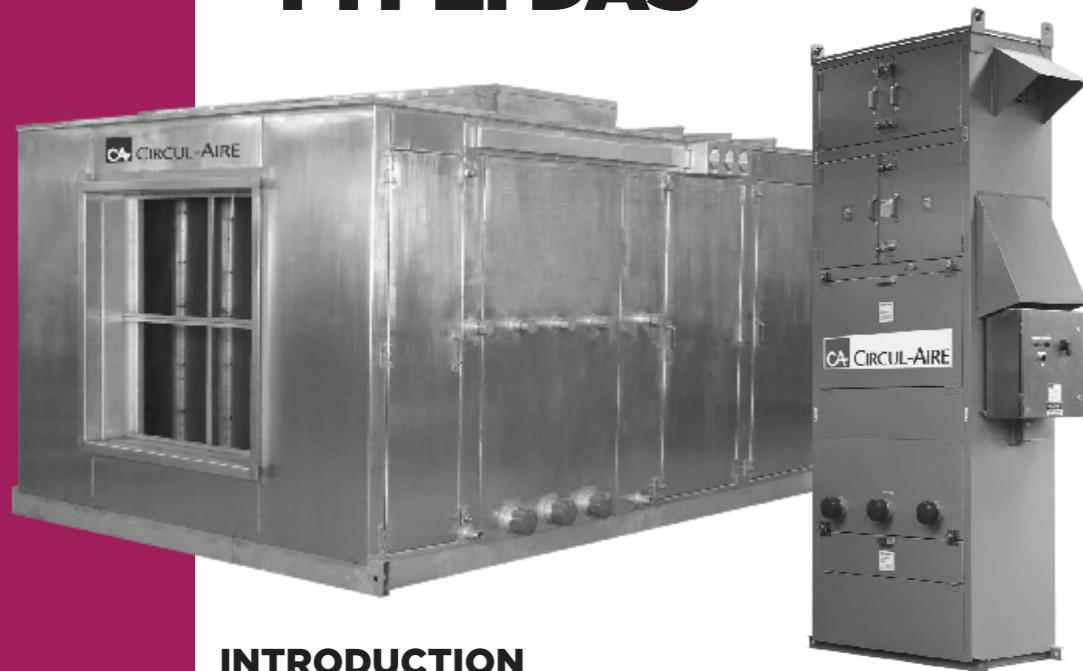


# DRY SCRUBBERS TYPE: DAS



DAS Vertical Unit  
Consult factory for DAS  
vertical sizing

## INTRODUCTION

### THE PROBLEMS

Odor and corrosion problems from various manufacturing processes are often the result of multiple airborne contaminants. Industries such as pulp and paper, oil and gas refineries and wastewater treatment generate contaminants such as hydrogen sulphide, an undesirable by-product which is malodorous, toxic and highly volatile.

In wastewater treatment facilities, specific characteristics such as basin detention times, loadings to biological processes and sludge generation potential can influence the odor levels.

Sept-age and sludge handling systems are also common sources of strong odors. Odor generation is often the result of organic overloading, inadequate supply of air, improper ventilation, or simply the failure to recognize that certain unit processes may require the implementation of special odor control technology.

Typical nuisance odors and corrosive contaminants are also produced in the manufacturing of chemicals, fertilizer, pharmaceuticals and food processing, as well as waste transfer stations, incineration plants and garbage depots.

The ability to control odorous emissions has become a growing concern as cities and populations are expanding closer to plant facilities. The objective of odor control is to prevent or minimize nuisance odor levels to the surrounding community. Safety and comfort of the employees working in plant facilities has also become a top priority. National and local regulations on air quality are more severe, responding to neighbor complaints and environmental groups.

The DAS systems can also be used for the abatement of intentional or non intentional releases of toxic airborne contaminants, thus preventing them from infecting the space.

### THE CONVENTIONAL SOLUTIONS

Traditional solutions used for odor and corrosion problems consist of two types of systems: wet scrubbers and dry scrubbers. Wet scrubbers are typically large towers utilizing chemical solutions to neutralize the odors. These types of systems are used in cases of very high concentrations (greater than 20 ppm) in order to reduce contaminant loads. Wet scrubbers require a major investment and substantial maintenance costs.

Circul-Aire's Deep Bed Air Systems (DAS) are smaller dry scrubbers filled with granular MULTI-MIX® media. Smaller concentrations (less than 20 ppm) require DAS dry scrubbers to efficiently remove contaminants to non-detectable levels.

Servicing DAS scrubbers is minimal only requiring annual bulk loading of the replacement media rather than complex and frequent maintenance procedures necessary for wet scrubbers.

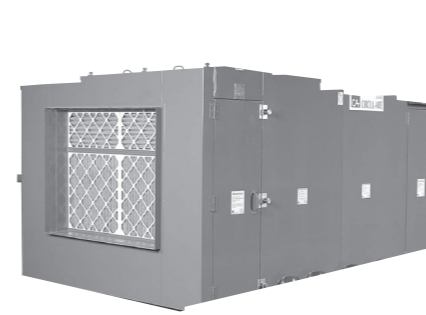
### VARIOUS MEDIA FOR CUSTOMIZED SOLUTIONS

Certain applications have several contaminants which are more complex to eliminate. Gas phase filtration often requires more than one type of media in order to efficiently remove contaminants. Circul-Aire's Deep Bed Air Scrubber is the ideal solution when multiple media sections are required.

### ENGINEERED VERSATILITY

Circul-Aire's engineering and R & D departments have simplified the process of designing custom DAS systems allowing more versatility for the specifier and providing a superior quality/price ratio. Over 300 DAS models are available integrating various components into a complete package.

## THE SOLUTION TO ODOR



DAS - Painted Mild Steel  
Draw-Through Arrangement



DAS 316SS - 3-Stage System detail of  
loading access doors



DAS Blow-Through Arrangement

## Table 1 - FILTER REQUIREMENTS

Models	Air Flow		Volume of Media per Single 12" Bed Depth*		Particulate Filter Quantities					
	CFM	m <sup>3</sup> /hr	CU. FT.	Liters	Pre-filter 30% (MERV 6)		After-filter 30% (MERV 6)		Final filter 90% (MERV 14)	
					24 x 24 x 2	24 x 12 x 2	24 x 24 x 2	24 x 12 x 2	24 x 24 x 2	24 x 12 x 2
202	300	510	5	142	1	0	1	0	1	0
302	450	765	7	198	1	1	1	1	1	1
204	600	1020	10	283	2	0	2	0	2	0
304	900	1529	14	396	2	2	2	2	2	2
404	1200	2039	18	509	4	0	4	0	4	0
504	1500	2549	22	623	4	2	4	2	4	2
604	1800	3059	26	736	6	0	6	0	6	0
306	1350	2294	21	595	3	3	3	3	3	3
406	1800	3059	27	765	6	0	6	0	6	0
506	2250	3823	33	935	6	3	6	3	6	3
606	2700	4588	39	1104	9	0	9	0	9	0
706	3150	5352	45	1274	9	3	9	3	9	3
806	3600	6117	51	1444	12	0	12	0	12	0
408	2400	4078	36	1019	8	0	8	0	8	0
508	3000	5098	44	1246	8	4	8	4	8	4
608	3600	6117	52	1473	12	0	12	12	12	1
708	4200	7137	60	1699	12	4	12	4	12	4
808	4800	8156	68	1926	16	0	16	0	16	0
908	5400	9176	76	2152	16	4	16	4	16	4
810	6000	10195	85	2407	20	0	20	0	20	0
910	6750	11470	95	2690	20	5	20	5	20	5
1010	7500	12744	105	2973	25	0	25	0	25	0
1011	8250	14018	116	3284	25	5	25	5	25	5
1012	9000	15293	126	3568	30	0	30	0	30	0
1212	10800	18351	150	4248	36	0	36	0	36	0

\* Maximum 3 Beds  
Media Weight = (Density of Media) x Volume x No. of Beds

DENSITIES:  
MM-1000 = 55 lb./ft<sup>3</sup> (880 kg/m<sup>3</sup>)  
MM-1355 = 43 lb./ft<sup>3</sup> (681 kg/m<sup>3</sup>)  
MM-1955 = 47 lb./ft<sup>3</sup> (745 kg/m<sup>3</sup>)

MM-3000 = 30 lb./ft<sup>3</sup> (480 kg/m<sup>3</sup>)  
MM-7000 = 41 lb./ft<sup>3</sup> (656 kg/m<sup>3</sup>)  
MM-8000 = 31 lb./ft<sup>3</sup> (497 kg/m<sup>3</sup>)  
MM-9000 = 38 lb./ft<sup>3</sup> (609 kg/m<sup>3</sup>)

Note:  
Media densities listed above are average densities and may vary between batches.

## Table 2 - DESIGN PRESSURE DROP

No. of 12" Beds	Particulate 30% (MERV 6) Pre-Filter		Circul-Aire MULTI-MIX® Chemical Media				Particulate 30% (MERV 6) After-Filter		Particulate 90% (MERV 14) Final Filter		External Static Pressure		Total Design Static Pressure			
	IWG	Pa	MM-1000		MM-3000 MM-7000 MM-9000		IWG	Pa	IWG	Pa	IWG	Pa	MM-1000		MM-3000 MM-7000 MM-9000	
			IWG	Pa	IWG	Pa							IWG	Pa	IWG	Pa
1	0.3	75	1.3	325	3.0	750	0.3	75	0.5	125	1.0	250	3.4	850	5.1	1275
2	0.3	75	2.6	650	6.0	750	0.3	75	0.5	125	1.0	250	4.7	1175	8.1	2025
2	0.3	75	3.9	975	9.0	750	0.3	75	0.5	125	1.0	250	6.0	1500	11.1	2775

**Table 3A - MOTOR PERFORMANCE 60 HZ.**

HP (kw)	Full Load RPM	Voltage/3ø/60 Hz				NEMA Code		Full load Efficiency %
		460		575		Design	Code	
		FLA	LRA	FLA	LRA			
1.0 (0.75)	1720	1.6	11.5	1.28	9.2	B	L	82.5
1.5 (1.1)	1710	2.2	17	1.75	13.6	B	L	84.0
2.0 (1.5)	1710	2.95	23	2.35	18	B	L	84.0
3.0 (2.2)	1740	4	32	3.2	25.6	B	K	87.5
5.0 (3.0)	1740	6.25	46	5	37	B	J	87.5
7.5 (5.5)	1740	9.3	62	7.5	50	B	H	89.5
10.0 (7.5)	1750	12.5	81	10	65	B	H	89.5
15.0 (11.0)	1750	17.6	112	14.1	90	B	G	91.0
20.0 (15.0)	1760	23	140	18.5	112	B	G	91.0

INSULATION: Class F  
 TEMPERATURE: 80°C at Rated H.P.  
 SERVICE FACTOR: 1.15  
 RATING: Continuous

**Table 4 - TYPICAL FAN PERFORMANCE (1-ONLY 12" BED OF MEDIA) 75 FPM (0.381 M/SEC) FACE VELOCITY**

Models	Air Flow		SISW Fan Arrangement Based on							
			MM-1000 at a total ΔP of 3.4 iwg (850 Pa)				MM-3000, 7000 or 9000 at a total ΔP of 5.1 iwg (1275 Pa)			
	CFM	m³/hr	DIA. (IN.)	RPM	BHP	HP (KW)	DIA. (IN.)	RPM	BHP	HP (KW)
202	300	510	7.0	2075	0.33	1.0 (0.75)	7.0	2545	0.46	1.0 (0.75)
302	450	765	7.0	2092	0.46	1.0 (0.75)	7.0	2564	0.81	1.0 (0.75)
204	600	1020	7.0	2198	0.69	1.0 (0.75)	7.0	2694	1.04	1.5 (1.1)
304	900	1529	9.0	1695	1.04	1.5 (1.1)	9.0	2008	1.50	2.0 (1.5)
404	1200	2039	13.5	2309	0.92	1.5(1.1)	13.5	2764	2.07	3.0 (2.2)
504	1500	2549	13.5	2495	1.15	1.5(1.1)	13.5	2842	1.84	3.0 (2.2)
604	1800	3059	13.5	2466	1.50	2.0(1.5)	13.5	2807	2.19	3.0 (2.2)
306	1350	2294	13.5	2313	1.04	1.5(1.1)	13.5	2805	1.96	3.0 (2.2)
406	1800	3059	13.5	2287	1.50	2.0(1.5)	13.5	2666	2.19	3.0 (2.2)
506	2250	3823	13.5	2482	2.07	3.0 (2.2)	13.5	2815	2.88	5.0 (3.0)
606	2700	4588	15.0	2205	2.42	3.0 (2.2)	15.0	2513	3.34	5.0 (3.0)
706	3150	5352	15.0	2381	3.11	5.0 (3.0)	15.0	2644	4.14	5.0 (3.0)
806	3600	6117	16.5	2100	3.34	5.0 (3.0)	16.5	2353	4.60	5.0 (3.0)
408	2400	4078	15.0	2108	2.07	3.0 (2.2)	15.0	2438	2.99	5.0 (3.0)
508	3000	5098	16.5	1938	2.53	3.0 (2.2)	16.5	2234	3.68	5.0 (3.0)
608	3600	6117	16.5	2100	3.34	5.0 (3.0)	16.5	2353	4.60	7.5 (5.5)
708	4200	7137	18.25	1830	3.80	5.0 (3.0)	18.25	2070	5.18	7.5 (5.5)
808	4800	8156	18.25	1959	4.72	7.5 (5.5)	18.25	2173	6.21	7.5 (5.5)
908	5400	9176	20.0	1926	4.95	7.5 (5.5)	20.0	2115	6.79	7.5 (5.5)
810	6000	10195	20.0	2057	5.98	7.5 (5.5)	20.0	2227	7.82	10.0(7.5)
910	6750	11470	22.25	1741	6.33	7.5 (5.5)	22.25	1909	8.51	10.0 (7.5)
1010	7500	12744	22.25	1861	7.59	10.0 (7.5)	22.25	2013	9.89	15.0 (11.0)
1011	8250	14018	24.5	1604	7.48	10.0 (7.5)	24.5	1767	10.01	15.0 (11.0)
1012	9000	15293	27.0	1372	7.59	10.0 (7.5)	27.0	1534	10.58	15.0 (11.0)
1212	10800	18351	30.0	1237	9.41	15.0(11.0)	30.0	1368	12.66	15.0 (11.0)

\* Total Ap includes 1.0 IWG (250 Pa) external static (as per Table 2).

**Table 3B - MOTOR PERFORMANCE 50 HZ.**

HP (kw)	Full Load RPM	Voltage/3ø/60 Hz		NEMA Code		Full load Efficiency %
		460		Design	Code	
		FLA	LRA			
1.0 (0.75)	1430	1.9	13.5	B	L	82.5
1.5 (1.1)	1425	2.6	20	B	L	84.0
2.0 (1.5)	1425	3.6	28.1	B	L	84.0
3.0 (2.2)	1450	4.8	38	B	K	87.5
5.0 (3.0)	1450	7.6	56	B	J	87.5
7.5 (5.5)	1450	11.3	76	B	H	89.5
10.0 (7.5)	1460	15.1	98	B	H	89.5
15.0 (11.0)	1460	21.3	136	B	G	91.0
20.0 (15.0)	1465	27.8	170	B	G	91.0

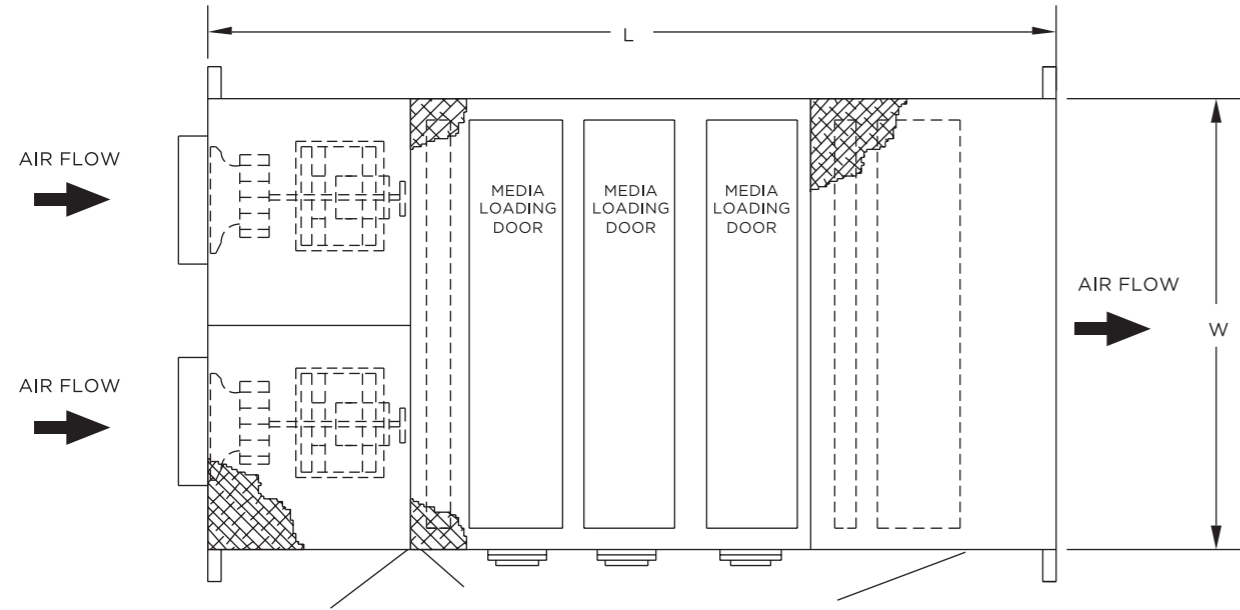
INSULATION: Class F  
 TEMPERATURE: 80°C at Rated H.P.  
 SERVICE FACTOR: 1.1  
 RATING: Continuous

**Table 5 - TYPICAL FAN PERFORMANCE (2-ONLY 12" BEDS OF MEDIA) 75 FPM (0.381 M/SEC) FACE VELOCITY**

Models	Air Flow		SISW Fan Arrangement Based on							
			MM-1000 at a total ΔP of 4.7 iwg (1175 Pa)				MM-3000, 7000 or 9000 at a total ΔP of 5.1 iwg (2025 Pa)			
	CFM	m³/hr	DIA. (IN.)	RPM	BHP	HP (KW)	DIA. (IN.)	RPM	BHP	HP (KW)
202	300	510	7.0	2434	0.46	1.0 (0.75)	7.0	3232	0.805	1.5 (1.1)
302	450	765	7.0	2441	0.69	1.0 (0.75)	7.0	3211	1.15	1.5 (1.1)
204	600	1020	7.0	2504	0.92	1.5 (1.1)	7.0	3253	1.61	2.0 (1.5)
304	900	1529	9.0	1939	1.38	2.0 (1.5)	9.0	2521	2.42	3.0 (2.2)
404	1200	2039	13.5	2685	1.27	1.5 (1.1)	13.5	3576	2.19	3.0 (2.2)
504	1500	2549	13.5	2672	1.61	2.0 (1.5)	13.5	3470	2.88	5.0 (3.0)
604	1800	3059	13.5	2738	1.96	3.0 (2.2)	15.0	3161	3.34	5.0 (3.0)
306	1350	2294	13.5	2677	1.50	2.0 (1.5)	13.5	3512	2.53	3.0 (2.2)
406	1800	3059	13.5	2581	2.07	3.0 (2.2)	15.0	3037	3.45	5.0 (3.0)
506	2250	3823	13.5	2737	2.65	3.0 (2.2)	15.0	3094	4.37	5.0 (3.0)
606	2700	4588	15.0	2442	3.11	5.0 (3.0)	15.0	3057	5.29	7.5 (5.5)
706	3150	5352	15.0	2582	3.80	5.0 (3.0)	15.0	3099	6.21	7.5 (5.5)
806	3600	6117	16.5	2294	4.26	5.0 (3.0)	16.5	2780	7.02	7.5 (5.5)
408	2400	4078	15.0	2365	2.76	5.0 (3.0)	15.0	3050	4.60	7.5 (5.5)
508	3000	5098	16.5	2169	3.45	5.0 (3.0)	16.5	2793	5.87	7.5 (5.5)
608	3600	6117	16.5	2294	4.26	5.0 (3.0)	16.5	2780	7.02	7.5 (5.5)
708	4200	7137	18.25	2015	4.83	7.5 (5.5)	18.25	2504	7.94	10.0 (7.5)
808	4800	8156	18.25	2123	5.87	7.5 (5.5)	18.25	2530	9.09	10.0 (7.5)
908	5400	9176	20.0	2070	6.33	7.5 (5.5)	20.0	2435	10.12	15.0 (11.0)
810	6000	10195	20.0	2188	7.36	10.0 (7.5)	20.0	2527	11.50	15.0 (11.0)
910	6750	11470	22.25	1869	7.94	10.0 (7.5)	22.25	2195	12.65	15.0 (11.0)
1010	7500	12744	22.25	1979	9.32	15.0 (11.0)	22.25	2280	14.38	20.0 (15.0)
1011	8250	14018	24.5	1728	9.32	15.0 (11.0)	24.5	2032	14.95	20.0 (15.0)
1012	9000	15293	27.0	1497	9.89	15.0 (11.0)	27.0	1776	15.98	20.0 (15.0)
1212	10800	18351	30.0	1368	12.66	15.0 (11.0)	30.0	1587	19.33	25.0 (18.5)

\* Total Ap includes 1.0 IWG (250 Pa) external static (as per Table 2).

**Table 6 - PLUG BLOWER TYPE**

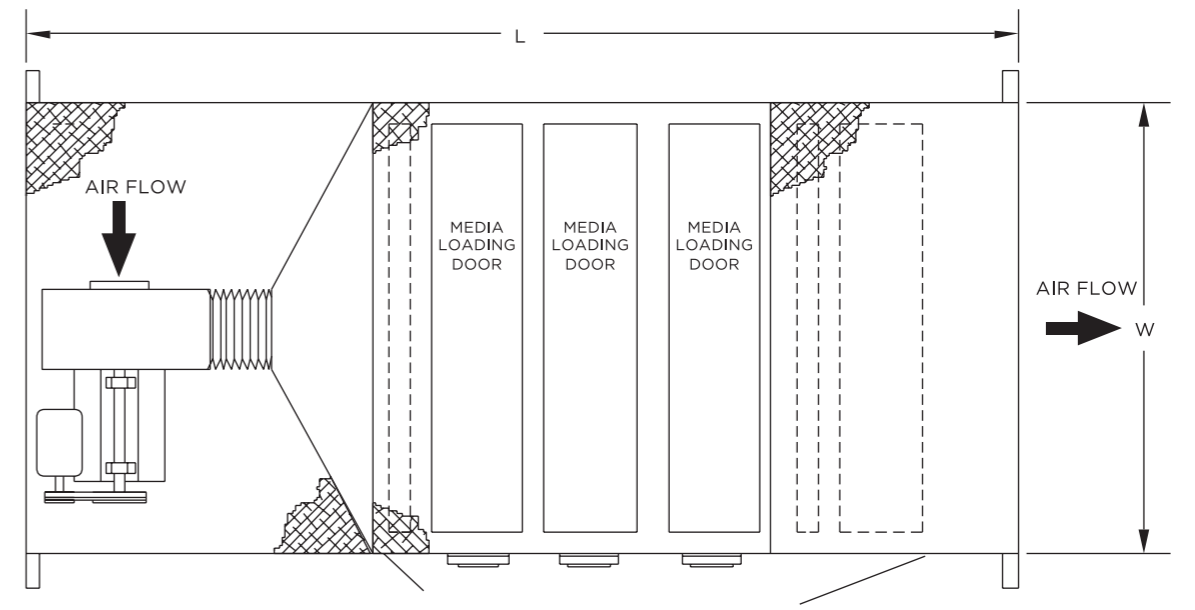


Models	Air Flow		Overall Height (H)		Width (W)		Length* (for single 12" bed)					
							Draw-through		Blow-through		Weight**	
	CFM	m <sup>3</sup> /hr	Inches	mm	Inches	mm	Inches	mm	Inches	mm	LB.	KG.
202	300	510	34	864	26	660	CF	CF	CF	CF	CF	CF
302	450	765	46	1168	26	660	CF	CF	CF	CF	CF	CF
204	600	1020	34	864	50	1270	CF	CF	CF	CF	CF	CF
304	900	1529	46	1168	50	1270	104	2642	87	2210	1750	795
404	1200	2039	58	1473	50	1270	106	2692	88	2235	2070	940
504	1500	2549	70	1778	50	1270	110	2794	89	2261	2300	1044
604	1800	3059	82	2083	50	1270	113	2870	89	2261	2500	1135
306	1350	2294	46	1168	74	1880	111	2819	89	2261	2350	1067
406	1800	3059	58	1473	74	1880	113	2870	89	2261	2620	1190
506	2250	3823	70	1778	74	1880	116	2946	90	2286	2900	1317
606	2700	4588	84	2134	74	1880	119	3023	90	2286	3300	1498
706	3150	5352	96	2438	74	1880	133	3378	101	2565	3750	1703
806	3600	6117	108	2743	74	1880	136	3454	101	2565	4150	1884
408	2400	4078	60	1524	98	2489	120	3048	89	2261	3350	1521
508	3000	5098	72	1829	98	2489	126	3200	90	2286	3870	1760
608	3600	6117	84	2134	98	2489	136	3454	101	2565	4290	1948
708	4200	7137	96	2438	98	2489	137	3480	101	2565	4650	2111
808	4800	8156	108	2743	98	2489	137	3480	101	2565	4940	2243
908	5400	9176	122	3099	98	2489	139	3531	103	2616	5400	2452
810	6000	10195	110	2794	122	3099	140	3556	104	2642	5940	2697
910	6750	11470	122	3099	122	3099	140	3556	104	2642	6280	2851
1010	7500	12744	134	3404	122	3099	142	3607	106	2692	6820	3096
1011	8250	14018	134	3404	134	3404	142	3607	106	2692	7180	3260
1012	9000	15293	134	3404	146	3708	142	3607	106	2692	7580	3441
1212	10800	18351	158	4013	146	3708	149	3785	113	2870	8350	3791

\* Add 12" (305 mm) in length per additional bed; maximum 3 beds total CF Consult Factory  
 \*\* MEDIA NOT INCLUDED See bottom of Table 1 for media weights. Weights based on zinc coated steel and stainless steel construction. See below for aluminum construction weights.

ALUMINUM CONSTRUCTION WEIGHT:  
 Multiply zinc coated steel weight in table by 0.65.  
 Example: DAS-406, zinc coated steel weight from table is 2620 lb. - 2620 lb. x 0.65 = 1703 lb. aluminum construction.  
 All weights are approximate and may vary depending on final construction. Actual weights can be provided upon request.

**Table 7 - SISW - COMPLETE FAN ASSEMBLY**



Models	Air Flow		Overall Height (H)		Width (W)		Length* (for single 12" bed)					
							Draw-through		Blow-through		Weight**	
	CFM	m <sup>3</sup> /hr	Inches	mm	Inches	mm	Inches	mm	Inches	mm	LB.	KG.
202	300	510	34	864	26	660	CF	CF	CF	CF	CF	CF
302	450	765	46	1168	26	660	CF	CF	CF	CF	CF	CF
204	600	1020	34	864	50	1270	CF	CF	CF	CF	CF	CF
304	900	1529	46	1168	50	1270	104	2642	100	2540	1750	795
404	1200	2039	58	1473	50	1270	106	2692	106	2692	2070	940
504	1500	2549	70	1778	50	1270	110	2794	112	2845	2300	1044
604	1800	3059	82	2083	50	1270	113	2870	114	2896	2500	1135
306	1350	2294	46	1168	74	1880	111	2819	112	2845	2350	1067
406	1800	3059	58	1473	74	1880	113	2870	114	2896	2620	1190
506	2250	3823	70	1778	74	1880	116	2946	116	2946	2900	1317
606	2700	4588	84	2134	74	1880	119	3023	121	3073	3300	1498
706	3150	5352	96	2438	74	1880	133	3378	124	3150	3750	1703
806	3600	6117	108	2743	74	1880	136	3454	130	3302	4150	1884
408	2400	4078	60	1524	98	2489	120	3048	125	3175	3350	1521
508	3000	5098	72	1829	98	2489	126	3200	130	3302	3870	1760
608	3600	6117	84	2134	98	2489	136	3454	130	3302	4290	1948
708	4200	7137	96	2438	98	2489	137	3480	130	3302	4650	2111
808	4800	8156	108	2743	98	2489	137	3480	132	3353	4940	2243
908	5400	9176	122	3099	98	2489	139	3531	134	3404	5400	2452
810	6000	10195	110	2794	122	3099	140	3556	134	3404	5940	2697
910	6 0	11470	122	3099	122	3099	140	3556	142	3607	6280	2851
1010	7500	12744	134	3404	122	3099	142	3607	142	3607	6820	3096
1011	8250	14018	134	3404	134	3404	142	3607	146	3708	7180	3260
1012	9000	15293	134	3404	146	3708	142	3607	150	3810	7580	3441
1212	10800	18351	158	4013	146	3708	149	3785	154	3912	8350	3791

\* Add 12" (305 mm) in length per additional bed; maximum 3 beds total CF Consult Factory  
 \*\* MEDIA NOT INCLUDED See bottom of Table 1 for media weights. Weights based on zinc coated steel and stainless steel construction. See below for aluminum construction weights.

ALUMINUM CONSTRUCTION WEIGHT:  
 Multiply zinc coated steel weight in table by 0.65.  
 Example: DAS-406, zinc coated steel weight from table is 2620 lb. - 2620 lb. x 0.65 = 1703 lb. aluminum construction.  
 All weights are approximate and may vary depending on final construction. Actual weights can be provided upon request.