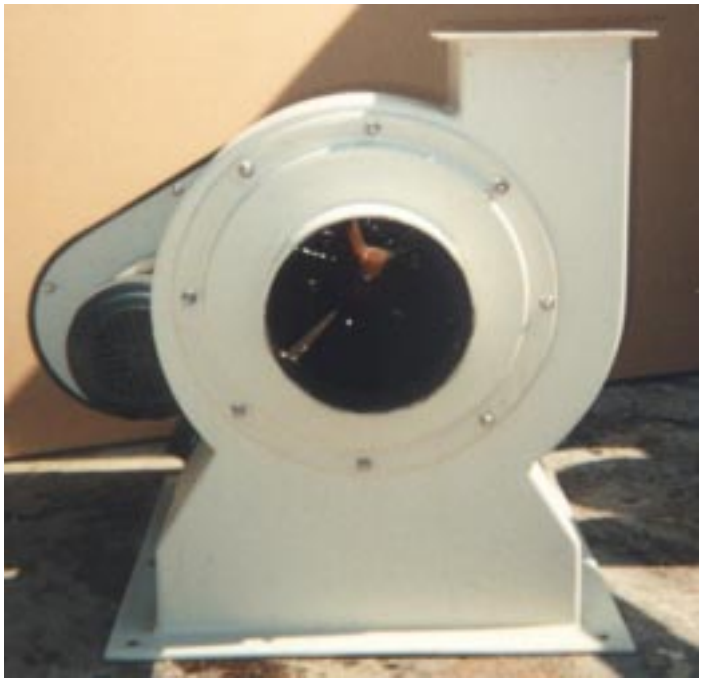
AIR CHEM SYSTEMS, INC.

RADIAL FANS



AIR CHEM SYSTEMS, INC. manufactures an extensive line of air pollution control equipment for the electronic, metal finishing, plating, sewage treatment, and other industries that generate nonflammable corrosive fumes and odors.

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RADIAL FAN DESIGNS

AIR CHEM SYSTEMS Radial (ACSR) Fans are self-contained ventilation units available in varying sizes for exhaust service applications in the industrial, chemical processing field. These fans are designed to provide an economical ventilation system with small air volume requirements against the resistance of the collection system and fume control equipment.

ACSR fan wheels, scrolls and bases are fabricated from corrosion-resistant, fiberglass reinforced plastic (FRP) to provide superior performance for exhausting highly corrosive fumes.

The turned, ground and polished (TG&P) shaft has an FRP sleeve so that no metal is exposed to the corrosives in the air stream.

All **ACSR** fans are clockwise rotation (when viewed from the drive end), upblast discharge and Arrangement 9 where the bearings, drives and motors are out of the air stream.

ACSR fan wheels are constructed and bonded utilizing a premium-grade, vinyl ester resin for maximum secondary bonding characteristics. No epoxy is used in the fabrication of ACSR fan wheels. All fan wheels are dynamically balanced for smooth, quiet operation and maximum dependability.

ACSR fan wheels are of the flat-blade, radiating spoke type for low or high pressure characteristics up to 7 inches of static pressure.

The discharge outlet is flanged for attachment of stacks or grills.

The performance tables for each fan in this catalog represent the various curves extrapolated into numerical form. On each table there is a series of underlined numbers indicating RPM and BHP in each static pressure (SP) column. These numbers indicate the most efficient point of operation for a given CFM at that static pressure. For cost considerations, select a fan where the CFM and static pressure required intersects at or below the underlined print but it should be no lower than 5600 FPM OV. If your selection falls above the underlined print, consider a smaller fan.

Fan noise is also an important consideration, particularly when the fan is located near occupied space and is operating against a Static Pressure of 1” or greater. The following table provides a quick method of considering the degree of quietness when selecting a fan.

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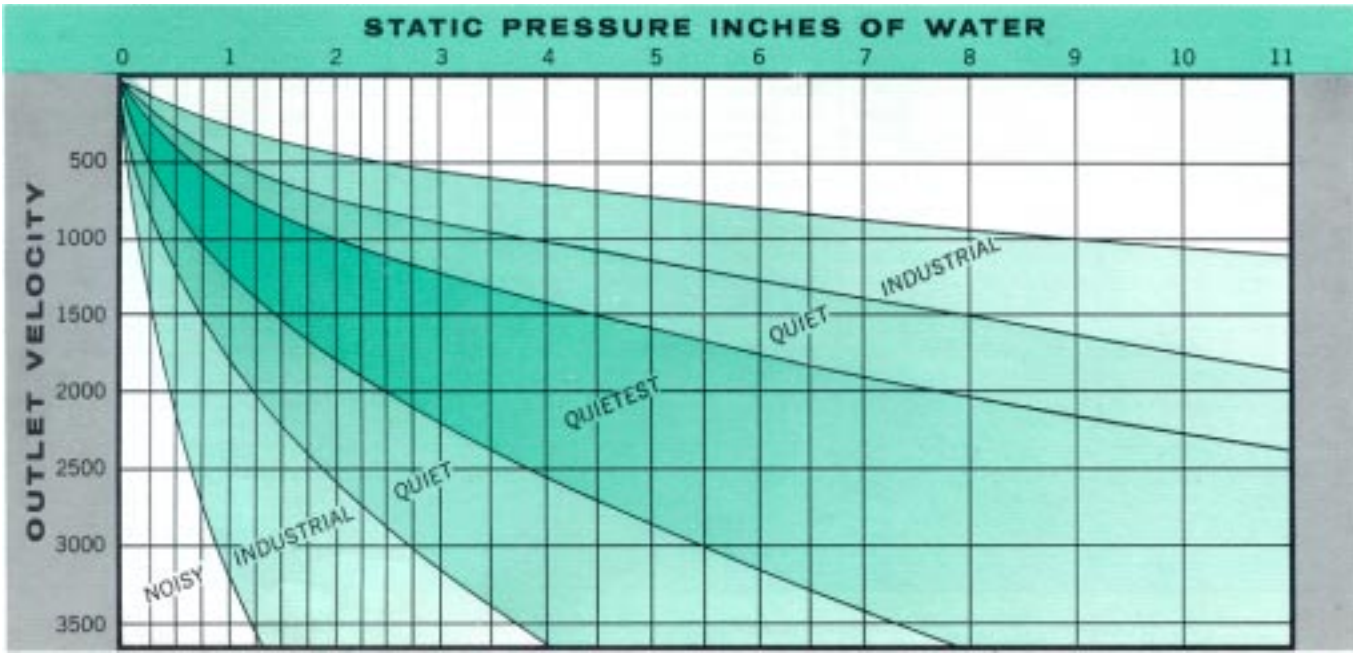
ACSI FAN SELECTION



DEFINITIONS:

CFM …….Cubic Feet Per Minute
SCFM……Standard CFM based on standard air of .075 lbs. @ 70 degrees F.
ACFM …..Actual CFM or condition at the site
FPM …….Feet Per Minute
BHP …….Brake Horse Power
OV ……..Outlet Velocity in FPM
RPM …….Revolution Per Minute
SPWC ….Static Pressure in inches of Water Column
SPHG …..Static Pressure in inches of Mercury

TEMPERATURE AND ALTITUDE

The following fan curve tables are based on standard air at 70° F., 29.92 inches barometric pressure and weighing .075 pounds per cubic foot. When air temperatures other than 70° F and/or altitudes other than sea level are involved, it is necessary to correct for the new fan requirements.

Table 1 indicates the correction factor for the temperature and altitude the fan will be operating at.

How to use Table 1:
Example: 10,000 CFM @ 2 1/2" S.P.W.C. @ 150^0 F at an altitude of 7000 feet. In this example the factor will be 1.50 from Table 1 below.

STEP 1: Multiply the static pressure by the factor (2.5 x 1.5 = 3.75" S.P.W.C. [use 4"]).
STEP 2: Select a fan from the following fan charts for the new condition of 10,000 CFM @ 4" S.P.W.C.
In this case an ACSC 300 fan at 10,349 CFM at 4" S.P.W.C. has a 1217 RPM @ 9.93 BHP.
STEP 3: Correct the horsepower and static pressure in Step 2 to non-standard performance by dividing the factor. (1) 4" S.P. ÷ 1.5 = 2.67 S.P. (2) 9.93 BHP ÷ 1.5 = 6.62 BHP
STEP 4: Check for maximum safe speed from Table 2. At 150^0 the safe speed factor from Table is .98. The maximum safe speed for the ACSC 300 fan, Class I is 1355 RPM x .98=1328 RPM. Our RPM selected above is 1217 therefore satisfactory.

Final performance is: 10,000 CFM @ 2.67 S.P.W.C. turning at 1217 RPM using 6.62 BHP operating at 150^0 F at 7000 ft. elevation. Use special high altitude motor if altitude exceeds 3300 feet.

TABLE 1

TEMP.	ALTITUDE												
(^{0}F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10,000	11,000	12,000
	1.00	1.04	1.08	1.12	1.16	1.20	1.25	1.30	1.35	1.40	1.46	1.51	1.57
-50	0.77	0.80	0.83	0.86	0.89	0.92	0.96	1.00	1.04	1.08	1.12	1.16	1.21
-25	0.82	0.89	0.89	0.92	0.95	0.98	1.03	1.07	1.11	1.15	1.20	1.24	1.29
0	0.87	0.90	0.94	1.08	1.01	1.04	1.09	1.13	1.17	1.22	1.27	1.31	1.37
25	0.91	0.95	0.98	1.02	1.06	1.09	1.14	1.18	1.23	1.27	1.33	1.37	1.43
50	0.96	1.00	1.04	1.08	1.11	1.15	1.20	1.25	1.30	1.34	1.40	1.45	1.51
70	1.00	1.04	1.08	1.12	1.16	1.20	1.25	1.30	1.35	1.40	1.46	1.51	1.57
100	1.06	1.10	1.14	1.19	1.23	1.27	1.33	1.38	1.43	1.48	1.55	1.60	1.66
125	1.10	1.14	1.19	1.23	1.28	1.32	1.38	1.43	1.49	1.54	1.61	1.66	1.73
150	1.15	1.20	1.24	1.29	1.33	1.38	1.44	1.50	1.55	1.61	1.68	1.74	1.81
175	1.20	1.25	1.30	1.34	1.39	1.44	1.50	1.56	1.62	1.68	1.75	1.81	1.88
200	1.25	1.30	1.35	1.40	1.45	1.50	1.56	1.63	1.69	1.75	1.83	1.89	1.96

TABLE 2 MAXIMUM SAFE SPEED CORRECTION FACTOR

TEMP.	0	70	100	150	175	200
RPM	1.00	1.00	1.00	0.98	0.945	0.91

FAN LAWS FOR AIR MOVING EQUIPMENT

The performance of all fans is governed by certain rules of physics known as fan laws. CFM, RPM, SP and HP are all related to each other in a known manner and when one changes, all others change. The CFM variable is the most commonly changed measurement in an air moving system therefore the following example of Fan Law application is based on a change from an existing CFM to a new CFM.

1. To determine performance at a new CFM, first calculate the ratio of the new CFM_2 to the existing CFM_1 (new CFM divided by existing CFM):

$$\frac{CFM_2}{CFM_1} = \text{RATIO (R)}$$

2. To determine new RPM_2, multiply Ratio (R) times existing RPM_1:

$$R \times RPM_1 = RPM_2$$

3. To determine new SP_2, multiply Ratio (R) times itself, and then times the existing SP_1:

$$R^2 \times SP_1 = SP_2$$

4. To determine new HP_2 required, multiply Ratio (R) times itself twice and then times the existing HP_1:

$$R^3 \times HP_1 = HP_2$$

EXAMPLE:
A fan is delivering 13,000 CFM @ 2" SP, running 745 RPM using 6.37 BHP (7 1/2 HP motor). To increase the speed of this fan to 15,000 CFM the Ratio is:

$$\frac{15000}{13000} = 1.154$$

The new RPM is $1.154 \times 748 = 863$
The new Static Pressure is $1.154^2 \times 2 = 2.66$
The new BHP is $1.154^3 \times 6.37 = 9.79$ (15 HP motor).

New drives and a 15 HP motor will be required for this fan to deliver 15,000 CFM @ 2.66 SPWC.

Size 9

CFM	OV	1" SP		1 1/2" SP		2" SP		2 1/2" SP		3" SP		4" SP		5" SP		6" SP		7" SP	
		RPM	BPH	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
136	**1000**	1589	0.03	1908	0.05	2194	0.07	2455	0.09	2696	0.12	3126	0.17	3506	0.22	3850	0.28	4169	0.42
163	**1200**	1640	0.04	1940	0.06	2208	0.08	2466	0.10	2686	0.13	3109	0.18	3488	0.24	3831	0.31	4147	0.37
190	**1400**	1700	0.05	1989	0.07	2244	0.09	2476	0.12	2697	0.14	3102	0.19	3472	0.26	3814	0.33	4129	0.40
218	**1600**	1773	0.06	2047	0.08	2292	0.11	2517	0.13	2722	0.16	3113	0.22	3470	0.28	3801	0.35	4112	0.42
245	**1800**	1853	0.07	2111	0.09	2349	0.12	2566	0.15	2768	0.18	3136	0.24	3482	0.30	3802	0.37	4104	0.45
272	**2000**	1936	0.08	2187	0.11	2411	0.14	2623	0.17	2819	0.20	3178	0.27	3504	0.33	3817	0.40	4109	0.48
299	**2200**	2026	0.10	2267	0.13	2485	0.16	2684	0.19	2876	0.22	3224	0.29	3545	0.36	3840	0.44	4126	0.52
326	**2400**	2113	0.11	2351	0.14	2561	0.18	2754	0.21	2937	0.25	3281	0.32	3590	0.39	3381	0.48	4151	0.56
354	**2600**	2189	0.13	2437	0.16	2643	0.20	2830	0.24	3005	0.27	3339	0.35	3645	0.44	3927	0.52	4194	0.60
381	**2800**	2258	0.15	2530	0.19	2726	0.23	2911	0.26	3082	0.30	3401	0.39	3702	0.47	3979	0.56	4239	0.65
408	**3000**	2322	0.17	2613	0.21	2813	0.25	2995	0.29	3161	0.34	3469	0.42	3761	0.51	4036	0.61	4291	0.70
435	**3200**	2385	0.19	2686	0.24	2908	0.28	3077	0.33	3244	0.37	3547	0.46	3826	0.55	4094	0.66	4348	0.76
462	**3400**	2461	0.21	2756	0.26	2992	0.32	3167	0.36	3327	0.41	3624	0.50	3897	0.60	4156	0.70	4405	0.81
490	**3600**	2543	0.24	2817	0.29	3067	0.35	3260	0.40	3412	0.45	3706	0.55	3974	0.65	4223	0.76	4466	0.87
517	**3800**	2630	0.27	2884	0.32	3138	0.38	3344	0.44	3505	0.49	3791	0.60	4052	0.70	4300	0.81	4532	0.92
544	**4000**	2720	0.30	2951	0.36	3205	0.42	3420	0.48	3594	0.54	3872	0.65	4133	0.76	4374	0.87	4602	0.99
571	**4200**	2811	0.33	3028	0.39	3267	0.46	3492	0.53	3680	0.59	3959	0.70	4217	0.82	4453	0.94	4680	1.06
598	**4400**	2906	0.36	3111	0.43	3334	0.50	3562	0.57	3753	0.64	4053	0.76	4600	0.88	4535	1.00	4756	1.13

Size 12

CFM	OV	1" SP		1 1/2" SP		2" SP		2 1/2" SP		3" SP		4" SP		5" SP		6" SP		7" SP	
		RPM	BPH	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
477	**1800**	1337	0.13	1523	0.18	1695	0.23	1852	0.29	1997	0.35	2263	0.46	2513	0.58	2744	0.71	2961	0.86
530	**2000**	1397	0.16	1578	0.21	1740	0.27	1893	0.33	2034	0.38	2293	0.52	2528	0.63	2754	0.77	2965	0.92
583	**2200**	1462	0.18	1636	0.25	1793	0.33	1937	0.36	2075	0.42	2326	0.56	2558	0.69	2771	0.84	2977	1.00
636	**2400**	1525	0.21	1696	0.27	1848	0.35	1987	0.40	2119	0.48	2368	0.61	2591	0.75	2801	0.92	2995	1.08
689	**2600**	1580	0.25	1759	0.31	1907	0.38	2042	0.46	2168	0.52	2409	0.67	2630	0.84	2834	1.00	3026	1.15
742	**2800**	1629	0.29	1826	0.36	1967	0.44	2101	0.50	2224	0.58	2454	0.75	2671	0.90	2871	1.08	3059	1.25
795	**3000**	1676	0.33	1886	0.40	2030	0.48	2161	0.56	2281	0.65	2503	0.81	2714	0.98	2912	1.17	3096	1.34
848	**3200**	1721	0.36	1938	0.46	3098	0.54	2220	0.63	2341	0.71	2560	0.88	2761	1.06	2954	1.27	3138	1.46
901	**3400**	1776	0.40	1989	0.50	2159	0.61	2285	0.69	2401	0.79	2615	0.96	2812	1.15	2999	1.34	3179	1.56
945	**3600**	1835	0.46	2033	0.56	2213	0.67	2352	0.77	2462	0.86	2674	1.06	2868	1.25	3037	1.46	3223	1.67
1007	**3800**	1898	0.52	2081	0.61	2264	0.73	2413	0.84	2529	0.94	2736	1.15	2924	1.34	3100	1.56	3270	1.77
1060	**4000**	1963	0.58	2129	0.69	2313	0.81	2468	0.92	2593	1.03	2794	1.25	2982	1.46	3156	1.67	3321	1.90
1113	**4200**	2028	0.63	2185	0.75	2357	0.88	2520	1.02	2663	1.13	2857	1.34	3043	1.57	3213	1.80	3377	2.04
1166	**4400**	2097	0.69	2245	0.83	2406	0.96	2570	1.09	2708	1.23	2925	1.46	3103	1.69	3272	1.92	3432	2.17
1219	**4600**	2166	0.77	2307	0.90	2453	1.04	2614	1.19	2760	1.32	2990	1.59	3163	1.82	3333	2.07	3490	2.30
1272	**4800**	2238	0.86	2371	1.00	2509	1.13	2666	1.29	2810	1.42	3050	1.71	3228	1.95	3393	2.21	3549	248
1325	**5000**	2311	0.94	2436	1.09	2567	1.23	2707	1.38	2856	1.53	3106	1.84	3298	2.11	3454	2.36	3610	2.63
1378	**5200**	2383	1.03	2503	1.19	2629	1.34	2759	1.47	2904	1.65	3590	1.96	3359	2.27	3518	2.53	3669	2.80

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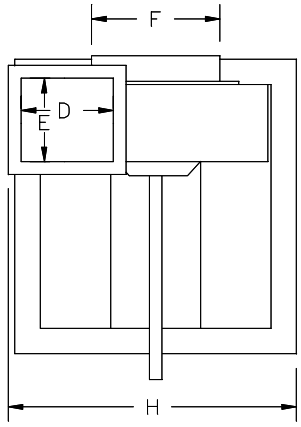
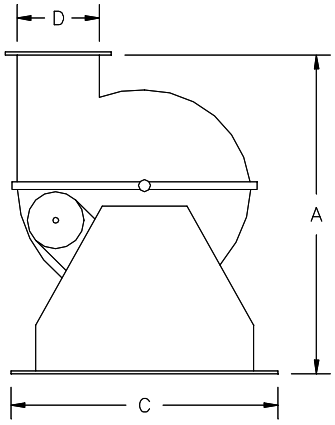
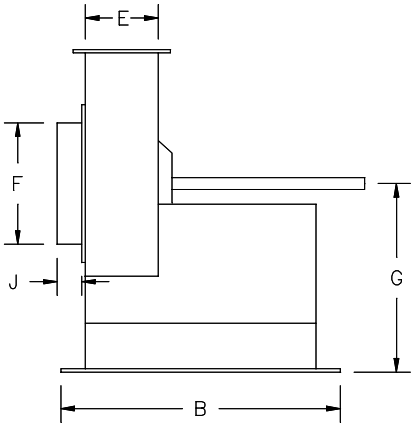
ACS Radial FRP Fan Dimensional Data



PLAN



DRIVE END



SIDE

MODEL/ SIZE	WHEEL DIA.	A	B	C	D	E	F	G	H	J
ACSR 9	9”	23 1/4	21	22	4 1/2	4	6	12 1/2	22	3
ACSR 12	12”	23 3/4	23	22	6 3/4	6	10	15 1/2	20 1/2	2

FO1—STAINLESS STEEL SHAFT:
This shaft is more rust resistant and provides additional level of corrosion resistance from fugitive fumes.

FO2—DISCHARGE GRILL:
Prevents injury to personnel from falling or sticking their hands into the fan. Recommended on small fans with no stack where the discharge is below head height or where there is a possibility of falling into the discharge opening.

FO3—FRP EXTENDED BASE:
To raise the centerline of the fan to align with a horizontal scrubber.

FO4—OUTLET TRANSITION:
Converts the rectangular fan discharge opening to a standard round stack diameter.

FO5—STACK:
Adds additional height to the discharge.

FO6—INLET TRANSITION:
Connects inlet diameter to incoming duct diameter.

Hoods

Scrubbers

Duct & Fittings

Air Strippers

Radial Fans

Centrifugal Fans

Special Systems

Process Tanks

Inline Fans

Storage Tanks

Odor Control

Ventilation Systems

Chrome Systems

SOx Systems

NOx Systems

Dampers

Custom Fabrication

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Manufacturer of Fiberglass Air Pollution Control & Industrial Equipment

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