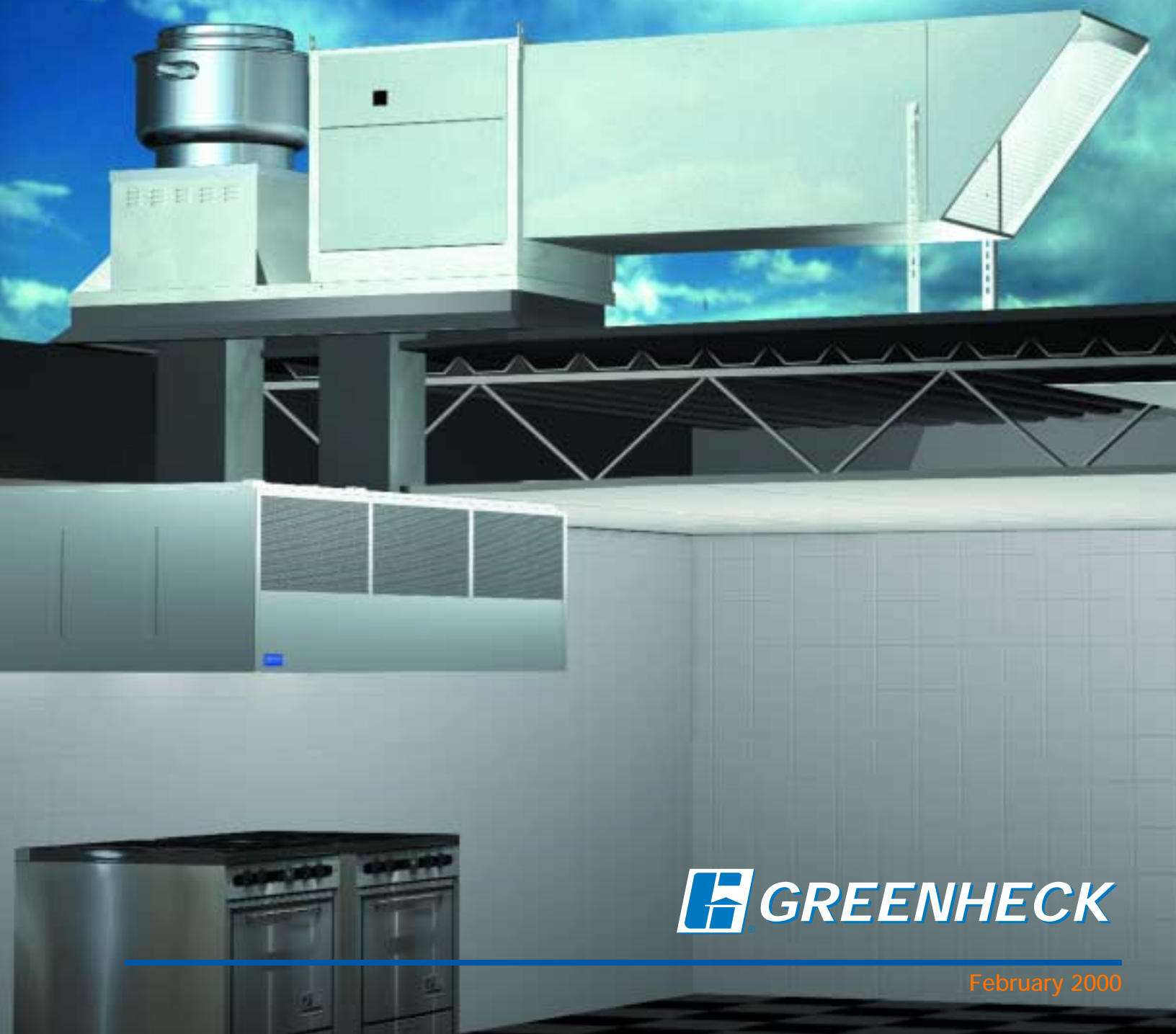


*Untempered
Make-Up Air for Kitchen Systems*
MODEL KSF



 **GREENHECK**

February 2000

Model KSF

Untempered Make-Up Air Unit

The Greenheck model KSF is designed to provide untempered make-up air for commercial and institutional kitchens. Seven sizes of this model provide airflow capacities up to 12,000 cfm and static pressure capabilities up to 2.0 in. wg.

Installation may be stand alone or on a combination curb with model CUBE exhaust fan. See page 3 for details.

Durable Construction

Designed for maximum weather resistance, KSF housings are constructed of heavy gauge G90 galvanized steel. Lifting lugs are standard.

Weatherhood

Weatherhood is standard and includes washable 1in. aluminum mesh filters. An extended weatherhood is available to provide 10 feet of horizontal separation from exhaust fan to meet code requirements.

Control Center (optional)

The control center includes the following standard components:

- Magnetic motor starter with solid state overload protection
- Control transformer with fusing
- Integral door interlocking disconnect switch
- Separately fused motor
- Distribution terminal strip



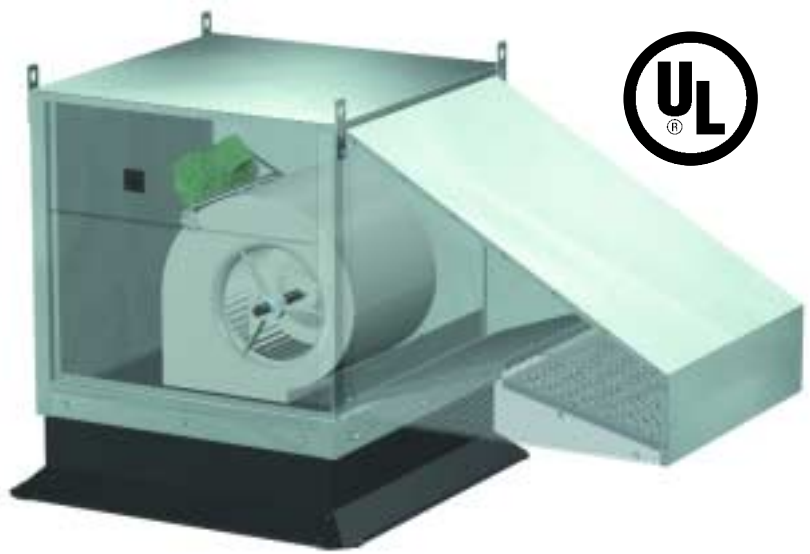
Premium grade control components are selected for reliable operation. All electrical components are UL Listed, recognized or classified and factory prewired for single point power connection.

Shafts

Shafts are precision turned, ground and polished steel sized so that the first critical speed is at least 25% over the maximum operating speed.

Bearings

Shafts rotate in permanently lubricated, heavy duty ball bearings. Bearings are selected for a minimum average (L10) life in excess of 100,000 hours at maximum operation speeds.



Vibration Isolators

The entire fan and motor assembly is mounted on vibration isolators to minimize noise transmission into the building.



Reliable Fan Performance

Air performance ratings from Greenheck's AMCA registered test chamber ensure accurate data.



Double width, double inlet forward curved wheels for high efficiency and low sound levels are constructed of heavy gauge steel. Wheels are statically and dynamically balanced to ensure vibration free operation.

Access Panels

Large access panels are provided for easy inspection and maintenance of motors, drives, fan wheel, filters and controls.

Factory Wired and Tested

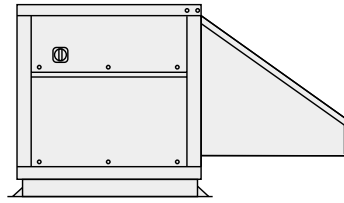
All units are tested prior to shipment to ensure proper operation.



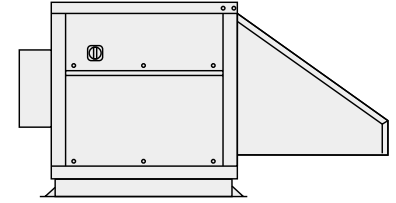
Standard Arrangements

Model KSF has a compact design that is available in both downblast discharge (arrangement DB) and horizontal discharge (arrangement HZ).

Installations may be as stand alone supply fans as pictured at right or as combination packages with exhaust and supply fans on a common curb as shown below.



Downblast Discharge Arrangement DB



Horizontal Discharge Arrangement HZ

Combination Packages

The Greenheck combination package simplifies installation and reduces field labor costs. The pre-engineered design ensures that the supply fan, exhaust fan, curb and combination extension components interface properly.

Equally important, Greenheck combination packages are specifically designed to comply with NFPA 96.

NFPA 96 states:

- Exhaust duct must terminate at least 24 in. above the roof deck
- Fan discharge must be at least 40 in. above the roof deck
- Air intake shall have a horizontal separation of 10 feet from the exhaust discharge

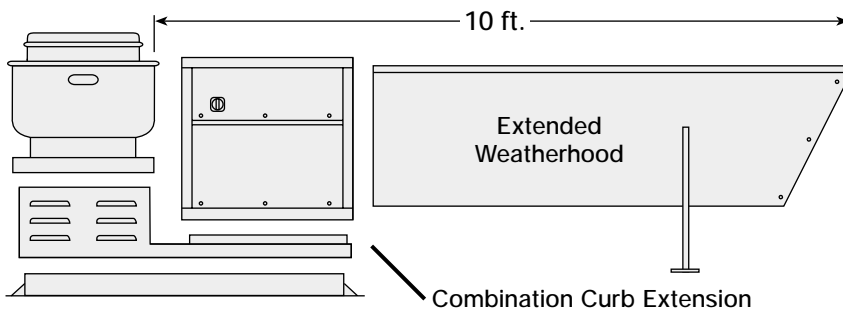
Where space limitations absolutely prevent 10 feet of horizontal separation from air intake, a vertical separation will be acceptable. In this case, the exhaust outlet must be a minimum of 3 feet above any air intake located within 10 feet horizontally.

With either 10 feet of horizontal separation or 3 feet of vertical separation, Greenheck has a combination package for your requirements. See drawings below.

Note: Consult local codes and the authority having jurisdiction if there are questions concerning the use of this product.

See Greenheck's Series C catalog for complete details on the exhaust fan.

10 ft. Horizontal Separation



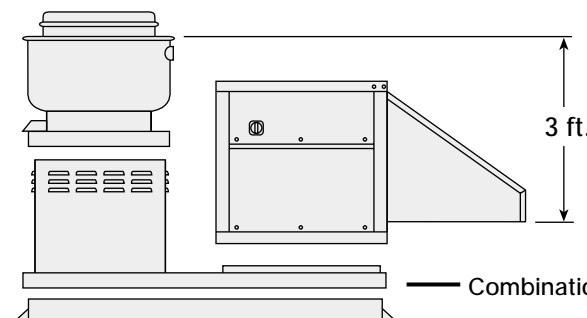
Provides 10 feet of horizontal separation for compliance to NFPA 96.

Combination Package Arrangement DBC

3 ft. Vertical Separation

Provides 3 feet of vertical separation for compliance to NFPA 96 (where space limitations prevent 10 feet of horizontal separation).

Combination Package Arrangement DB3



Note: Consult local codes and the authority having jurisdiction if there are questions concerning the use of this product.

KSF-108

CFM	OV		TOTAL STATIC PRESSURE in inches of WG									
			0.125	0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000	
400	826	RPM	496	607								
		BHP	0.03	0.04								
700	1,446	RPM	686	781	863	932	1056					
		BHP	0.10	0.12	0.14	0.16	0.20					
1,000	2,066	RPM	902	977	1047	1111	1227	1325	1414	1499		
		BHP	0.23	0.27	0.30	0.34	0.41	0.47	0.53	0.59		
1,300	2,685	RPM	1128	1193	1250	1303	1408	1503				
		BHP	0.48	0.52	0.57	0.62	0.71	0.80				
1,525	3,150	RPM	1303	1359	1412							
		BHP	0.75	0.81	0.86							

KSF-109

CFM	OV		TOTAL STATIC PRESSURE in inches of WG									
			0.125	0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000	
1,300	1,413	RPM	593	678	762	842	987	1118	1236			
		BHP	0.15	0.19	0.23	0.27	0.35	0.43	0.52			
1,600	1,739	RPM	691	764	833	902	1032	1153	1265	1371	1561	
		BHP	0.26	0.30	0.35	0.40	0.50	0.60	0.69	0.80	1.02	
1,900	2,065	RPM	793	859	918	976	1091	1201	1303	1404	1588	
		BHP	0.41	0.47	0.52	0.58	0.70	0.82	0.93	1.04	1.28	
2,200	2,391	RPM	899	956	1011	1061	1161	1261	1356	1448		
		BHP	0.61	0.68	0.74	0.80	0.94	1.08	1.22	1.35		
2,575	2,798	RPM	1034	1082	1132	1178	1265	1349	1435			
		BHP	0.95	1.03	1.11	1.18	1.33	1.49	1.65			

KSF-110

CFM	OV		TOTAL STATIC PRESSURE in inches of WG									
			0.125	0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000	
2,400	2,123	RPM	741	781	834	885	977	1066	1153	1234	1392	
		BHP	0.54	0.59	0.65	0.72	0.85	0.98	1.12	1.27	1.57	
2,750	2,433	RPM	839	871	913	958	1046	1124	1202	1279	1423	
		BHP	0.80	0.85	0.91	0.99	1.14	1.29	1.44	1.60	1.93	
3,100	2,743	RPM	940	967	996	1036	1118	1192	1262	1330		
		BHP	1.13	1.18	1.24	1.32	1.50	1.67	1.84	2.01		
3,450	3,053	RPM	1041	1064	1089	1119	1191	1264				
		BHP	1.55	1.60	1.66	1.73	1.92	2.12				
3,625	3,207	RPM	1092	1112	1137	1160	1230					
		BHP	1.80	1.84	1.91	1.97	2.16					

KSF-112

CFM	OV		TOTAL STATIC PRESSURE in inches of WG									
			0.125	0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000	
2,700	1,731	RPM	507	561	617	671	768	860	941	1014		
		BHP	0.40	0.47	0.55	0.63	0.78	0.94	1.09	1.24		
3,300	2,115	RPM	596	641	687	733	821	902	979	1052	1183	
		BHP	0.68	0.77	0.87	0.96	1.15	1.33	1.52	1.72	2.09	
3,900	2,500	RPM	691	729	766	804	881	956	1027	1093	1221	
		BHP	1.09	1.19	1.30	1.41	1.63	1.86	2.08	2.28	2.76	
4,500	2,885	RPM	787	817	852	884	951	1017	1082	1146		
		BHP	1.64	1.74	1.87	2.00	2.25	2.51	2.77	3.03		
5,100	3,269	RPM	884	911	940	970	1027					
		BHP	2.35	2.47	2.60	2.75	3.03					

Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream.

KSF-115

CFM	OV		TOTAL STATIC PRESSURE in inches of WG								
			0.125	0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000
4,700	2,146	RPM	524	567	608	1.31	722	790	856	915	1031
		BHP	1.02	1.16	1.31	1.45	1.74	2.03	2.34	2.63	3.29
5,400	2,465	RPM	589	628	665	700	768	832	891	950	1056
		BHP	1.49	1.66	1.83	1.99	2.32	2.65	2.98	3.33	4.01
6,100	2,785	RPM	656	691	724	757	819	877	934	988	1090
		BHP	2.10	2.29	2.47	2.66	3.04	3.40	3.79	4.16	4.94
6,800	3,105	RPM	723	755	786	815	872	928	979	1031	
		BHP	2.86	3.07	3.28	3.48	3.91	4.33	4.72	5.15	
7,500	3,424	RPM	792	821	849	876	929	980			
		BHP	3.78	4.02	4.25	4.47	4.94	5.41			

KSF-118

CFM	OV		TOTAL STATIC PRESSURE in inches of WG								
			0.125	0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000
6,500	2,145	RPM	438	473	510	544	608	667	723	776	
		BHP	1.26	1.42	1.60	1.78	2.13	2.47	2.83	3.20	
7,500	2,475	RPM	495	526	557	588	646	702	754	802	897
		BHP	1.87	2.06	2.26	2.46	2.86	3.27	3.66	4.05	4.92
8,500	2,805	RPM	554	580	607	636	690	740	790	835	922
		BHP	2.66	2.87	3.09	3.32	3.79	4.22	4.69	5.14	6.04
9,500	3,135	RPM	614	637	661	685	735	783	827	872	954
		BHP	3.67	3.86	4.13	4.37	4.90	5.41	5.90	6.43	7.43
10,500	3,465	RPM	675	695	715	738	783	827	870	909	
		BHP	4.91	5.14	5.39	5.66	6.23	6.80	7.37	7.90	

KSF-120

CFM	OV		TOTAL STATIC PRESSURE in inches of WG								
			0.125	0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000
10,000	2,450	RPM	467	492	515	541	589	634	678	723	803
		BHP	2.83	3.07	3.3	3.55	4.04	4.53	5.03	5.59	6.64
10,500	2,573	RPM	488	513	535	559	606	648	691	734	813
		BHP	3.25	3.50	3.75	4.00	4.52	5.01	5.56	6.12	7.25
11,000	2,696	RPM	509	533	555	576	622	663	705	744	824
		BHP	3.70	3.98	4.24	4.49	5.03	5.56	6.12	6.67	7.88
11,500	2,818	RPM	529	552	574	594	638	679	717	757	834
		BHP	4.21	4.49	4.77	5.03	5.59	6.16	6.71	7.3	8.55
12,000	2,941	RPM	551	573	594	613	655	695	732	770	884
		BHP	4.75	5.05	5.34	5.62	6.20	6.79	7.35	7.97	9.24

Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream.

Pressure Loss Data

KSF Outlet Dampers

CFM	108,109,110	112	115	118	120
2,000	.07	.03			
4,000	.28	.12	.05		
6,000			.11	.05	.04
8,000			.20	.10	.07
10,000				.15	.11
12,000					.16
14,000					.22

KSF Filters

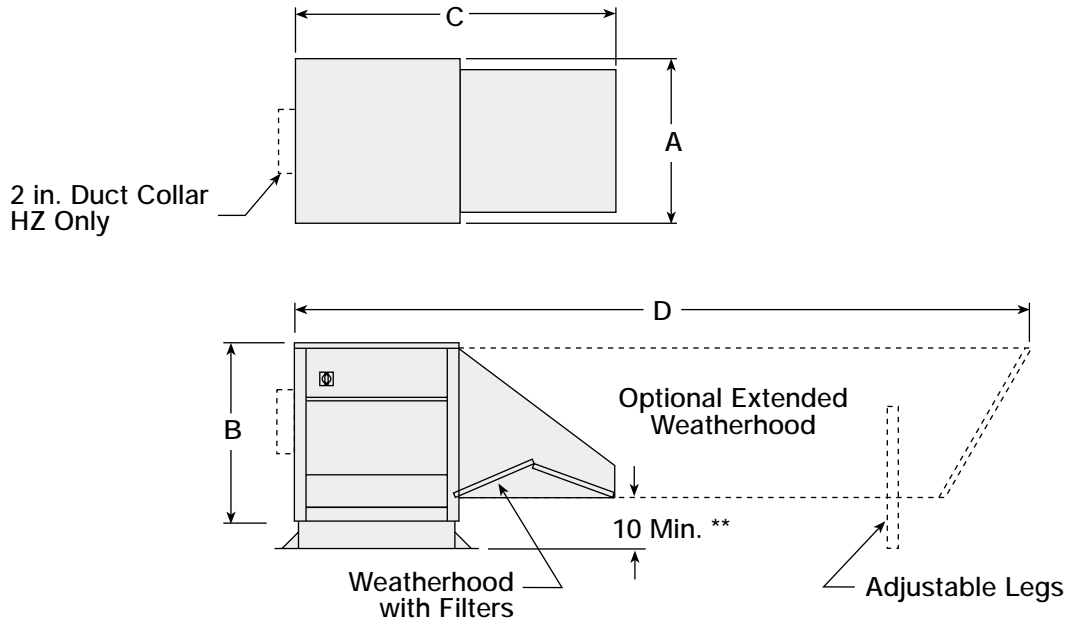
CFM	108,109,110		112,115		118,120	
	1 in.	2 in.	1 in.	2 in.	1 in.	2 in.
2,000	.06	.10				
4,000	.23	.39	.06	.10		
6,000			.13	.22	.07	.11
8,000			.23	.38	.11	.19
10,000					.17	.29
12,000					.25	.41
14,000					.33	.55

Intake Damper (10' horizontal only)

CFM	108,109,110	112,115	118,120
2,000	.02	.01	
4,000	.09	.03	.01
6,000		.08	.03
8,000		.14	.05
10,000			.10

For Arrg. DBC Add 1000 CFM to determine filter loss.

Arrangement DB and HZ

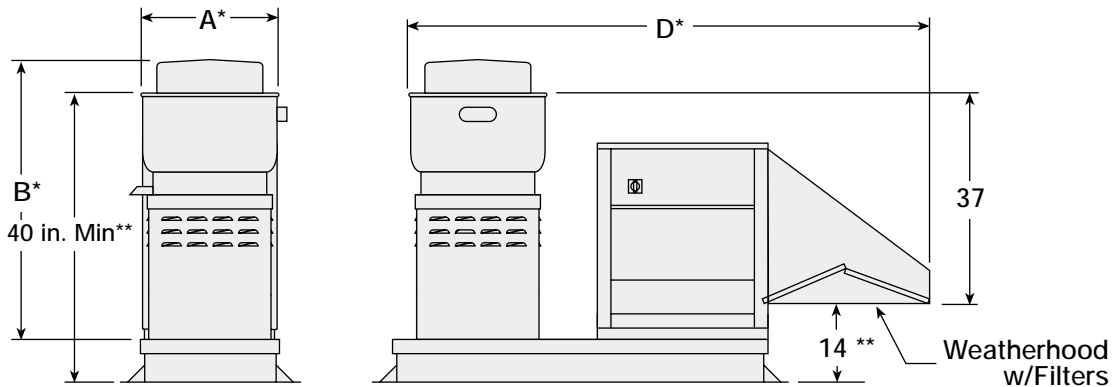


KSF Size	A	B	C	D	Curb (Nom.)	Roof Opening
108,109,110	30	32.5	58.5	136	30 x 30	20 x 20
112,115	40	38.5	80	139.5	40 x 40	28 x 28
118,120	52	48.5	96.75	144.25	52 x 52	40 x 40

All dimensions are in inches

** Assumes 8 in. high roof curb.

Arrangement DB3 (Combination Package with 3 ft. Vertical Separation)



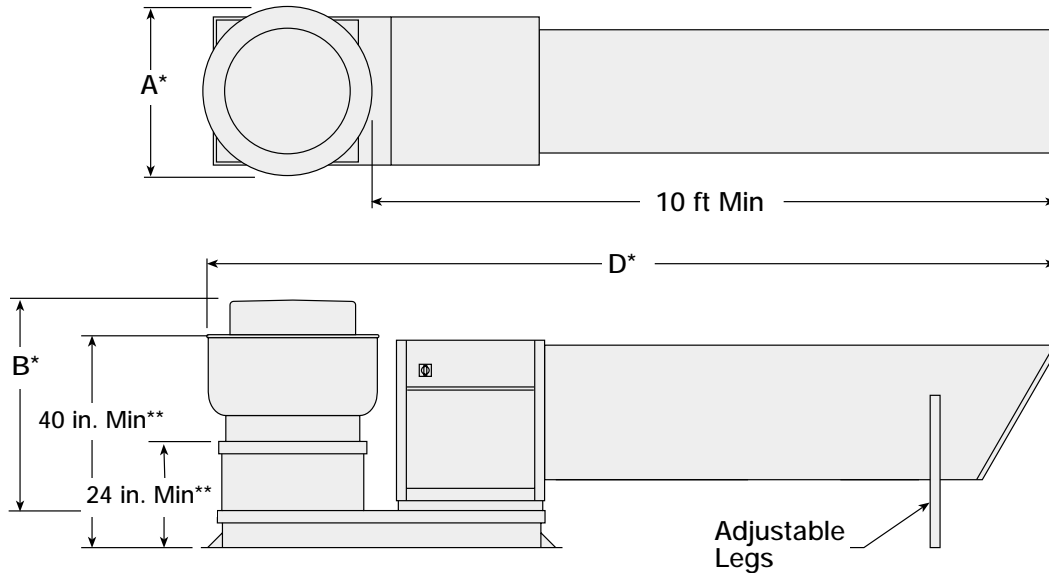
KSF Size	A*	B*	D*	Curb (nom.)	Roof Opening
108,109,110	34	50	97	30 x 66	22 x 58
112,115	48	52	132	40 x 88	32 x 80
118,120	56	62	157	52 x 110	44 x 102

* Maximum dimensions (dependent on CUBE fan).

** Assumes 8 in. high roof curb.

All dimensions are in inches

Arrangement DBC (Combination Package with 10' Horizontal Separation)



KSF Size	A*	B*	D*	Curb (nom.)	Roof Opening
108,109,110	34	46	178	30 x 66	22 x 58
112,115	48	53	196	40 x 88	32 x 80
118,120	56	62	208	52 x 110	44 x 102

All dimensions are in inches

* Maximum dimensions (dependent on CUBE fan).

** Assumes 8 in. high roof curb.

*** Max cfm 11,300.

Accessories

Control Centers

Prewired fan control centers contain magnetic motor starters, control transformers, integral master disconnect switch, fuse blocks and other required components for power connection. The control center is wired in conformance with the National Electric Code.

Roof Curbs

Prefabricated roof curbs are available to reduce installation time and costs by ensuring compatibility between the fan and the roof opening. All curbs are lined with fiberglass insulation to prevent condensation and reduce sound levels. See Greenheck's roof curb catalog for complete details.

Duct Adapter

The duct adapter fits over the roof curb and supports the top of the duct to allow ductwork to be completed before the fan is set in place. Duct adapters also limit performance losses by directing airflow into the ductwork.

Filters

All units come standard with 1 in. washable aluminum mesh filters. Optional 2 in. aluminum mesh filters are available.

Dampers

Motorized discharge dampers are available in order to prevent drafts into the building when the unit is not in use. The damper is shipped loose and mounted downstream in the ductwork. Arrangement DB with 10 ft. horizontal separation is also available with a motorized intake damper.

Extended Weatherhood

An extended weatherhood is available for stand alone installations and is required for arrangement DBC.

Special Coatings

Special coatings are available for decorative or protective purposes. Consult your Greenheck representative or the factory for more information.

General: Make-up air unit shall be as manufactured by Greenheck or approved equal provided all specifications are met. Greenheck Model KSF equipment is used as the basis of design. Performance to be as scheduled on plans.

Unit Casing and Frames: Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable panels.

Fan Section: Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks (size 120). Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

Motors and Drives: Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces. Units with motors of 10 HP and less shall be supplied with an adjustable drive pulley.

Electrical: All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 120 VAC circuit, integral door interlocking disconnect switch with separate motor fusing and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

Filters: Filters shall be mounted in a straight or V-bank arrangement such that velocities across the filters do not exceed 550 feet per minute. Filters shall be 1 inch or 2 inch aluminum mesh and easily removable.

Weather Hood: Weather hood shall be constructed of G90 galvanized steel and include 1 inch aluminum mesh filters at the intake.

Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid.

Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

Due to continuing research, Greenheck reserves the right to change specifications without notice.



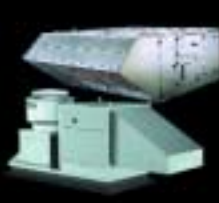
Complete Kitchen Ventilation Systems.



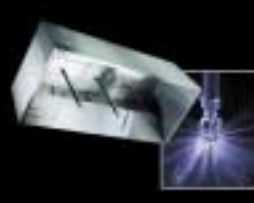
Exhaust Hoods



Exhaust Fans



Make-Up Air Units



Fire Suppression



Utility Distribution

Visit the Greenheck website for the most current information available
www.greenheck.com

Greenheck • P.O. Box 410 Schofield, WI 54476-0410 • Phone (715) 359-6171 • Fax (715) 355-2399 • www.greenheck.com