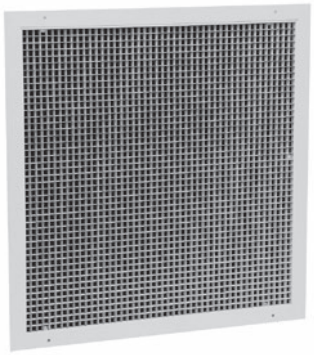
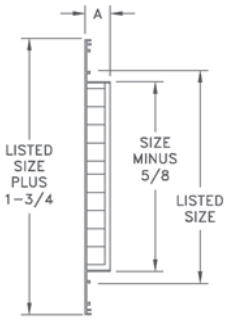


RE5 Grille

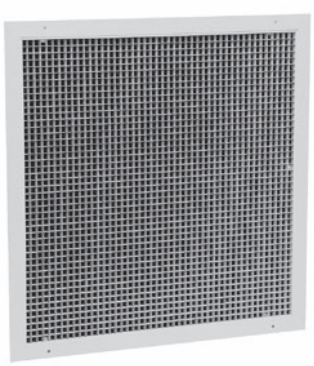
- All-aluminum construction
- Grid core 1/2" x 1/2" x 1/2"
- Square core design with extruded aluminum frame
- Bright White or Mill finish



MODEL	GRID CORE DIMENSIONS	A
RE5	½ x ½ x ½	1–1/16
RE510	½ x ½ x 1	1–9/16
RE1	1 x 1 x 1	1–9/16

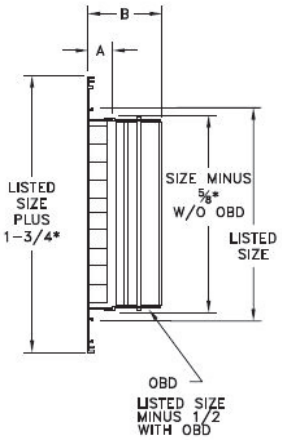
RE5 Available Sizes (in.)

HT	WIDTH																				
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X



RED5 Register

- Aluminum construction
- Opposed-blade, galvanized damper
- Square core design with extruded aluminum construction
- Bright White or Mill finish



RED5 REGISTER

MODEL	GRID CORE DIMENSIONS	A	B
RE5	1/2x1/2x1/2	1–1/4	2–1/2
RE510	1/2x1/2x1	1–1/4	2–15/16
RE1	1x1x1	1–1/4	2–15/16

RED5 Available Sizes (in.)

HT	WIDTH																				
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Engineering Data on Page 87

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.

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Engineering Data

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.

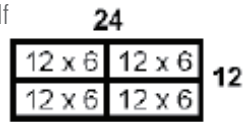
Method 2: A more exact method would be to do interpolation process between two listed sizes. If 14x14 is not given, but 18x10 and 20x10 are, then this equation will get more exact 14x14 data. Y = Y1 + [{(X - X1) * (Y2-Y1)} / (X2 - X1)] where:
Y = unknown CFM or throw that is being computed for 14x14
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 77

RH90 Registers and Grilles (Page 26)

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(s) 78

RE5 Series Return Air Registers and Grilles (Page 23)

Face Velocity		400	500	600	700	800	900	1000
6 x 6	CFM	30	37	44	52	59	67	74
Ak .070	Ps	.010	.013	.018	.023	.030	.038	.049
8 x 8	CFM	87	108	130	152	174	195	217
Ak .220	Ps	.010	.013	.018	.023	.031	.039	.049
10 x 10	CFM	160	200	240	280	320	360	400
Ak .400	Ps	.010	.014	.018	.024	.031	.040	.050
12 x 6	CFM	103	129	155	180	206	232	258
Ak .260	Ps	.010	.014	.018	.024	.031	.039	.049
14 x 6	CFM	127	159	191	223	255	287	319
Ak .320	Ps	.010	.014	.018	.024	.031	.040	.050
14 x 8	CFM	184	230	276	322	368	414	460
Ak .460	Ps	.011	.014	.018	.024	.032	.040	.050
12 x 12	CFM	249	311	373	435	497	559	622
Ak .620	Ps	.011	.014	.018	.025	.032	.041	.051
24 x 8	CFM	345	431	517	603	689	775	862
Ak .860	Ps	.011	.014	.019	.025	.032	.041	.052
18 x 12	CFM	392	490	589	687	785	883	981
Ak .980	Ps	.012	.014	.019	.025	.033	.041	.052
30 x 8	CFM	440	550	660	770	880	990	1100
Ak 1.100	Ps	.012	.015	.019	.025	.033	.042	.052
24 x 12	CFM	534	668	801	935	1068	1202	1336
Ak 1.340	Ps	.012	.015	.019	.026	.033	.042	.053
18 x 18	CFM	604	756	907	1058	1209	1360	1511
Ak 1.510	Ps	.013	.015	.019	.026	.033	.042	.054
30 x 12	CFM	674	843	1011	1180	1348	1517	1685
Ak 1.690	Ps	.013	.015	.019	.026	.034	.042	.054
20 x 20	CFM	751	939	1127	1315	1502	1690	1878
Ak 1.880	Ps	.013	.015	.019	.026	.034	.043	.055
36 x 12	CFM	812	1015	1218	1422	1625	1828	2031
Ak 2.030	Ps	.014	.015	.019	.026	.034	.043	.055
24 x 20	CFM	903	1129	1355	1581	1807	2033	2258
Ak 2.260	Ps	.014	.016	.019	.026	.034	.043	.055
30 x 18	CFM	1016	1270	1524	1778	2032	2286	2540
Ak 2.540	Ps	.014	.016	.020	.027	.034	.043	.056
24 x 24	CFM	1083	1354	1625	1895	2166	2437	2708
Ak 2.710	Ps	.014	.016	.020	.027	.034	.043	.056
36 x 18	CFM	1216	1519	1823	2127	2431	2735	3039
Ak 3.040	Ps	.014	.016	.020	.027	.035	.043	.056
30 x 24	CFM	1346	1683	2019	2356	2692	3029	3366
Ak 3.370	Ps	.015	.016	.020	.027	.035	.044	.057
36 x 24	CFM	1602	2003	2403	2804	3204	3605	4005
Ak 4.010	Ps	.014	.016	.020	.027	.035	.044	.057
30 x 30	CFM	1665	2081	2497	2913	3330	3746	4162
Ak 4.160	Ps	.014	.016	.020	.027	.035	.044	.057
36 x 30	CFM	1972	2465	2958	3451	3944	4437	4929
Ak 4.930	Ps	.014	.016	.021	.028	.035	.044	.056
48 x 24	CFM	2091	2614	3137	3660	4183	4705	5228
Ak 5.230	Ps	.013	.016	.021	.028	.036	.045	.055
36 x 36	CFM	2325	2906	3487	4068	4650	5231	5812
Ak 5.810	Ps	.012	.016	.021	.028	.036	.045	.053
48 x 36	CFM	2981	3726	4471	5216	5961	6706	7452
Ak 7.450	Ps	.012	.013	.021	.028	.036	.045	.044
48 x 48	CFM	3751	4689	5626	6564	7502	8439	9377
Ak 9.380	Ps	.012	.013	.021	.029	.037	.046	.044

For sizes not listed and sizing tips see page(s) 78

Recommended Noise Criteria and Face Velocity Ranges are on page 77