-direction	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.8	2.1	2.5

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	140	175	209	244	279	314	349	419	489	559
8"	1-direction	3.1	3.9	4.6	5.4	6.2	7.0	7.7	9.3	10.8	12.4
	2-direction	4.4	5.5	6.6	7.7	8.8	9.9	11.0	13.2	15.4	17.6
	3-direction Short	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.1	8.1
	3-direction Long	3.5	4.4	5.3	6.2	7.0	7.9	8.8	10.6	12.3	14.1
	4-direction	1.5	1.9	2.3	2.7	3.1	3.4	3.8	4.6	5.4	6.1

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	218	273	327	382	436	491	545	654	764	873
10"	1-direction	6.1	7.6	9.2	10.7	12.2	13.7	15.3	18.3	21.4	24.4
	2-direction	7.1	8.9	10.7	12.5	14.3	16.1	17.8	21.4	25.0	28.5
	3-direction Short	2.1	2.6	3.1	3.7	4.2	4.7	5.2	6.3	7.3	8.4
	3-direction Long	6.4	8.0	9.6	11.2	12.8	14.4	16.0	19.2	22.4	25.6
	4-direction	2.9	3.6	4.3	5.0	5.7	6.4	7.1	8.6	10.0	11.4

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	314	393	471	550	628	707	785	942	1100	1257
12"	1-direction	9.8	12.2	14.7	17.1	19.6	22.0	24.5	29.3	34.2	39.1
	2-direction	9.1	11.4	13.6	15.9	18.2	20.5	22.7	27.3	31.8	36.4
	3-direction Short	3.6	4.5	5.4	6.3	7.2	8.1	9.0	10.8	12.6	14.4
	3-direction Long	8.0	10.0	12.0	14.0	16.0	18.0	20.1	24.1	28.1	32.1
	4-direction	2.1	2.6	3.1	3.7	4.2	4.7	5.2	6.3	7.3	8.4

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	428	535	641	748	855	962	1069	1283	1497	1710
14"	1-direction	12.1	15.1	18.2	21.2	24.2	27.3	30.3	36.3	42.4	48.5
	2-direction	8.4	10.5	12.6	14.7	16.8	18.9	21.0	25.2	29.4	33.6
	3-direction Short	3.9	4.9	5.9	6.8	7.8	8.8	9.8	11.7	13.7	15.7
	3-direction Long	7.0	8.8	10.5	12.3	14.0	15.8	17.5	21.0	24.5	28.0
	4-direction	2.8	3.5	4.2	4.9	5.6	6.3	7.0	8.4	9.8	11.2

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	559	698	838	977	1117	1257	1396	1676	1955	2234
16"	1-direction	24.3	30.4	36.5	42.5	48.6	54.7	60.8	72.9	85.1	97.2
	2-direction	14.1	17.6	21.1	24.6	28.1	31.7	35.2	42.2	49.3	56.3
	3-direction Short	11.2	14.0	16.8	19.7	22.5	25.3	28.1	33.7	39.3	44.9
	3-direction Long	16.3	20.4	24.5	28.6	32.7	36.7	40.8	49.0	57.1	65.3
	4-direction	3.2	4.0	4.9	5.7	6.5	7.3	8.1	9.7	11.3	12.9

Throw Data - Terminal Velocity of 150 FPM

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	79	98	118	137	157	177	196	236	275	314
6"	1-direction	1.5	1.9	2.3	2.6	3.0	3.4	3.8	4.2	4.5	4.9
	2-direction	1.7	2.1	2.5	3.0	3.4	3.8	4.2	4.7	5.1	5.5
	3-direction Short	0.6	0.7	0.9	1.0	1.2	1.3	1.5	1.6	1.8	1.9
	3-direction Long	0.3	0.4	0.4	0.5	0.6	0.7	0.7	0.8	0.9	0.9
	4-direction	0.6	0.7	0.8	1.0	1.1	1.2	1.4	1.5	1.7	1.8

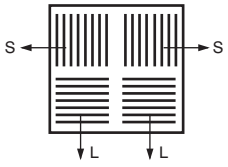
	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	140	175	209	244	279	314	349	419	489	559
8"	1-direction	1.6	2.1	2.5	2.9	3.3	3.7	4.1	4.5	4.9	5.4
	2-direction	1.7	2.1	2.5	2.9	3.3	3.8	4.2	4.6	5.0	5.4
	3-direction Short	1.3	1.6	1.9	2.3	2.6	2.9	3.2	3.5	3.9	4.2
	3-direction Long	1.5	1.9	2.2	2.6	3.0	3.3	3.7	4.1	4.5	4.8
	4-direction	1.1	1.4	1.6	1.9	2.2	2.5	2.7	3.0	3.3	3.6

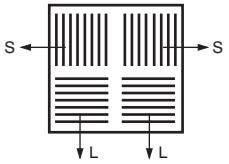
	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	218	273	327	382	436	491	545	654	764	873
10"	1-direction	3.0	3.7	4.5	5.2	6.0	6.7	7.5	8.2	9.0	9.7
	2-direction	2.8	3.5	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0
	3-direction Short	1.5	1.9	2.2	2.6	3.0	3.4	3.7	4.1	4.5	4.8
	3-direction Long	2.5	3.1	3.7	4.3	5.0	5.6	6.2	6.8	7.4	8.1
	4-direction	2.3	2.9	3.4	4.0	4.6	5.2	5.7	6.3	6.9	7.5

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	314	393	471	550	628	707	785	942	1100	1257
12"	1-direction	3.4	4.3	5.2	6.0	6.9	7.8	8.6	9.5	10.3	11.2
	2-direction	2.1	2.6	3.1	3.6	4.1	4.7	5.2	5.7	6.2	6.7
	3-direction Short	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.7	7.3	7.9
	3-direction Long	2.1	2.6	3.1	3.6	4.1	4.7	5.2	5.7	6.2	6.7
	4-direction	1.7	2.1	2.5	2.9	3.3	3.8	4.2	4.6	5.0	5.4

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	428	535	641	748	855	962	1069	1283	1497	1710
14"	1-direction	5.3	6.6	7.9	9.3	10.6	11.9	13.2	14.5	15.9	17.2
	2-direction	3.0	3.8	4.6	5.3	6.1	6.8	7.6	8.3	9.1	9.9
	3-direction Short	2.3	2.9	3.5	4.1	4.6	5.2	5.8	6.4	6.9	7.5
	3-direction Long	2.6	3.2	3.9	4.5	5.1	5.8	6.4	7.1	7.7	8.4
	4-direction	2.2	2.7	3.2	3.8	4.3	4.9	5.4	5.9	6.5	7.0

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	559	698	838	977	1117	1257	1396	1676	1955	2234
16"	1-direction	14.9	18.6	22.3	26.0	29.7	33.5	37.2	40.9	44.6	48.3
	2-direction	7.0	8.7	10.4	12.2	13.9	15.6	17.4	19.1	20.9	22.6
	3-direction Short	5.2	6.5	7.8	9.1	10.4	11.7	13.0	14.3	15.6	16.9
	3-direction Long	6.7	8.4	10.0	11.7	13.4	15.1	16.7	18.4	20.1	21.8
	4-direction	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.6





Recommended Noise Criteria and Face Velocity Ranges are on page 6

HART COOLEY
install confidence.

Rezzin Square Ceiling Diffuser

Rezzin Square (two-way corner)

Neck Velocity		300	400	500	600	700
Neck Size 6"	CFM	60	80	100	120	135
Ak 0.284	Ps	0.002	0.004	0.006	0.008	0.011
Vt 75	Throw	2.5	3.5	4.0	5.0	6.0
Vt 100	Throw	2.5	3.0	4.0	4.5	5.5
Vt 150	Throw	1.5	2.0	2.5	3.0	3.5
Neck size 7"	CFM	82	109	136	164	191
Ak 0.267	Ps	0.009	0.016	0.025	0.037	0.050
Vt 75	Throw	4.0	5.0	6.0	7.5	8.5
Vt 100	Throw	3.5	4.5	5.5	7.0	8.0
Vt 150	Throw	2.5	3.0	4.0	4.5	5.5
Neck size 8"	CFM	105	140	175	209	244
Ak 0.251	Ps	0.016	0.029	0.045	0.065	0.088
Vt 75	Throw	5.0	6.5	8.0	9.5	11.0
Vt 100	Throw	4.5	6.0	7.5	9.0	10.5
Vt 150	Throw	3.0	4.0	5.0	6.0	7.0

Rezzin Square (three-way)

Neck Velocity		300		400		500		600		700	
Neck Size 6"	CFM	60		80		100		120		135	
Ak 0.247	Ps	0.002		0.004		0.006		0.008		0.011	
Vt 75 S/L	Throw	2.0	2.5	3.0	3.5	3.5	4.5	4.5	5.5	5.0	6.0
Vt 100 S/L	Throw	2.0	2.5	3.0	3.5	3.5	4.0	4.0	5.0	5.0	6.0
Vt 150 S/L	Throw	1.5	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.0	4.0
Neck Size 7"	CFM	80		110		135		165		190	
Ak 0.243	Ps	0.009		0.016		0.026		0.037		0.050	
Vt 75 S/L	Throw	2.5	4.0	3.5	5.5	4.5	7.0	5.5	8.5	6.0	9.5
Vt 100 S/L	Throw	2.5	3.5	3.5	5.3	4.0	6.3	5.0	7.5	5.5	9.0
Vt 150 S/L	Throw	1.8	2.5	2.5	3.5	3.0	4.5	3.5	5.5	4.0	6.0
Neck Size 8"	CFM	105		140		175		210		245	
Ak 0.239	Ps	0.016		0.029		0.046		0.066		0.090	
Vt 75 S/L	Throw	3.0	5.5	4.0	7.5	5.0	9.0	6.0	11.0	7.0	13.0
Vt 100 S/L	Throw	3.0	5.0	3.5	7.0	4.5	8.5	5.5	10.5	6.5	12.0
Vt 150 S/L	Throw	2.0	3.5	2.5	4.5	3.0	6.0	3.5	7.0	4.5	8.0

Rezzin Square (four-way)

Neck Velocity		300	400	500	600	700
Neck Size 6"	CFM	60	80	100	120	135
Ak 0.210	Ps	0.001	0.002	0.003	0.005	0.006
Vt 75	Throw	3.0	3.5	4.5	5.5	6.5
Vt 100	Throw			4.5	5.0	6.0
Vt 150	Throw	1.5	2.5	3.0	3.5	4.0
Neck Size 7"	CFM	80	110	135	165	190
Ak 0.209	Ps	0.003	0.005	0.008	0.011	0.015
Vt 75	Throw			6.0	7.5	8.5
Vt 100	Throw	3.5	4.5	5.5	7.0	8.0
Vt 150	Throw	2.5	3.0	4.0	4.5	5.5
Neck Size 8"	CFM	105	140	175	210	245
Ak 0.209	Ps	0.005	0.008	0.013	0.018	0.025
Vt 75	Throw	4.5	6.0	7.5	9.0	10.5
Vt 100	Throw	4.0	5.5	7.0	8.5	10.0
Vt 150	Throw	3.0	3.5	4.5	5.5	6.5

Rezzin Round Ceiling Diffuser

Face Velocity		300	400	500	600	700	800	900	1000
Neck Size 6" Ak .224	CFM	67	89	112	134	157	179	201	224
	Ps	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	Throw	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Neck Size 7" Ak .229	CFM	69	92	115	137	160	183	206	229
	Ps	0.05	0.09	0.13	0.19	0.26	0.34	0.43	0.53
	Throw	1.75	2.25	2.75	3.25	3.75	4.25	5.00	5.50
Neck Size 8" Ak .235	CFM	70	94	117	141	164	188	211	235
	Ps	0.10	0.17	0.26	0.38	0.52	0.67	0.85	1.05
	Throw	2.00	2.50	3.00	3.50	4.00	4.50	5.50	6.00

Terminal Velocity of 50 FPM

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

HART COOLEY
install confidence.

659T/659TI/PFT/PFTI Series Performance

Average Face Velocity		300	400	500	600
659T	CFM	730	975	1220	1465
Ak 2.440	-Ps	.017	.030	.047	.067
PFT	CFM	820	1095	1370	1645
Ak 2.740	-Ps	.028	.050	.078	.113
659-TI					
w/12" collar	CFM	670	890	1115	1340
Ak 2.230	-Ps	.084	.147	.230	.330
w/14" collar	CFM	680	905	1130	1355
Ak 2.260	-Ps	.060	.105	.165	.240
w/16" collar	CFM	695	930	1160	1390
Ak 2.320	-Ps	.039	.068	.106	.155
PFTI					
w/12" collar	CFM	770	1025	1280	1535
Ak 2.320	-Ps	.098	.170	.265	.380
w/14" collar	CFM	775	1035	1295	1555
Ak 2.590	-Ps	.076	.125	.200	.283
w/16" collar	CFM	790	1050	1315	1580
Ak 2.630	-Ps	.055	.094	.145	.210

Note: Tested without filters. Typical capacity is 2 CFM per square inch of nominal filter area. Recommended face velocity is 300-450 FPM. Velocities higher will decrease filter performance, increase flow resistance, and possibly be of noise concern. Velocity measured 1" from face.

96AFBT/96AFBTI

Face Velocity		300	400	500	600	700
20 x 20	CFM	675	900	1125	1350	1575
Ak 2.25	Static Pressure (in W.C.)	-0.024	-0.042	-0.065	-0.094	-0.128
	Total Pressure (in W.C.)	-0.018	-0.032	-0.050	-0.072	-0.098

Note: Tested without filters. Typical capacity is 2 CFM per square inch of nominal filter area. Recommended face velocity is 300-450 FPM. Velocities higher will decrease filter performance, increase flow resistance, and possibly be of noise concern. Velocity measured 1" from face.

RE5T/RE5TI
REF5T/REF5TI
Rezzin Egg Crate
RHF45T
RH45T

Average Face Velocity		300	400	500	600	700	800	900	1000
RE5T/RE5TI									
22 x 22	CFM	942	1256	1570	1884	2198	4464	5022	5320
Ak 3.14	-Ps	.006	.001	.016	.022	.031			
46 x 22	CFM	2004	2672	3340	4008	4676			
Ak 6.68	-Ps	.006	.001	.016	.022	.031			
RH45T									
22 x 22	CFM	785	1045	1305	1565	1825			
Ak 2.610	-Ps	.015	.030	.043	.062	.084			
46 x 22	CFM	1635	2180	2725	3270	3815			
Ak 5.460	-Ps	.006	.001	.016	.022	.031			
REF5T*/REF5TI*									
20 x 20	CF	771	1028	1285	1542	1799			
Ak 2.57	-Ps	.003	.006	.010	.014	.019			
44 x 20	CFM	1674	2232	2790	3348	3906			
Ak 5.58	-Ps	.003	.006	.009	.013	.018			
Rezzin Egg Crate									
20 x 20	CFM	420	560	700	840	980			
Ak 1.400	-Ps	.004	.008	.013	.018	.025			
RHF45T*									
20 x 20	CFM	650	870	1085	1300	1520			
Ak 2.170	-Ps	.015	.025	.040	.060	.080			
44 x 20	CFM	1430	1910	2385	2860	3340			
Ak 4.770	-Ps	.015	.024	.039	.058	.078			

Note: Tested without filters. Typical capacity is 2 CFM per square inch of nominal filter area. Recommended face velocity is 300-450 FPM. Velocities higher will decrease filter performance, increase flow resistance, and possibly be of noise concern. Velocity measured 1" from face.

441 & 445

Neck Velocity		250	350	450	550	650	750	850	1000	1200
6"	CFM	50	70	90	110	130	145	165	195	235
Diameter	Ps	.004	.009	.014	.021	.029	.036	.046	.065	.092
	NC	<20	<20	<20	<20	<20	22	26	33	36
Ak .370	441 Throw	5.5	7.0	9.5	11.0	14.0	16.0	18.0	22.0	24.0
Ak .430	445 Throw	4.0	5.0	6.5	8.0	10.0	11.0	13.0	15.0	17.0
8"	CFM	85	120	155	190	225	260	295	350	420
Diameter	Ps	.006	.011	.018	.027	.037	.050	.064	.090	.127
	NC	<20	<20	<20	<20	22	27	33	35	38
Ak .450	441 Throw	7.0	10.0	13.0	16.0	18.0	21.0	25.0	29.0	31.0
Ak .530	445 Throw	5.0	7.0	9.5	12.0	13.0	15.0	18.0	21.0	23.0
10"	CFM	135	190	245	300	355	410	465	545	655
Diameter	Ps	.009	.018	.030	.044	.062	.082	.105	.145	.212
	NC	<20	<20	<20	24	31	34	37	42	44
Ak .530	441 Throw	9.0	12.0	16.0	20.0	24.0	27.0	30.0	32.0	34.0
Ak .620	445 Throw	6.5	9.0	11.0	14.0	17.0	19.0	21.0	23.0	24.0
12"	CFM	195	275	355	430	510	590	670	785	940
Diameter	Ps	.013	.026	.044	.064	.090	.120	.155	.215	.300
	NC	<20	<20	26	33	38	42	44	46	48
Ak .590	441 Throw	10.0	13.0	19.0	25.0	30.0	32.0	33.0	34.0	35.0
Ak .700	445 Throw	7.5	9.0	14.0	17.0	21.0	23.0	24.0	25.0	26.0
14"	CFM	265	375	480	590	695	800	910	1070	1285
Diameter	Ps	.018	.036	.059	.089	.125	.165	.210	.295	.410
	NC	<20	22	29	36	42	>45	>45	>45	>45
Ak .640	441 Throw	8.0	13.0	22.0	26.0	28.0	30.0	31.0	32.0	33.0
Ak .750	445 Throw	6.0	10.0	16.0	20.0	22.0	24.0	26.0	28.0	30.0

Note: The use of a balancing hood is recommended to balance the system.

NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM

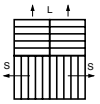
442, 443 & 444 SurfAire®

Neck Velocity		250	350	450	550	650	750	850	1000	1200
6"	CFM	50	70	90	110	130	145	165	195	235
Diameter	Ps	.004	.009	.014	.021	.029	.036	.046	.065	.094
	NC	<20	<20	<20	<20	<20	23	27	31	35
Ak .430	444 Throw	3.0	3.5	4.5	6.0	7.5	8.0	9.0	11.0	12.0
Ak .430	443 Throw*	3.0/4.0	3.5/5.0	4.5/6.5	6.0/8.0	7.5/10.0	8.0/11.0	9.0/13.0	11.0/15.0	12.0/17.0
Ak .430	442 Throw	4.0	5.0	6.5	8.0	10.0	11.0	13.0	15.0	17.0
8"	CFM	85	120	155	190	225	260	295	350	420
Diameter	Ps	.006	.012	.019	.029	.040	.054	.070	.098	.140
	NC	<20	<20	<20	<20	21	26	31	34	37
Ak .530	444 Throw	4.0	5.0	6.5	8.0	9.5	11.0	13.0	15.0	17.0
Ak .530	443 Throw*	4.0/5.5	5.0/7.0	6.5/9.0	8.0/11.0	9.5/14.0	11.0/16.0	13.0/19.0	15.0/21.0	17.0/23.0
Ak .530	442 Throw	5.5	7.0	9.0	11.0	14.0	16.0	19.0	21.0	23.0
10"	CFM	135	190	245	300	355	410	465	545	655
Diameter	Ps	.009	.017	.028	.043	.069	.078	.102	.140	.205
	NC	<20	<20	<20	22	29	35	38	42	46
Ak .620	444 Throw	4.0	6.0	8.0	10.0	12.0	13.0	15.0	18.0	19.0
Ak .620	443 Throw*	4.0/6.0	6.0/8.0	8.0/11.0	10.0/14.0	12.0/17.0	13.0/19.0	15.0/21.0	18.0/25.0	19.0/26.0
Ak .620	442 Throw	6.0	8.0	11.0	14.0	17.0	19.0	21.0	25.0	26.0
12"	CFM	190	245	355	450	530	590	670	785	940
Diameter	Ps	.012	.024	.040	.059	.082	.110	.142	.195	.275
	NC	<20	<20	22	28	35	39	44	47	52
Ak .700	444 Throw	5.0	7.5	10.0	11.5	14.0	16.0	18.0	19.0	20.0
Ak .700	443 Throw*	5.0/8.5	7.5/11.0	10.0/14.0	11.5/17.0	14.0/19.0	16.0/23.0	18.0/25.0	19.0/26.0	20.0/27.0
Ak .700	442 Throw	8.5	11.0	14.0	17.0	19.0	23.0	25.0	26.0	27.0
14"	CFM	285	375	480	590	695	800	910	1070	1285
Diameter	Ps	.015	.031	.050	.075	.105	.137	.177	.245	.350
	NC	<20	21	27	31	36	40	45	48	53
Ak .750	444 Throw	6.0	9.0	11.0	14.0	17.0	19.0	20.0	22.0	24.0
Ak .750	443 Throw*	6.0/8.5	9.0/13.0	11.0/16.0	14.0/20.0	17.0/24.0	19.0/26.0	20.0/27.0	22.0/28.0	24.0/29.0
Ak .750	442 Throw	8.5	13.0	16.0	20.0	24.0	26.0	27.0	28.0	29.0

Note: The use of a balancing hood is recommended to balance the system.

NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM

*443 throw S/L



673T, 673TI, 673TPI R6

6"	CFM	100	150	200	225	250	275	300
Diameter	NC	<20	<20	21	24	27	30	32
Inlet								
Ak .730	Static Pressure	-.057	-.127	-.226	-.287	-.354	-.428	-.509
8"	CFM	150	200	250	300	400	500	550
Diameter	NC	<20	<20	<20	<20	25	31	36
Inlet								
Ak .795	Static Pressure	-.040	-.072	-.112	-.161	-.287	-.448	-.542
10"	CFM	300	400	500	600	700	800	850
Diameter	NC	<20	<20	<20	24	28	33	35
Inlet								
Ak .880	Static Pressure	-.066	-.117	-.183	-.264	-.359	-.469	-.530
12"	CFM	400	500	600	700	800	1000	1200
Diameter	NC	<20	<20	<20	<20	22	28	34
Inlet								
Ak .980	Static Pressure	-.057	-.088	-.127	-.173	-.226	-.354	-.509
14"	CFM	600	700	800	1000	1200	1400	1600
Diameter	NC	<20	<20	<20	20	24	28	34
Inlet								
Ak 1.105	Static Pressure	-.069	-.094	-.122	-.191	-.275	-.374	-.489
16"	CFM	800	1000	1200	1600	1800	2000	2200
Diameter	NC	<20	<20	<20	25	28	31	36
Inlet								
Ak 1.240	Static Pressure	-.072	-.112	-.161	-.287	-.363	-.448	-.542

Recommended Noise Criteria and Face Velocity Ranges are on page 6

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install confidence.

REN4

Neck Velocity		180	220	300	350	400	450	500	580	650	700
6" Diameter Ak .430	CFM	35	45	60	70	80	90	100	115	130	135
	Ps	.002	.003	.004	.006	.008	.010	.012	.015	.020	.022
	NC	<20	<20	<20	<20	<20	<20	20	22	26	30
	Throw	3.0	3.5	4.5	5.5	6.5	7.5	8.0	9.0	11.0	11.0
8" Diameter Ak .530	CFM	65	75	105	120	140	155	175	200	225	245
	Ps	.002	.003	.006	.008	.010	.013	.016	.021	.027	.032
	NC	<20	<20	<20	<20	<20	22	25	30	35	38
	Throw	4.0	5.0	6.0	7.0	8.5	9.5	11.0	12.0	13.0	15.0
10" Diameter Ak .620	CFM	100	120	165	190	220	245	275	315	355	380
	Ps	.003	.005	.009	.011	.015	.019	.024	.031	.040	.045
	NC	<20	<20	<20	<20	20	23	27	33	35	39
	Throw	4.0	5.5	7.0	8.0	9.5	11.0	12.0	13.0	15.0	16.0
12" Diameter Ak .700	CFM	140	175	235	275	315	355	395	455	510	550
	Ps	.005	.007	.013	.018	.023	.029	.036	.048	.061	.071
	NC	<20	<20	<20	<20	21	24	27	33	36	40
	Throw	4.5	5.5	7.0	8.0	10.0	11.0	12.0	14.0	15.0	17.0
14" Diameter Ak .750	CFM	190	235	320	375	430	480	535	620	695	750
	Ps	.007	.011	.020	.027	.036	.044	.055	.074	.094	.107
	NC	<20	<20	<20	<20	20	24	28	32	35	40
	Throw	4.5	5.5	7.0	8.5	10.0	11.0	12.0	14.0	16.0	17.0

Note: The use of a balancing hood is recommended to balance the system.
NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM

RENPS, RENPS 56, ARENPS, PDS

Neck Velocity		300	400	500	600	700	800	900	1000	1100
6" Diameter An .200	CFM	60	80	100	120	140	160	180	200	220
	Ps	.008	.011	.017	.024	.032	.042	.054	.066	.080
	NC	<20	<20	<20	<20	24	27	32	36	38
	Throw	1.0	2.0	3.0	3.0	4.0	4.0	5.0	5.0	6.0
8" Diameter An .350	CFM	105	140	175	210	245	280	310	350	385
	Ps	.008	.011	.017	.024	.034	.043	.054	.068	.083
	NC	<20	<20	<20	20	24	27	30	34	38
	Throw	2.0	3.0	4.0	4.0	5.0	6.0	7.0	8.0	8.5
10" Diameter An .540	CFM	165	220	270	325	385	430	490	550	600
	Ps	.008	.012	.017	.024	.032	.043	.056	.068	.082
	NC	<20	<20	20	24	29	33	36	39	42
	Throw	2.0	3.0	4.0	5.0	5.0	6.0	7.0	8.0	9.0
12" Diameter An .780	CFM	230	310	390	470	550	610	700	780	870
	Ps	.009	.016	.026	.037	.050	.065	.080	.100	.125
	NC	<20	<20	20	23	26	31	34	37	40
	Throw	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0
14" Diameter An 1.070	CFM	315	430	535	640	750	855	960	1090	1200
	Ps	.009	.016	.026	.037	.050	.065	.083	.125	.150
	NC	<20	20	25	30	35	39	43	45	48
	Throw	3.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0

Note: The use of a balancing hood is recommended to balance the system.
NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM An = Neck Area in Sq. Ft.

AFPD, HVS/HVS R6, FPD/FPD R6, FPD3/FPD3 R6

Neck Velocity		400	500	600	700	800	900	1000	1200	1400	1600
6" An .200 Ak .780	CFM	80	100	120	135	155	175	195	235	275	315
	Ps	.008	.012	.017	.021	.028	.035	.043	.063	.086	.112
	NC	<20	<20	<20	<20	<20	<20	20	25	30	35
	Throw	2.0	3.0	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0
8" An .350 Ak .920	CFM	140	175	210	245	280	315	350	420	490	560
	Ps	.010	.015	.022	.029	.038	.049	.060	.086	.117	.150
	NC	<20	<20	<20	<20	20	25	30	35	35	40
	Throw	3.5	4.5	5.5	6.5	7.0	8.0	9.0	10.5	12.5	14.5
10" An .540 Ak 1.200	CFM	220	270	325	380	435	490	545	655	765	870
	Ps	.014	.021	.030	.041	.054	.068	.084	.122	.167	.212
	NC	<20	<20	<20	20	25	30	35	35	40	45
	Throw	5.5	7.0	8.5	10.0	11.0	12.5	14.0	17.0	19.5	22.0
12" An .780 Ak 1.650	CFM	315	390	470	550	630	705	785	940	1100	1255
	Ps	.015	.023	.033	.045	.060	.072	.094	.132	.180	.230
	NC	<20	<20	20	25	30	35	35	40	45	45
	Throw	6.0	7.5	9.0	10.5	12.0	13.5	15.0	18.0	21.0	24.0
14" An 1.070 Ak 2.060	CFM	430	535	640	750	855	960	1070	1285	1500	1710
	Ps	.023	.036	.051	.071	.093	.115	.140	.205	.277	.350
	NC	<20	<20	20	25	30	35	40	40	45	45
	Throw	6.5	8.0	9.5	11.5	13.0	14.5	16.0	19.0	22.5	25.0

Terminal Velocity of 75 FPM
An = Neck Area in Sq. Ft.

NC = Noise Criteria based on 10dB room absorption (Re: 10^{-12} watts).

PDSD

Neck Velocity		300	400	500	600	700	800	900	1000	1200
6" Diameter An .200	CFM	60	80	100	120	135	155	175	195	235
	Ps	.007	.013	.020	.029	.037	.048	.062	.076	.110
	NC	<20	<20	<20	20	21	24	28	33	37
	1-Way Throw	4.0	6.0	7.0	8.0	10.0	11.0	13.0	14.0	16.0
	2- and 3-Way Throw	3.5	4.5	6.0	7.0	8.0	9.5	10.5	11.5	13.0
	4-Way Throw	2.5	3.5	4.5	5.0	6.0	7.0	7.5	8.0	9.0
8" Diameter An .350	CFM	105	140	175	210	245	280	315	350	420
	Ps	.011	.019	.030	.043	.059	.077	.097	.120	.173
	NC	<20	<20	<20	20	22	27	31	35	40
	1-Way Throw	6.0	8.0	10.0	11.5	13.0	14.5	16.0	18.0	21.0
	2- and 3-Way Throw	5.0	7.0	8.5	10.5	12.0	13.5	14.5	16.0	19.0
	4-Way Throw	4.0	5.0	6.5	7.5	9.0	10.0	11.5	12.5	14.0
10" Diameter An .540	CFM	165	220	275	325	380	435	490	545	655
	Ps	.015	.026	.040	.046	.076	.100	.125	.115	.225
	NC	<20	<20	<20	21	27	33	37	40	45
	1-Way Throw	8.5	11.0	14.0	16.5	19.0	22.0	25.0	27.0	30.0
	2- and 3-Way Throw	7.5	10.0	12.5	14.5	17.0	19.5	22.0	24.0	27.0
	4-Way Throw	5.0	7.0	8.5	10.5	12.0	14.0	15.5	17.0	20.0
12" Diameter An .780	CFM	235	315	395	470	550	630	705	785	940
	Ps	.016	.029	.045	.068	.086	.113	.140	.170	.250
	NC	<20	<20	<20	20	25	32	35	38	44
	1-Way Throw	10.0	13.0	16.5	19.5	22.0	25.0	27.0	30.0	34.0
	2- and 3-Way Throw	8.5	11.5	14.5	17.5	20.0	22.0	25.0	27.0	30.0
	4-Way Throw	6.0	8.0	10.0	12.0	14.0	16.5	18.0	20.0	23.0
14" Diameter An 1.070	CFM	320	430	535	640	750	855	960	1070	1285
	Ps	.021	.037	.057	.082	.112	.145	.180	.225	.320
	NC	<20	<20	20	26	31	36	40	44	49
	1-Way Throw	11.0	15.0	19.0	22.5	26.0	29.0	32.0	35.0	39.0
	2- and 3-Way Throw	10.0	13.5	17.0	20.0	23.0	26.0	28.0	31.0	35.0
	4-Way Throw	7.0	10.0	12.0	14.4	17.0	19.0	21.0	23.0	27.0

Notes: The use of a balancing hood is recommended to balance the system.
NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM

DPD/DPD R6, ADPD

Neck Velocity		400	500	600	700	800	900	1000	1200	1400	1600
6" An .200 Ak .279	CFM	80	100	120	135	155	175	195	235	275	315
	Ps	.006	.010	.014	.018	.023	.030	.037	.054	.073	.096
	NC	<20	<20	<20	<20	<20	20	25	30	35	40
	Throw	1.0	2.0	2.0	2.5	3.0	3.5	4.0	4.5	5.5	6.5
8" An .350 Ak .354	CFM	140	175	210	245	280	315	350	420	490	560
	Ps	.010	.015	.022	.029	.038	.049	.060	.086	.117	.150
	NC	<20	<20	<20	20	25	30	30	35	40	45
	Throw	2.5	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	9.0
10" An .540 Ak .400	CFM	220	275	325	380	435	490	545	655	765	875
	Ps	.014	.021	.030	.041	.054	.068	.084	.122	.167	.212
	NC	<20	<20	<20	20	25	30	35	40	45	50
	Throw	4.0	5.5	6.5	8.0	9.0	10.5	11.5	14.5	17.0	20.0
12" An .780 Ak .397	CFM	315	395	470	550	630	705	785	945	1100	1260
	Ps	.015	.023	.033	.045	.060	.072	.094	.132	.180	.230
	NC	<20	<20	20	25	30	35	35	40	45	50
	Throw	5.5	7.0	8.5	10.0	11.5	13.0	14.5	17.5	20.5	24.0
14" An 1.070 Ak .393	CFM	430	535	640	750	855	960	1070	1280	1500	1710
	Ps	.023	.036	.051	.071	.093	.115	.140	.205	.277	.350
	NC	<20	<20	25	30	35	35	40	45	50	55
	Throw	7.0	8.5	10.5	12.0	13.5	15.5	17.0	20.5	24.0	24.5

Terminal Velocity of 75 FPM
An = Neck Area in Sq. Ft.

NC = Noise Criteria based on 10dB room absorption (Re: 10^{-12} watts).

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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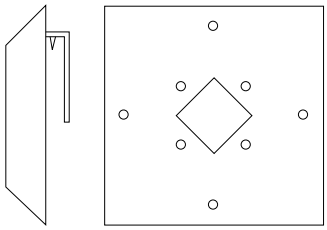
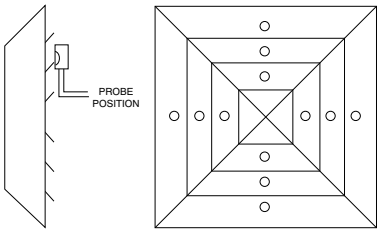
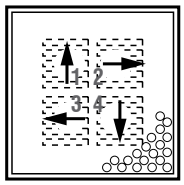
install confidence.

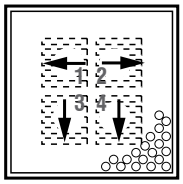
Probe Position: The probe is held 1 inch in from the outer edge of the diffuser, flush with the face.



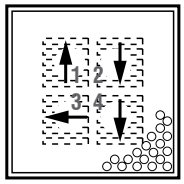




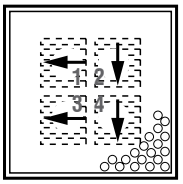
Four-Way (Short Throw)
- For throw in all four directions, use short throw data.



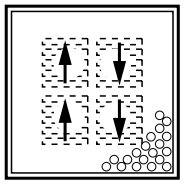
Three-Way (Short Throw)
- For throw in all three directions, use short throw data.



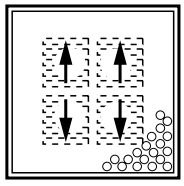
Three-Way (Long & Short)
- For throw in the #2 & #4 direction use long throw data.
- For throw in the #1 & #3 directions, use short throw data.



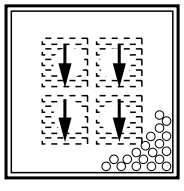
Two-Way Corner (Long & Short)
- For throw in the #2 & #4 direction use long throw data.
- For throw in the #1 & #3 directions, use short throw data.



Two-Way (Long Throw)
- For throw in both directions use long throw data.



Two-Way (Short Throw)
- For throw in both directions use short throw data.



One-Way (Long Throw)
- For throw use long throw data.

SBP

Neck Velocity		300	400	500	600	700	800	900	1000	1200	1400
Velocity Pressure		.006	.010	.016	.022	.031	.040	.051	.062	.090	.122
6" Diameter	CFM	60	80	100	120	140	160	180	200	240	280
	Total Pressure	.005	.008	.013	.025	.025	.032	.041	.050	.027	.098
	Short Horizontal Throw	2-1-1	2-1-1	3-1-1	3-2-1	4-2-1	4-2-1	5-2-2	5-3-2	6-3-2	7-4-2
	Long Horizontal Throw	3-1-1	4-2-1	5-2-2	6-3-2	7-3-2	8-4-3	9-4-3	10-5-3	12-6-4	14-7-5
	Noise Criteria	<20	<20	<20	<20	<20	22	24	26	31	37
8" Diameter	CFM	105	140	175	210	245	280	315	350	420	490
	Total Pressure	.009	.015	.024	.034	.046	.061	.077	.095	.136	.185
	Short Horizontal Throw	3-1-1	4-2-1	5-2-2	6-4-3	7-3-2	8-4-3	9-4-3	10-5-3	12-6-4	14-7-5
	Long Horizontal Throw	5-3-2	7-4-2	9-5-3	11-5-4	13-6-4	15-7-5	16-8-5	18-9-6	22-11-7	25-13-8
	Noise Criteria	<20	<20	<20	<20	20	25	30	34	39	44
10" Diameter	CFM	165	220	275	330	385	440	495	550	660	770
	Total Pressure	.013	.023	.036	.052	.071	.092	.117	.144	.208	.283
	Short Horizontal Throw	5-2-2	6-3-2	8-4-3	10-5-3	11-6-4	13-6-4	14-7-5	16-8-5	19-10-6	23-11-8
	Long Horizontal Throw	9-5-3	12-6-4	15-8-5	18-9-6	21-11-7	24-12-8	27-14-9	30-15-10	36-18-12	42-21-14
	Noise Criteria	<20	<20	<20	22	25	28	33	36	41	47
12" Diameter	CFM	240	320	400	480	560	640	720	800	960	1120
	Total Pressure	.017	.030	.047	.068	.093	.121	.153	.189	.273	.371
	Short Horizontal Throw	7-4-2	10-5-3	12-6-4	15-7-5	17-9-6	20-10-7	22-11-7	25-12-8	30-15-10	35-17-12
	Long Horizontal Throw	14-7-5	19-9-6	23-12-8	28-14-9	33-16-11	37-19-12	42-21-14	47-23-16	56-28-19	65-33-22
	Noise Criteria	<20	<20	21	25	29	32	35	38	44	50
14" Diameter	CFM	330	440	550	660	770	880	990	1100	1320	1540
	Total Pressure	.020	.036	.057	.081	.111	.145	.183	.226	.326	.443
	Short Horizontal Throw	11-6-4	15-7-5	18-9-6	22-11-7	26-13-9	29-15-10	33-17-11	37-18-12	44-22-15	52-26-17
	Long Horizontal Throw	21-10-7	28-14-9	34-17-11	41-21-14	48-24-16	55-28-18	62-31-21	69-34-23	83-41-28	97-48-32
	Noise Criteria	<20	<20	25	31	36	40	43	45	48	53

Notes:

1. Tests conducted in accordance with ANSI/ASHRAE 70-1991 at isothermal conditions.
2. Tests conducted with a straight rigid inlet condition. Other inlet conditions may alter performance.
3. Unit of measure: Neck Velocity = FPM; Velocity Pressure = in. w.c. Air Flow Rate = CFM; Total Pressure = in. w.c. Throw = ft at 50, 100, and 150 fpm terminal velocity
4. Noise Criteria (NC) is based upon 10 dB room absorption (Re: 10^{-12} watts) evaluated at 125 thru 4000 Hz octave bands.
5. Flow hoods are recommended for system balancing.

PD, PDR, RENP

Neck Velocity		200	300	400	500	600	700	800
6" Diameter	CFM	40	60	80	100	120	135	155
	-Ps	.003	.007	.012	.019	.027	.034	.044
8" Diameter	CFM	70	105	140	175	210	245	380
	-Ps	.004	.010	.017	.026	.037	.051	.068
10" Diameter	CFM	110	165	220	275	325	380	435
	-Ps	.005	.011	.020	.030	.043	.058	.076
12" Diameter	CFM	155	235	315	395	470	550	630
	-Ps	.005	.012	.021	.033	.046	.063	.083
14" Diameter	CFM	215	320	430	535	640	750	855
	-Ps	.006	.013	.023	.035	.050	.069	.090
16" Diameter	CFM	280	420	560	700	840	975	1115
	-Ps	.008	.018	.031	.048	.070	.094	.120
18" Diameter	CFM	355	530	705	885	1060	1235	1415
	-Ps	.008	.018	.031	.049	.070	.092	.125
24" x 24"	CFM	735	1100	1470	1835	2200	2570	2935
	-Ps	.008	.018	.032	.050	.070	.095	.130

Note: The use of a balancing hood is recommended to balance the system.
NC is based on 10 db room attenuation (Re: 10^{-12} watts) ASHRAE 36-72. X=less than 20.
Terminal velocity of 75 FPM.

Recommended Noise Criteria and Face Velocity Ranges are on page 6

CBPS Supply

One-Way Supply

		Neck Velocity - V_N							
Neck Size		300	400	500	600	700	800	1000	1200
6"	CFM	60	80	100	120	140	160	200	240
	Ps	.060	.080	.100	.150	.200	.260	.400	.580
	Throw	2.5-4.0-5.0	3.5-5.0-6.0	4.0-6.0-7.0	4.5-7.0-8.5	5.5-8.0-9.5	6.5-9.5-11.5	8.0-12.0-14.5	9.5-14.0-17.0
	NC	<20	<20	<20	22	26	30	40	>45
8"	CFM	105	140	175	210	245	280	350	420
	Ps	.080	.110	.160	.240	.320	.420	.650	.930
	Throw	4.0-6.0-7.0	5.5-8.0-9.5	6.5-10.0-12.0	8.0-12.0-14.5	7.5-14.0-17.0	10.5-10.6-19.0	13.5-20.0-24.0	16.0-24.0-29.0
	NC	<20	<20	21	26	31	39	>45	>45
10"	CFM	165	220	275	325	380	435	545	650
	Ps	.080	.110	.170	.250	.320	.430	.660	.940
	Throw	4.5-7.0-8.5	6.5-9.5-11.5	8.0-12.0-14.5	9.5-14.5-17.5	11.0-16.5-20.0	12.5-19.0-23.0	16.0-24.0-29.0	19.0-28.5-34.0
	NC	<20	<20	23	26	34	40	>45	>45
12"	CFM	235	315	395	470	550	630	790	940
	Ps	.080	.110	.170	.250	.340	.440	.690	.980
	Throw	5.5-8.5-10.0	7.5-11.0-13.5	9.5-14.0-17.0	11.0-16.5-20.0	13.0-19.5-26.5	14.5-22.0-26.5	18.5-27.5-33.0	22.0-33.0-39.5
	NC	<20	20	25	33	40	45	>45	>45
14"	CFM	325	430	535	640	750	860	1075	1275
	Ps	.110	.140	.210	.300	.420	.550	.860	1.200
	Throw	4.5-7.0-8.5	6.5-9.5-11.5	8.0-12.0-14.5	9.5-14.5-17.5	11.5-17.0-20.5	13.0-17.5-23.5	16.5-24.5-29.5	19.5-29.0-35.0
	NC	<20	20	25	30	38	44	>45	>45
16'	CFM	420	560	700	840	980	1120	1400	1680
	Ps	.020	.040	.060	.080	.110	.140	.220	.260
	Throw	5.0-8.0-10.0	7.0-10.0-12.0	10.0-13.0-16.0	12.0-15.0-18.0	13.0-18.0-21.0	14.0-19.0-24.0	18.0-26.0-30.0	20.0-31.0-36.0
	NC	<20	<20	26	34	39	43	>45	>45

Two-Way Supply

		Neck Velocity - V_N							
Neck Size		300	400	500	600	700	800	1000	1200
6"	CFM	60	80	100	120	140	160	200	240
	Ps	.050	.070	.090	.130	.170	.220	.340	.500
	Throw	2.0-3.0-3.5	2.5-3.5-4.5	3.5-5.0-6.0	4.0-5.5-6.5	4.5-6.5-8.0	5.0-7.5-9.0	6.5-9.5-11.5	7.5-11.5-13.5
	NC	<20	<20	<20	20	24	28	37	44
8"	CFM	105	140	175	210	245	280	350	420
	Ps	.400	.054	.084	.120	.165	.215	.330	.480
	Throw	3.0-4.5-5.5	3.5-5.5-6.5	4.5-7.0-8.5	5.5-8.5-10.0	6.5-9.5-11.5	7.5-11.0-13.0	9.5-14.0-17.0	11.0-16.5-20.0
	NC	<20	<20	<20	23	29	36	43	>45
10"	CFM	165	220	275	325	380	435	545	650
	Ps	.060	.080	.130	.180	.250	.310	.510	.730
	Throw	4.5-6.5-7.5	5.5-8.5-10.0	7.0-10.5-12.5	8.5-12.5-15.0	9.5-14.5-17.5	11.0-16.5-20.0	14.0-21.0-25.0	16.5-25.0-30.0
	NC	<20	<20	<20	25	29	37	45	>45
12"	CFM	235	315	395	470	550	630	790	940
	Ps	.050	.070	.110	.150	.210	.270	.430	.600
	Throw	4.5-6.5-7.5	5.5-8.5-10.0	7.0-10.5-12.5	8.5-12.5-15.0	10.0-15.0-18.0	11.5-17.0-20.5	14.5-21.5-26.0	17.0-25.5-30.5
	NC	<20	<20	23	30	37	43	>45	>45
14"	CFM	325	430	535	640	750	860	1075	1275
	Ps	.050	.070	.100	.150	.200	.260	.410	.570
	Throw	3.5-5.5-6.5	4.5-7.0-8.5	6.0-9.0-11.0	7.0-10.5-12.5	8.5-12.5-15.0	9.5-14.0-17.0	11.5-17.5-21.0	14.0-21.0-25.0
	NC	<20	<20	22	28	35	40	>45	>45
16'	CFM	420	560	700	840	980	1120	1400	1680
	Ps	.020	.040	.060	.080	.110	.140	.220	.260
	Throw	4.0-6.0-8.0	5.0-8.0-9.0	7.0-10.0-12.0	9.0-11.0-13.0	10.0-14.0-16.0	11.0-16.0-19.0	13.0-19.0-24.0	16.0-22.0-27.0
	NC	<20	<20	26	34	39	43	>45	>45

Three-Way Supply

		Neck Velocity - V_N							
Neck Size		300	400	500	600	700	800	1000	1200
6"	CFM	60	80	100	120	140	160	200	240
	Ps	.020	.030	.040	.060	.080	.100	.150	.230
	Throw	2.5-3.5-4.5	3.0-4.5-5.5	3.5-5.5-6.5	4.5-6.5-8.0	5.0-7.5-9.0	5.5-8.5-10.5	7.5-11.0-13.5	8.5-13.0-15.5
	NC	<20	<20	<20	<20	23	25	34	40
8"	CFM	105	140	175	210	245	280	350	420
	Ps	.020	.030	.040	.060	.080	.100	.160	.220
	Throw	3.0-4.0-5.0	4.0-5.5-6.5	4.5-7.0-8.5	5.5-8.0-9.5	6.5-9.5-11.5	7.5-11.0-13.5	9.0-13.5-16.0	11.0-16.5-20.0
	NC	<20	<20	<20	21	26	33	39	44
10"	CFM	165	220	275	325	380	435	545	650
	Ps	.030	.040	.060	.090	.120	.150	.240	.340
	Throw	4.5-6.5-8.0	5.5-8.5-10.5	7.0-10.5-12.5	8.5-12.5-15.0	9.5-14.5-17.5	11.5-17.0-20.5	14.0-21.0-25.0	17.0-25.0-30.0
	NC	<20	<20	<20	21	26	34	41	>45
12"	CFM	235	315	395	470	550	630	790	940
	Ps	.020	.030	.050	.070	.100	.130	.200	.290
	Throw	4.5-6.5-8.0	5.5-8.5-10.0	7.0-10.5-12.5	8.5-12.5-15.0	10.0-14.5-17.5	11.0-16.5-20.0	13.5-20.5-24.5	16.5-24.5-29.5
	NC	<20	<20	21	27	34	39	44	>45
14"	CFM	325	430	535	640	750	860	1075	1275
	Ps	.020	.030	.050	.070	.100	.130	.200	.280
	Throw	4.0-5.0-7.0	5.5-8.0-9.5	6.0-9.0-11.0	8.0-12.0-14.5	9.5-14.0-17.0	10.5-16.0-19.5	13.5-20.0-24.0	15.5-23.5-28.0
	NC	<20	<20	20	25	32	37	44	>45
16'	CFM	420	560	700	840	980	1120	1400	1680
	Ps	.020	.040	.060	.080	.110	.140	.220	.260
	Throw	5.0-6.0-8.0	6.0-9.0-10.0	7.0-9.0-12.0	9.0-13.0-15.0	10.0-13.0-16.0	11.0-15.0-18.0	12.0-18.0-21.0	15.0-21.0-26.0
	NC	<20	<20	26	34	39	43	>45	>45

NOTES:

1. **Ps** is static Pressure Loss in inches of H_2O
2. **NC** is based on 10db room attenuation (Re: 10^{-12} watts)
3. Throw is iso-thermal air at 150, 100, 75 FPM terminal velocities.
4. The use of a balancing hood is recommended to balance the system.

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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CBPS Supply

Four-Way Supply

Neck Size		Neck Velocity - V_N 300	400	500	600	700	800	1000	1200
6"	CFM	60	80	100	120	140	160	200	240
	Ps	<.010	.010	.020	.030	.040	.050	.080	.120
	Throw	1.5-2.0-2.5	1.5-2.5-3.0	2.0-3.0-4.0	2.5-3.5-4.5	3.0-4.5-5.5	3.5-5.0-6.0	4.0-6.0-7.0	5.0-7.5-9.0
	NC	<20	<20	<20	<20	21	24	32	38
8"	CFM	105	140	175	210	245	280	350	420
	Ps	<.010	.010	.020	.030	.040	.060	.090	.120
	Throw	1.5-2.5-3.0	2.0-3.0-4.0	2.5-4.0-5.0	3.5-5.0-6.0	4.0-5.5-7.0	4.5-6.5-8.0	5.5-8.0-10.0	6.5-9.5-11.5
	NC	<20	<20	<20	<20	25	31	37	42
10"	CFM	165	220	275	325	380	435	545	650
	Ps	0.01	.020	.030	.040	.060	.070	.110	.160
	Throw	3.0-4.0-5.0	3.5-5.5-6.5	4.5-6.5-8.0	5.5-8.0-10.0	6.0-9.0-11.0	7.0-10.5-12.5	9.0-13.0-15.5	10.5-15.5-18.5
	NC	<20	<20	<20	21	27	32	39	44
12"	CFM	235	315	395	470	550	630	790	940
	Ps	.010	.020	.030	.040	.060	.080	.120	.170
	Throw	2.5-3.5-4.0	3.0-4.5-5.5	3.5-5.5-6.5	4.5-7.0-8.5	5.5-8.0-9.5	6.0-7.0-11.0	7.5-11.5-14.0	9.0-13.5-16.0
	NC	<20	<20	20	26	32	37	42	>45
14"	CFM	325	430	535	640	750	860	1075	1275
	Ps	.010	.020	.030	.050	.060	.080	.130	.180
	Throw	2.0-3.0-3.5	2.5-4.0-5.0	3.5-5.0-6.0	4.0-6.0-7.0	4.5-7.0-8.5	5.5-8.0-10.0	6.5-10.0-12.0	7.5-11.5-14.0
	NC	<20	<20	<20	24	30	35	42	>45
16'	CFM	420	560	700	840	980	1120	1400	1680
	Ps	.020	.040	.060	.080	.110	.140	.220	.260
	Throw	3.0-4.0-5.0	4.0-6.0-7.0	5.0-8.0-11.0	6.0-9.0-12.0	8.0-11.0-14.0	9.0-13.0-16.0	10.0-15.0-19.0	12.0-17.0-22.0
	NC	<20	<20	26	34	39	43	>45	>45

NOTES:
1. **Ps** is static Pressure Loss in inches of H_2O
2. **NC** is based on 10db room attenuation (Re: 10^{-12} watts)
3. Throw is iso-thermal air at 150, 100, 75 FPM terminal velocities.
4.The use of a balancing hood is recommended to balance the system.

CBPR Return

Neck Velocity - V_N		200	300	400	500	600	700	800
-Ps		.01	.02	.03	.05	.07	.10	.12
6" Diameter	CFM	40	60	80	100	120	140	160
8" Diameter	CFM	70	105	140	175	210	245	280
10" Diameter	CFM	110	165	220	275	330	385	440
12" Diameter	CFM	160	240	320	395	475	550	630
14" Diameter	CFM	215	320	430	535	640	750	855
16" Diameter	CFM	281	420	563	698	836	975	1114
18" Diameter	CFM	356	531	712	881	1056	1231	1406

DPD12

Neck Velocity		400	500	600	700	800	900	1000	1200	1400
6" An .200 Ak .279	CFM	80	100	120	135	155	175	195	235	275
	Ps	.006	.010	.014	.018	.023	.030	.037	.054	.073
	NC	<20	<20	<20	<20	<20	20	25	30	35
	Throw	1.0	2.0	2.0	2.5	3.0	3.5	4.0	4.5	5.5
7" An .267 Ak .298	CFM	107	134	160	187	214	240	267	320	374
	Ps	.008	.012	.017	.025	.031	.043	.052	.075	.103
	NC	<20	<20	<20	20	25	30	30	35	40
	Throw	2.5	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0
8" An .350 Ak .354	CFM	140	175	210	245	280	315	350	420	490
	Ps	.010	.015	.022	.029	.038	.049	.060	.086	.117
	NC	<20	<20	<20	20	25	30	30	35	40
	Throw	2.5	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0

Terminal Velocity of 75 FPM
An = Neck Area in Sq. Ft.
NC = Noise Criteria based on 10dB room absorption (Re: 10^{-12} watts).

FPD12

Neck Velocity		400	500	600	700	800	1000	1200	1400	1600
6" An .200	CFM	80	100	120	135	155	195	235	275	315
	Ps	.008	.012	.019	.025	.033	.052	.074	.101	.131
	NC	<20	<20	<20	<20	<20	25	30	35	40
	Throw	4	5	5	6	7	8	9	10	11
7" An .275	CFM	107	134	160	187	214	267	321	374	428
	Ps	.01	.015	.023	.031	.041	.064	.091	.125	.162
	NC	<20	<20	<20	<20	20	30	35	40	45
	Throw	4	5	6	7	8	10	11	12	13
8" An .350	CFM	140	175	210	245	280	350	420	490	560
	Ps	.012	.019	.028	.038	.05	.078	.112	.153	.199
	NC	<20	<20	<20	<20	20	30	35	40	45
	Throw	5	6	7	8	9	11	12	14	15

Terminal Velocity of 75 FPM
An = Neck Area in Sq. Ft.
NC = Noise Criteria based on 10dB room absorption (Re: 10^{-12} watts).

Recommended Noise Criteria and Face Velocity Ranges are on page 6

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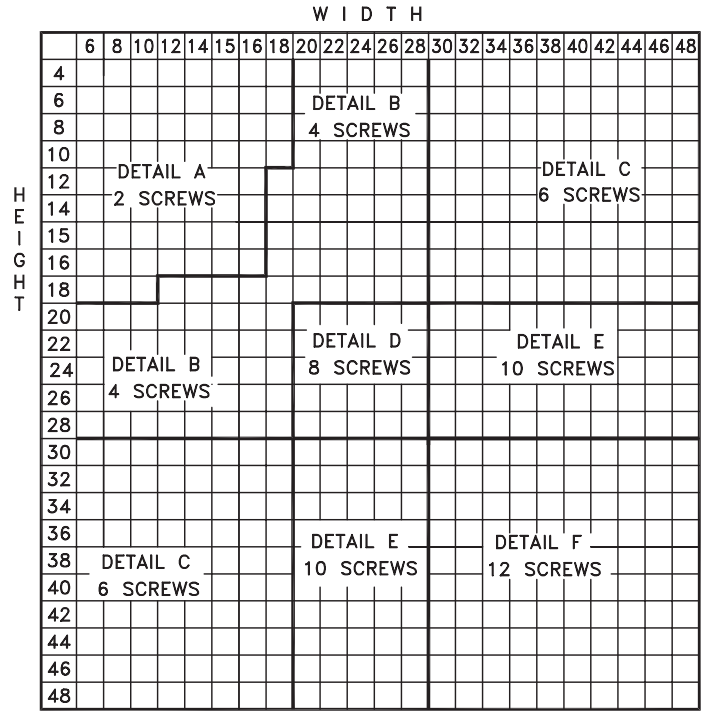
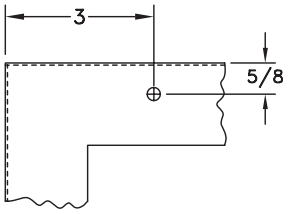
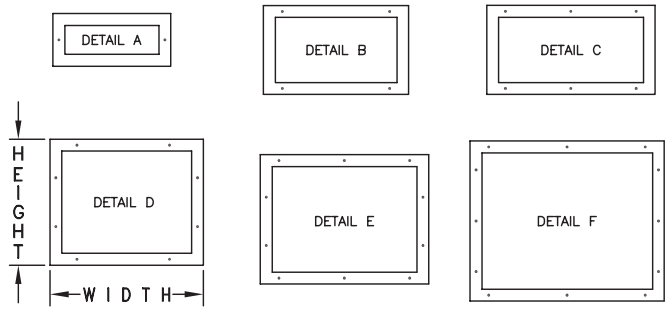
Screw Hole Location Chart
92 Series, 94 Series, 821, 831







Recommended Noise Criteria and Face Velocity Ranges are on page 6

Engineering Data

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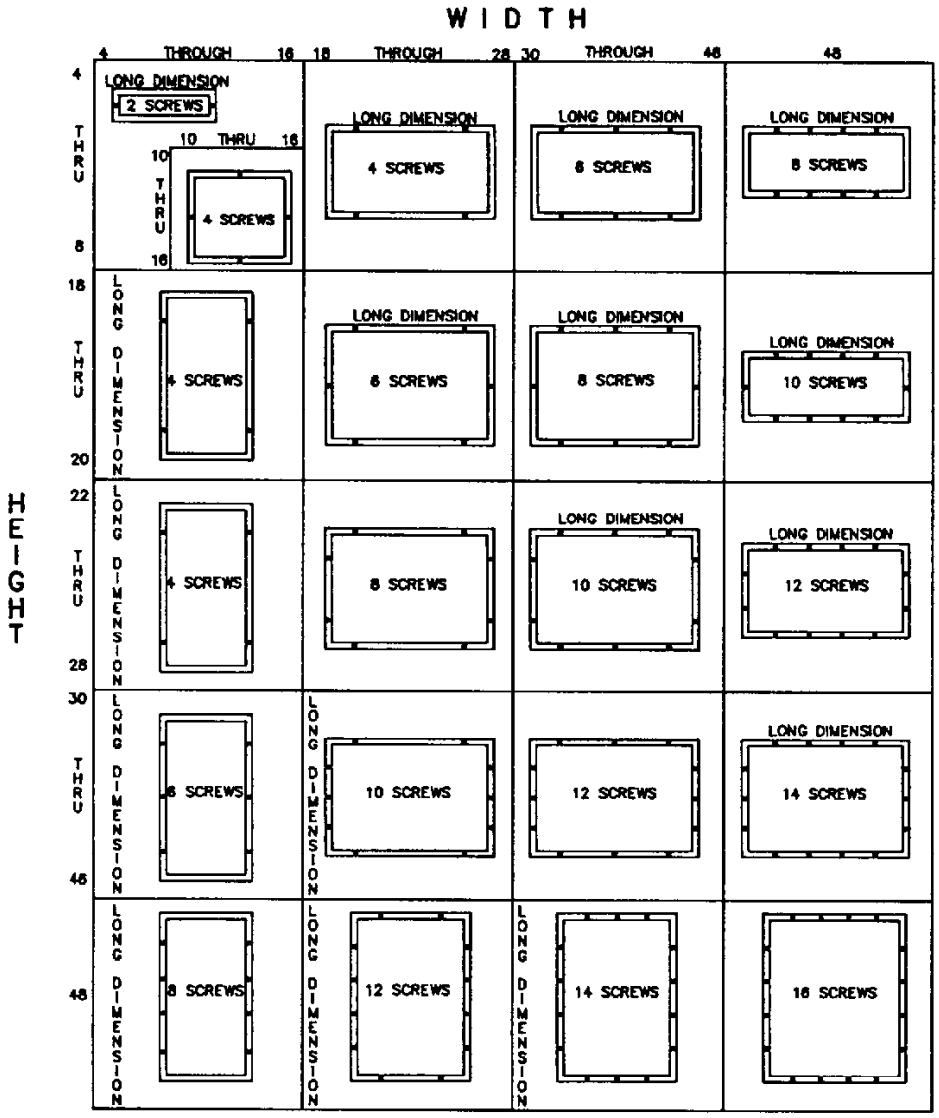
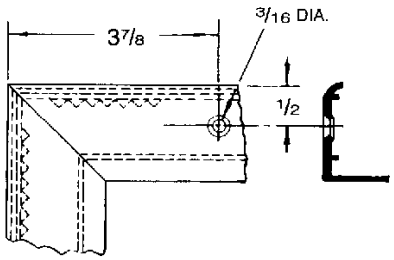
Screw Hole Chart for Extruded Aluminum Line
V Series, H Series, C Series, RH Series





Recommended Noise Criteria and Face Velocity Ranges are on page 6

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).

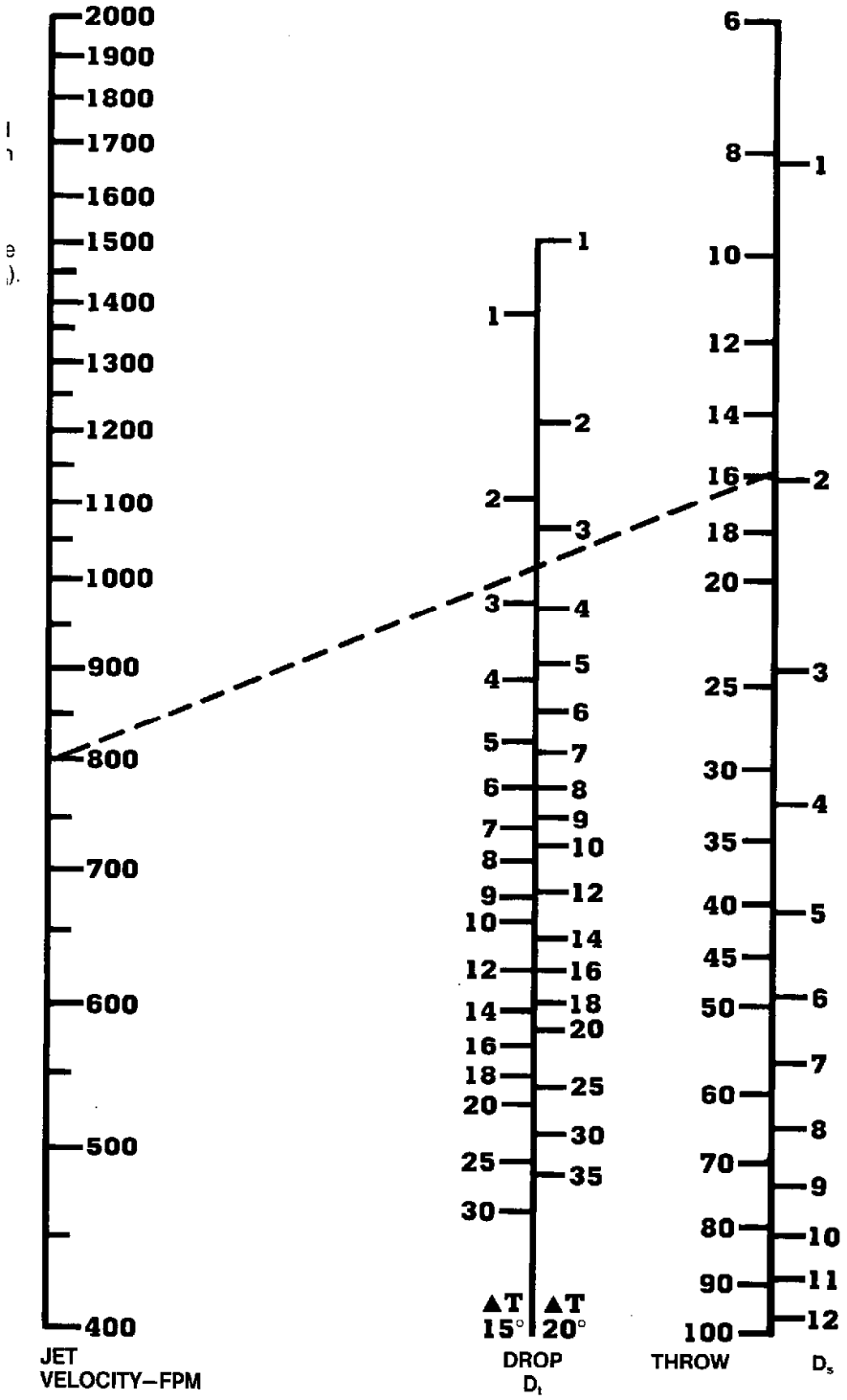
Example: The drop for a 92 Series register "C" deflection 16x5 size has an 800 fpm velocity and a 16 foot throw. Connect these two points on the chart and read the drops as follows:

$D_t = 2.7'$ $D_S = 2'$

D total = 2.7 + 2 = 4.7'

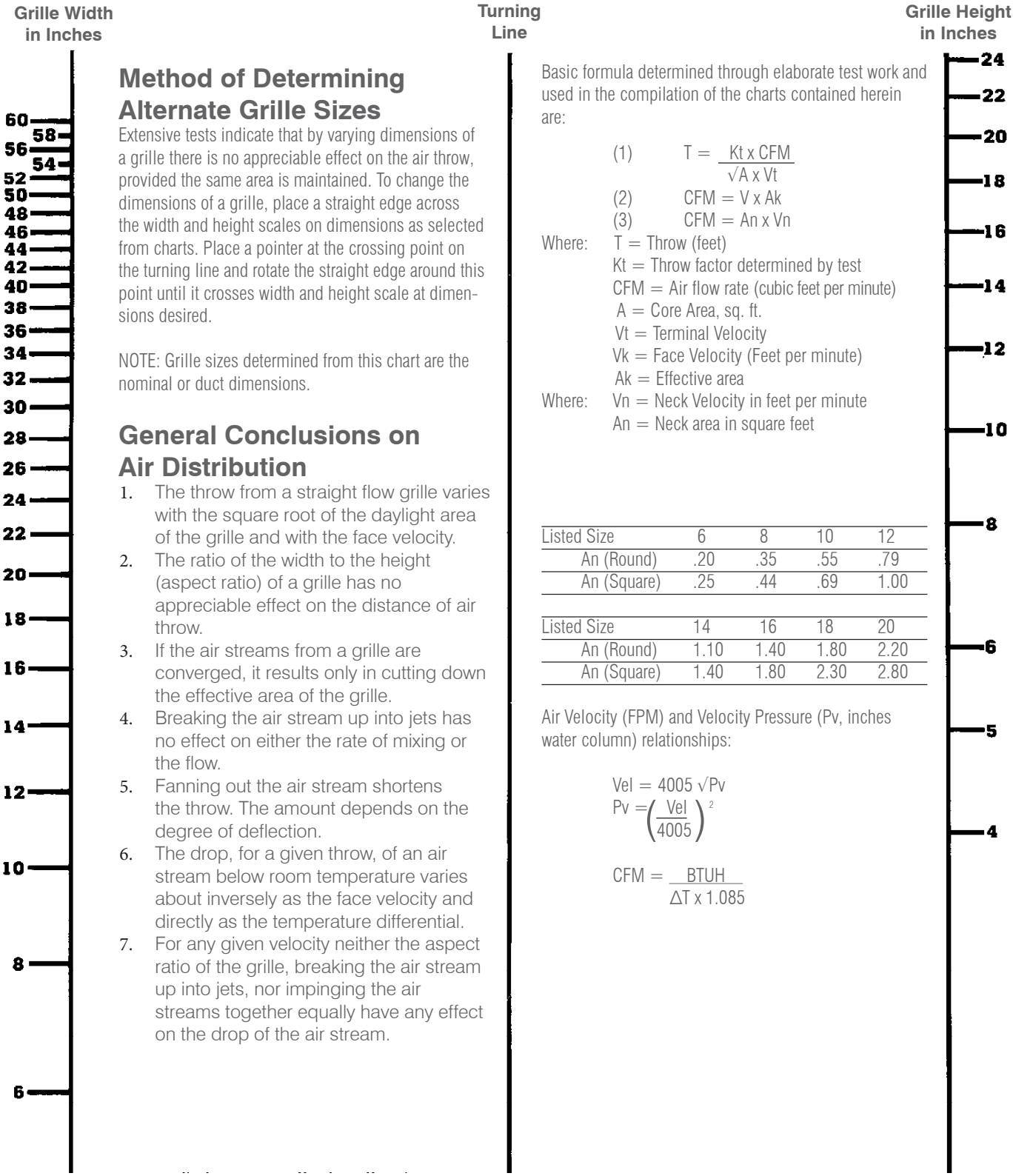
D_t = Drop along line of throw due to temperature difference.

D_S = Drop resulting from vertical spread.



Recommended Noise Criteria and Face Velocity Ranges are on page 6

92 Series, H and V Series Alternate Sizing Graph



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 formula 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

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:

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

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

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

Recommended Noise Criteria and Face Velocity Ranges are on page 6

Suggested Specifications

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Surfaire® T-Bar Diffusers
Furnish and install Hart & Cooley SurfAire® insulated ceiling diffusers as shown on the plans. The diffuser shall be a 2'x2' T-Bar lay-in. Face shall be stucco embossed aluminum with off-white baked enamel finish for ceiling aesthetics, corrosion protection and ease of cleaning. Face will have formed deflector apertures which distribute air in thin layers along the ceiling surface and which provide for optimum dispersion in one, two, three, four-way or two-way corner patterns.

Back panel shall be formed galvanized steel covered with glass fiber insulation and an aluminum foil vapor barrier. Insulation is held securely in place by face margin edge fold over. Insulation will be prescored to accept specified collar sizes.

5400 Series collars will be supplied providing efficient, tight attachment with bayonet fasteners to mating prepunched holes in back panel. Collars will provide flex duct locking tabs and damper mounting slots. Collar damper slots provide for damper attachment or removal at any time.

3800 Series, fully adjustable, butterfly dampers shall be supplied (if specified). Damper adjustment handle is inserted before or after damper is mounted and is removable at any time.

Perforated Insulated T-Bar Diffusers and Return Grilles
Contractor shall furnish and install Hart & Cooley PDS perforated diffuser or PDSD perforated diffuser with deflectors as indicated on the plans. Perforated diffusers shall be 2'x2' T-Bar lay-in. Exposed face will have a minimum 51% free area and be coated with off-white baked enamel finish. Deflectors (if specified) shall be fully adjustable, externally providing one, two, three, four-way or two-way corner air diffusion capability.

Back panel shall be black pre-coated formed steel covered with glass fiber insulation and an aluminum foil vapor barrier. Insulation is held securely in place by face margin edge fold over. Insulation is prescored to accept specified collar sizes.

5400 Series collars will be supplied providing efficient, tight attachment with bayonet fasteners to mating pre-punched holes in back panel. Collars will provide flex duct locking tabs and damper mounting slots. Collar damper slots provide for damper attachment or removal at any time.

3800 Series fully adjustable butterfly dampers shall be supplied (if specified). Damper adjustment handle is inserted before or after damper is mounted and is removable at any time.

Matching Hart & Cooley PDR perforated return air grilles shall be furnished according to the plans.

Removable Face Perforated T-Bar Diffusers and Return Grilles
Contractor shall furnish and install Hart & Cooley RFPS series perforated diffusers as indicated on the plans. Exposed face will be of a removable hinged style with a minimum 51% free area and be coated with white baked enamel finish. Deflectors are to be the patented, directable deflector to ensure proper adjustable air deflection. Back panel shall be black, pre-coated, formed steel to minimize sight into diffuser.

5400 Series collars will be supplied providing efficient, tight attachment with bayonet fasteners to mating pre-punched holes in back panel. Collars will provide flex duct locking tabs and amper mounting slots. Collar damper slots provide for damper attachment or removal at any time.

3800 Series fully adjustable butterfly dampers shall be supplied (if specified). Damper adjustment handle is inserted before or after damper is mounted and is removable at any time.

Matching Hart & Cooley RFPR perforated return air grilles shall be furnished according to the plans.

High Volume Supply T-Bar Diffuser
Contractor shall furnish and install Hart & Cooley HVS high volume supply 2'x2' T-Bar lay-in diffuser as shown on the plans. This diffuser will consist of a formed back panel and three stepdown formed elements, all made of heavy gauge steel. Finish shall be an off-white baked enamel. Interior air diffusion elements are easily removable at any time without tools for access to damper control rod. The air diffusion pattern shall be a full 360°.

The back panel shall be fully insulated with fiberglass having an aluminum foil vapor barrier. Insulation is held rigidly in place with adhesive and will be prescored to accept specified collar sizes.

5400 Series collars will be supplied providing efficient, tight attachment with bayonet fasteners to mating pre-punched holes in back panel. Collars will provide flex duct locking tabs and amper mounting slots. Collar damper slots provide for damper attachment or removal at any time.

3800 Series fully adjustable butterfly dampers shall be supplied (if specified). Damper adjustment handle is inserted before or after damper is mounted and is removable at any time.

Fixed Pattern T-Bar Diffuser
Contractor shall furnish and install Hart & Cooley FPD fixed pattern diffuser 2'x2' T-Bar lay-in as shown on the plans. This diffuser will consist of a formed back panel and two stepdown formed elements, all made of heavy gauge steel. Finish shall be an off-white baked enamel. Interior air diffusion elements are easily removable at any time without tools for access to damper or neck. The air diffusion pattern shall be a full 360°.

3800 Series fully adjustable butterfly dampers shall be supplied (if specified) and can be adjustable through the face.

Glossary of Terms

Ceiling or Wall Effect
The tendency of an air stream moving along a wall or ceiling surface to remain in contact with that surface.

Core Area
The total plane area of that portion of a grille, face, or register bounded by a line tangent to the outer opening through which air can pass. The core area is less than the register size. Example, a 14-in. x 8-in. register may have a core that is 1 in. less than the listed size; so, the core area is 13in. x 7in. – 91 sq. in.

Diffuser
An outlet discharging supply air in a spreading pattern.

Diffusion
Distribution of air within a space by an outlet discharging supply air in a spreading pattern.

Drop
The vertical distance between the base of the outlet and the bottom of the air stream at the end of the horizontal throw.

Effective Area, Ak (Sq. Ft.)
The calculated area of an outlet based on the average measured velocity between the fins.

Envelope
The outer boundary of an air stream moving at a specific velocity (for example, a 50 fpm envelope).

Free Area
The total minimum area of the openings in the air outlet or inlet through which air can pass.

Grille
A louvered covering for an opening through which air passes.

Induction
The process of drawing room air into the projected air stream due to the velocity of the projected air stream (sometimes called aspiration).

Jet Velocity, Fpm (Face Velocity)
The average measured velocity of air passing between the fins.

Natural Convection Currents
Air currents created by a buoyancy effect caused by the difference in temperature between the room air and the air in contact with a warm or cold surface.

Outlet
Any opening through which air is delivered to condition a space.

Outlet Velocity, Fpm
The average velocity of the supply air, measured as it passes through the plane of the opening in the supply outlet.

Pressure Loss, WG
Indicates how much total pressure is required to move air through a register.

Primary Air
The mixture of supply air from the outlet and room air within the 1 50 fpm envelope.

Radius of Diffusion, Ft.
The horizontal distance (throw) from a ceiling diffuser to the point of terminal velocity.

Register
A grille which is equipped with a damper or control valve, and which directs air in a nonspreading jet.

Return
Any opening through which air is removed from a conditioned space.

Spread, Ft.
The maximum width of the total air stream at the point of terminal velocity.

Static Pressure, PS
The outward force of air within a duct measured in inches of water.

Stratification Boundary
The boundary between room air currents moving faster than 1 5 fpm and the stratification zone.

Stratified Zone
A region in which room air velocity is less than 1 5 fpm.

Temperature Difterential
The temperature difference between the primary and the room air.

Temperature Variation (ΔT)
The temperature difference between points within the same space.

Terminal Velocity, Fpm
When the velocity of total air drops to 50 or 75 fpm, depending on the particular application, it reaches terminal velocity. Terminal velocity is not sharply defined for all applications.

Throw (Blow), Ft.
The horizontal distance an air stream travels after leaving a horizontal sidewall outlet before maximum velocity is reduced to terminal velocity. For a perimeter outlet, throw is the vertical distance the air stream travels before maximum velocity is reduced to terminal velocity.

Total Air
The mixture of projected air and room air set in motion by the supply air.

Total Pressure, Pt
The sum of the velocity and static pressures measured in inches of water.

Vane Ratio
The ratio showing depth of vane to minimum width between two adjacent vanes.

Velocity Pressure, Pv
The forward-moving force of air within a duct measured in inches of water.

NC Noise Criteria
A single number noise rating system that indicates what Broad Band, continuous sounds are reasonably acceptable.

Hart & Cooley, LLC
5030 Corporate Exchange Blvd. SE
Grand Rapids, MI 49512

P (800) 433-6341
F (800) 223-8461

hartandcooley.com

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Form No. 851531-PD 06/2017