

Utility Sets

Standard Design Features

Standard design features common to all Class I and Class II fans

Shaft

- AISI 1045, turned ground and polished for accuracy.
- Designed to provide first critical speed of at least 1.43 times the maximum class speed.

Bearings

- Heavy-duty grease lubricated pillow block bearings selected for minimum average life (AFBMA L-50) of at least 200,000 hours at maximum class speed.

Drive

- Adjustable pitch, 1.2 or 1.5 service factor V-belt drives with cast iron sheaves and V-belts designed to be oil and heat resistant, and to dissipate static electricity.

Motor

- Available in various sizes, voltages, enclosures and efficiencies to meet the needs of any application.

Shutter

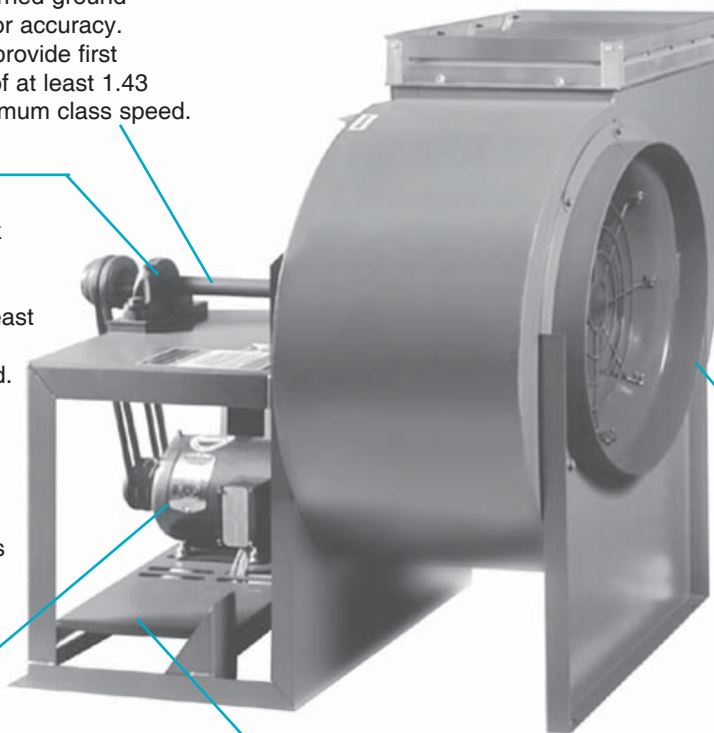
- Optional discharge gravity shutter.

Housing

- Rugged, all-welded construction.
- Rotatable to 8 standard discharge positions.

Inlet Cone

- Deep-spun cone, aerodynamically designed for smooth air entry into wheel, shown here with optional inlet screen.



Motor/Bearing Pedestal

- Large open motor compartment allows complete access to motor and motor base for quick and easy servicing and belt tension adjustment.

Construction Features

Class I	Class II
Rotatable to size 36	
Static Pressures to 5"	Static Pressures to 8"
Capacities to 26,000 CFM	Capacities to 33,000 CFM
Wheel Diameters from 12.25" to 36.50"	
Temperatures to 500°F	Temperatures to 600°F
Maximum Motor Frame Size 256T (20HP)	Maximum Motor Frame Size 326T (50HP)
Full AMCA Class Rated Performance	

Performance Ratings



Carnes Company certifies that the Type VBFB fans shown herein are licensed to bear the AMCA Seal for Sound and Air. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.



Carnes Company certifies that the Type VFBB fans shown herein are licensed to bear the AMCA Seal for Air. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.



Class I VBB Fans are available as listed under UL 705 and Canadian cUL 705
Class I VBB Fans are also available as listed under UL 762 for restaurant & grease laden air applications. Consult your local Carnes Representative.



Class II Design Features

In addition to the standard design features, the Class II vent sets are also equipped with the following features:

Shaft Cooler, Seal and Guard

- Included with the optional high temperature package. This assembly provides greater thermal protection for the shaft and bearings.

Outlet Flange

- Standard on sizes 20 and larger.

Class II Rated Wheel

- Constructed of all welded steel for heavy-duty applications.

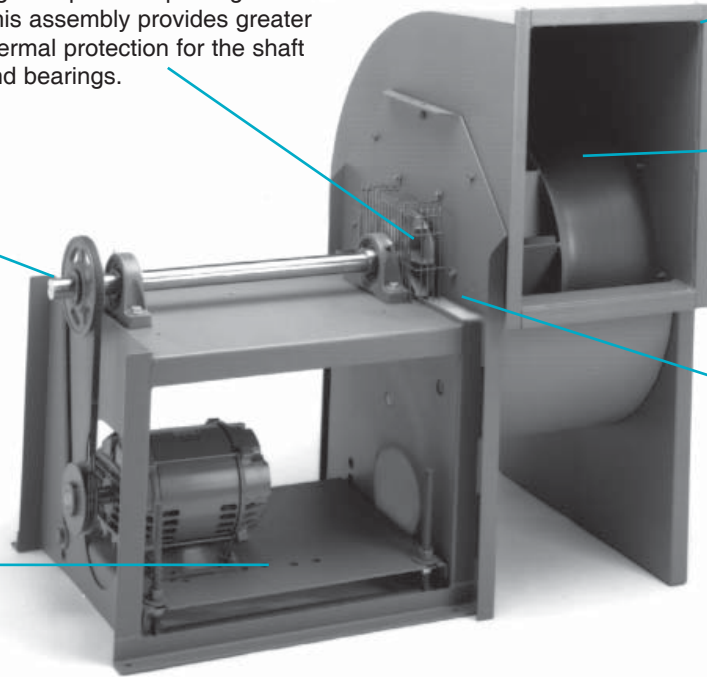
Heat Gap

- Separation between the fan housing and motor/bearing pedestal. For operating temperatures above 300°F, this gap is insulated to provide additional protection to the motor, bearings and V-belt.

Shaft and Bearings

- Heavy-duty Class II shaft and bearings.

- Extra-large motor/bearing pedestal accommodates all motor sizes required for full Class II performance.

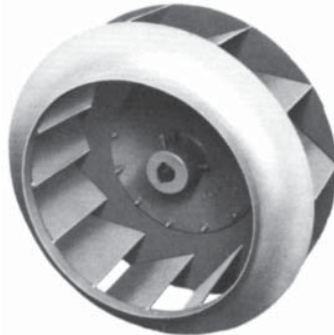


Impeller Selection



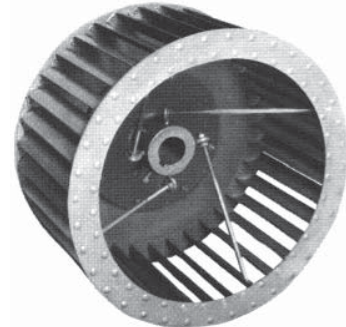
Aluminum BI

- Wheels for VBB Class I sizes 12 through 27 are constructed in riveted aluminum. For operating temperatures over 250° a welded steel wheel is provided.



Steel BI

- Wheels for VBB Class I sizes 30 through 36, as well as all VBB Class II sizes, are constructed in welded steel.



Steel FC

- All VFB fans are equipped with riveted steel wheels.

▼ Typical Specifications

Fans shall be Type **VBB** Backward Inclined or Type **VFB** Forward Curved Ventilating Sets, as manufactured by Carnes Company, Verona, Wisconsin.

PERFORMANCE — Fans shall be tested in accordance with AMCA 211 and AMCA 311 test codes for air moving devices and shall be guaranteed by the manufacturer to deliver rated published performance levels. **VBB** fans shall be licensed to bear the AMCA Certified Ratings Seal for both sound and air. **VFB** shall be licensed to bear the AMCA Certified Ratings Seal for air.

HOUSING — Fan housings shall be heavy-gauge, continuously welded construction. Housings with lock seams or partially welded construction are not acceptable. Housings shall be suitably braced to prevent vibration or pulsation. Housings shall have tapered spun, aerodynamically designed inlet cones or shrouds providing stable flow and high rigidity. Housings shall be of the rotatable design, convertible to eight standard discharge configurations.

WHEELS — **VBB** backward inclined wheels shall be single thickness plate type designed for maximum efficiency and quiet operation and shall be of the non-overloading type. Class I wheels, sizes 12 through 27, shall be constructed of aluminum, with blades riveted and welded to the spun wheel cone and backplate. Class I wheels, sizes 30 through 36, and all Class II wheels shall be constructed of heavy-gauge steel with welded (not riveted) blades.

VBB forward curved wheels shall be constructed of heavy-gauge steel and riveted to a steel shroud and backplate.

All wheels shall be statically and dynamically balanced.

SHAFT — Shafts shall be AISI 1040 or 1045 hot rolled steel, accurately turned, ground, polished and ring gauged for accuracy. Shafts shall be sized for the first critical speed of at least 1.43 times the maximum speed.

BEARINGS — Bearings shall be heavy-duty, grease lubricated, anti-friction ball, self-aligning, pillow block type and selected for a minimum average bearing life (AFBMA L-50) in excess of 200,000 hours at the maximum fan RPM.

DRIVE — Motor sheaves shall be cast iron, and supplied as either variable pitch or fixed pitch. Drives and belts shall be rated for a minimum of 120% of the required motor HP.

FINISH AND COATING — The entire fan assembly, excluding the shaft, shall be thoroughly degreased and deburred before application of a rust-preventative primer. After the fan is completely assembled, a finish coat of paint shall be applied to the entire assembly. The fan shaft shall be coated with a petroleum-based protectant. Aluminum components shall be unpainted.

ACCESSORIES — When specified, accessories such as belt guards, weather covers, access doors, variable inlet vanes, outlet shutters, inlet screens, etc., shall be provided by Carnes Company to maintain one source responsibility.

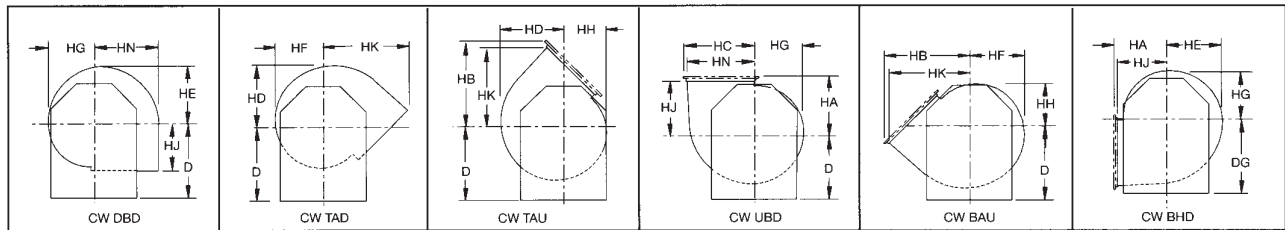
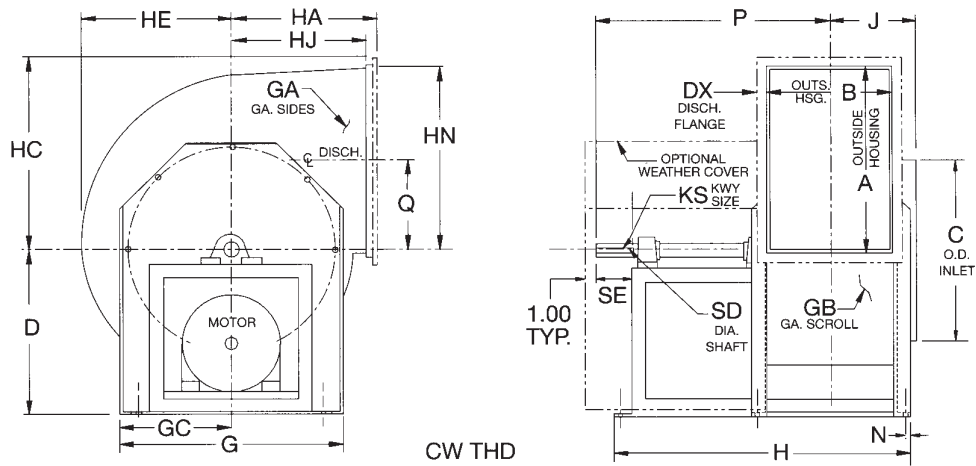
UL 705 LISTING — **VBB** fans shall be listed under UL 705 for power ventilators. **VBB** fans shall include a UL listed motor, B-belt drive, special weather cover with additional cooling louvers and UL 705 label. Disconnect switches or other electrical devices (not including motor) shall be field mounted and wired in accordance with all local and national codes.

UL 762 LISTING — **VBB** fans shall be listed under UL 762 for power ventilators used in restaurant exhaust service (grease laden air). **VBB** fans shall include a UL listed motor, V-belt drive, special weather cover with additional cooling louvers, bolted access door, drain connection, wheel backplate fins and UL 762 label. **VBB** fans shall be upblast or top angular up discharge and shall be a discharge height of at least 40" above the roof line. They are to be installed in accordance with NFPA 96. Disconnect switches or other electrical devices (not including motor) shall be field mounted and wired in accordance with all local and national codes.

FACTORY RUN TEST — All fans prior to shipment shall be completely assembled and test run as a unit at operating speed or maximum RPM allowed for the particular construction type. Each wheel shall be statically and dynamically balanced in accordance with ANSI/AMCA 204-06 "Balance Quality and Vibration Levels for Fans" to Fan Application Category BV-3, Balance Quality Grade G6.3. Balance readings shall be taken by electronic type equipment in the axial, vertical and horizontal directions on each of the bearings. Records shall be maintained and a written copy shall be available upon request.

GUARANTEE — The manufacturer shall guarantee the workmanship and materials for a least one (1) year from startup or eighteen (18) months from shipment, whichever occurs first.

DIMENSIONAL DATA — Models VFBB and VBBB



NOTES:

1. FLANGED OUTLET IS OPTIONAL ON SIZES 12 -20 . FLANGED OUTLET IS STANDARD ON SIZES 22 -36 (EXCEPT ON TAD & DBD).
2. "CW" ROTATION IS SHOWN. "CCW" ROTATION IS SIMILAR BUT OPPOSITE.
3. SHAFT DIAMETER IS INCREASED TO 1.187 ON HI-TEMP. FANS WHICH REQUIRE SHAFT COOLERS.
4. ALL UNITS ARE ROTATABLE TO ALL POSITIONS (EXCEPT SIZES 30 -36 WITH "D" CENTERLINE HEIGHT ARE NOT ROTATABLE TO BHD).

SIZE	A	B	C	D		DG		DX	G	GA	GB	GC	H		HA	HB	HC	HD	HE	HF
				CL I	CL II	CL I	CL II						CL I	CL II						
12	13.00	9.75	13.25	14.50	17.63	14.50	17.63	1.00	16.00	14	14	8.00	24.50	32.00	9.75	16.75	13.94	11.19	10.56	9.94
13	14.31	10.81	14.56	15.75	19.13	15.75	19.13	1.00	17.50	14	14	8.75	25.63	34.81	10.75	18.38	15.25	12.31	11.63	10.94
15	15.88	11.94	16.19	17.75	19.38	17.75	19.38	1.00	19.00	14	14	9.50	28.75	36.00	11.94	20.31	16.81	13.75	12.88	12.13
16	17.44	13.19	17.75	19.00	19.38	19.00	19.38	1.00	20.50	14	14	10.25	30.13	37.31	13.13	22.25	18.38	15.06	14.13	13.31
18	19.38	14.56	19.50	21.00	21.88	21.00	21.88	1.25	22.50	12	14	11.25	34.38	43.44	14.50	24.81	20.56	16.69	15.69	14.75
20	21.19	15.94	21.38	22.75	22.75	22.75	22.75	1.25	25.00	12	14	12.50	35.75	44.81	15.81	27.00	22.38	18.38	17.31	16.25
22	23.56	17.69	23.75	25.50	25.50	25.50	25.50	1.25	27.25	12	14	13.63	40.75	47.13	17.69	30.00	24.75	20.44	19.06	17.94
24	25.94	19.44	26.06	28.00	28.00	28.00	28.00	1.25	29.75	12	14	14.88	43.50	48.81	19.50	33.00	27.13	22.38	21.00	19.75
27	28.63	21.38	28.50	30.50	30.50	30.50	30.50	1.50	33.00	12	14	16.50	47.38	53.00	21.44	36.44	30.06	24.69	23.19	21.81
30	31.81	23.81	31.63	34.25	34.25	34.25	34.25	1.50	36.13	10	12	18.06	52.88	56.00	23.81	40.31	33.25	27.44	25.75	24.25
33	35.13	26.06	34.75	37.25	37.25	37.25	37.25	1.50	38.88	10	12	19.44	56.13	61.75	26.25	44.44	36.56	30.13	28.38	26.69
36	38.75	28.88	38.50	41.00	41.00	41.00	41.00	1.50	43.75	10	12	21.88	64.56	64.56	29.00	48.88	40.13	33.50	31.50	29.63

SIZE	HG	HH	HJ	HK	HN	J	KS		L		N	P		Q	SD		SE		MAX. MTR.	
							CL I	CL II	CL	CL II		CL I	CL II		CL I	CL II	CL I	CL II		
12	9.31	8.69	9.25	15.69	12.94	7.44	25x.13	25x.13	12.00	18.50	0.50	19.75	26.50	6.44	1.000	1.187	2.75	2.75	145T	184T
13	10.25	9.56	10.25	17.31	14.25	8.00	25x.13	25x.13	12.00	20.25	0.50	20.31	29.56	7.13	1.000	1.187	2.75	3.38	145T	215T
15	11.38	10.63	11.44	19.25	15.81	9.06	25x.13	25x.13	13.88	20.25	0.50	23.13	30.13	7.88	1.000	1.187	3.25	3.38	184T	215T
16	12.50	11.69	12.63	21.19	17.38	9.69	25x.13	25x.13	13.88	20.00	0.63	23.75	30.75	8.69	1.000*	1.187	3.25	3.38	184T	215T
18	13.81	12.88	14.00	23.56	19.31	10.88	25x.13	38x.19	16.75	24.75	0.63	27.94	36.81	9.63	1.187	1.437	3.75	4.00	215T	256T
20	15.19	14.13	15.31	25.75	21.13	11.56	38x.19	38x.19	16.75	24.63	0.63	28.63	37.50	10.56	1.437	1.437	3.75	4.00	215T	256T
22	16.81	15.69	17.19	28.75	23.50	12.44	38x.19	38x.19	19.00	23.88	0.88	27.63	38.38	11.75	1.437	1.437	3.75	4.00	215T	256T
24	18.50	17.25	19.00	31.75	25.88	13.31	38x.19	38x.19	20.00	23.88	0.88	29.00	39.25	12.94	1.437	1.687	3.75	4.00	215T	256T
27	20.44	19.06	20.94	35.00	28.56	14.25	38x.19	38x.19	22.00	26.13	0.88	31.69	43.13	14.25	1.437	1.687	4.00	4.63	215T	286T
30	22.75	21.25	23.31	38.94	31.75	15.50	50x.25	50x.25	24.00	25.38	1.13	40.38	44.44	15.81	1.937	1.937	3.75	4.63	215T	286T
33	25.00	23.31	25.75	43.00	35.06	16.63	50x.25	50x.25	25.00	28.88	1.13	42.50	49.69	17.50	1.937	2.187	3.75	5.25	256T	326T
36	27.75	25.88	28.50	47.44	39.63	18.00	50x.25	63x.31	28.88	28.88	1.13	50.56	51.06	19.25	1.937	2.437	4.75	5.25	286T	326T

DIMENSIONS ARE NOT TO BE USED FOR CONSTRUCTION. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

Fan Accessories



Outlet Shutters

Interconnected blade style shutters, of either gravity or motor operated type. Fabricated with die-formed and felted edges, they are noiseless in operation and completely weathertight. For volume control, Heavy-duty center-pivoted dampers can be installed at the discharge side of these ventilating sets.

Belt Guard

Standard belt guards are of the open back style, and are readily removable for belt or pulley adjustments. For OSHA-style belt guards, see notes on weather cover.

Screens

Inlet guards of heavy-gauge wire are available for protection with a minimal resistance to air flow. Outlet screens of galvanized hardware cloth are also available for installation to outlets, with or without discharge shutter.

Weather Cover

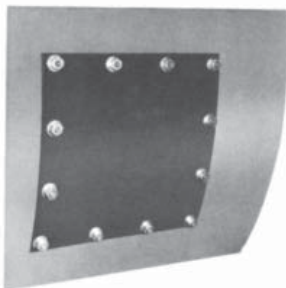
An easily removable weather cover is available for either Class I or Class II fans. The weather cover provides complete protection for the motor, fan bearings, and V-belt drive. If any OSHA-style belt guard is specified on vent sets, a weather cover will be supplied.



Variable Inlet Vanes

Variable inlet vanes provide economical, stable and efficient air volume control for manual or motorized operation. Low maintenance, easy assembly and disassembly, and long life are prime features of this vane design. Blades are supported by needle roller bearings riding on fatigue-resistant steel shafts, hardened to minimize wear. Bearings are lubricated for life with high grade moisture-resistant grease and protected with quality seals. The vane bearing housings are welded in position and stiffened with a welded support ring. The welded structure eliminates flutter and vibration while still utilizing the efficiency of cantilevered design.

We offer two types of inlet vanes, depending on fan size. Inlet vanes for sizes 12, 13 and 15 are external type, bolted to the fan inlet flange. Inlet vanes for sizes 16 and larger are supplied as nested type, with inlet vane blades nested within the inlet cone and all linkages internal to the fan. (Nested-style inlet vanes shown at right.)



Access Doors

Two types of access doors are available: a bolted or quick-opening type. Access doors are often specified where examination and cleaning of the fan interior is required.



Additional Accessories Include:

Inlet Flange, Outlet Flange, Drain Connection, Disconnect Switch, Vibration Isolation Pads, Rails and Hangers.

Special Materials and Protective Coatings

Optional Finishes		Available Materials	
• Epoxy	• Synthetic Resin	• 304 Stainless	• Monel
• Air-dried Phenolic (Heresite)	(Sanitile)	• 316 Stainless	• Aluminum
• Baked Phenolic			

High-Temperature Applications

Temp (°F)	Derating Factors For High Temp.		
	Aluminum	Steel	Stainless
70	1.00	1.00	1.00
200	1.00	.98	0.95
250	1.00	.97	0.93
300	—	.96	0.91
400	—	.95	0.88
500	—	.90	0.84
600	—	.86	0.81

When high temperatures are encountered, maximum RPMs for the class must be derated by the factors in this table.

Maximum RPM at 70°F

Size	VBBB		VFBB	
	Class I	Class II	Class I	Class II
12	3167	4119	1559	1871
13	2874	3738	1415	1698
15	2587	3364	1273	1528
16	2352	3058	1157	1389
18	2118	2729	1046	1256
20	1932	2490	955	1146
22	1737	2238	858	1030
24	1577	2033	780	935
27	1397	1803	707	849
30	1257	1623	637	764
33	1143	1475	579	694
36	995	1283	523	628

High Temperature Construction Requirements			
Temp. Range	Wheel Mat'l	Lubrication	Other Requirements
-20 to 250°F	12 - 27 VBBB Class I is riveted aluminum; all others steel.	Grease	Standard Fan
251 to 300°F	Steel	Grease	Standard Fan
301 to 500°F	Steel	High-Temp Grease	Shaft Cooler, Shaft Seal, Expansion & Non-Expansion Bearings; Class II: Insulated Heat Gap
501 to 600°F (Class II Only)	Steel	High-Temp Grease	Shaft Cooler, Shaft Seal, Expansion & Non-Expansion Bearings, High-Temp. Alum. Paint, Insulated Heat Gap

Spark Resistant Construction

AMCA Type	Temperature Limit	Fan Construction
A	To 250° F	All airstream parts are aluminum (wheel, housing, and shaft seal).
B	To 250°F	Aluminum wheel and rubbing plate.
C	To 250°F	12 to 27 VBBB Class I: Aluminum wheel and rubbing plate.
	251 To 500°F	12 to 27 VBBB, Class I&II: Steel wheel, alum. inlet cone, and rubbing plate.
	All Others To 500°F	Aluminum inlet cone and rubbing plate.

NOTES:

1. No bearings, drive components or electrical device shall be placed in the air or gas stream, unless they are constructed or enclosed in such a manner that failure of that component cannot ignite the surrounding gas stream.
2. The user shall electrically ground all fan parts.
3. For this standard, nonferrous material shall be any material with less than 5% iron or any other material with demonstrated ability to be spark resistant.
4. The use of aluminum or aluminum alloys in the presence of steel that has been allowed to rust requires special consideration. Research by the U.S. Bureau of Mines, and others, has shown that aluminum impellers rubbing on rusty steel may cause high intensity sparking.

The use of the above standard in no way implies a guarantee of safety for any level of spark resistance. "Spark resistant construction also does not protect against ignition of explosive gases caused by catastrophic failure or from any airstream material that may be present in the system."

VBBB Sound Calculations

The sound power levels published here have been determined by laboratory tests in accordance with AMCA Standard 300-96 and carry the AMCA Seal for VBBB fans. The sound power levels shown are decibel (dB) levels referred to 10⁻¹² watts. We have listed sound power levels for the eight octave bands with frequency range as shown below.

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY	45 to	90 to	180 to	355 to	710 to	1400 to	2800 to	5600 to
CENTER	90	180	355	710	1400	2800	5600	11200
CTR. FREQUENCY	63	125	250	500	1000	2000	4000	8000

Sound power levels (SPL) of the fans can be easily obtained using Carnes Fan-C-Lect software selection. The SPL can also be obtained using specific sound power level method described below:

Sound Power Level of a fan = Specific Sound Power Level (L_{WK}) + Capacity Function (M)

Use of this method will be illustrated by the following example:

Calculate sound power levels for

Size..... VBBB36, SWSI Elevation..... 3000 ft.
 CFM..... 15500 RPM..... 893
 SP 2.5" w.g. OV 2024
 Temp 300°

1. How to determine L_{WK}

We have published values for L_{WK} at various speeds and operating points on pages C-315 through C-317. The operating point is a ratio of design CFM to the wide open volume (WOV). The WOV equals CFM for a given RPM at zero static pressure. WOV can be calculated by multiplying fan RPM by the factors (Rf) shown in the table. Thus, WOV volume for 893 RPM = 29.05 x 893 = 25,942 CFM.

Size	Rf for - VBBB SWSI
12	1.090
13	1.459
15	2.001
16	2.664
18	3.580
20	4.712
22	6.488
24	8.661
27	11.64
30	15.96
33	21.25
36	29.05

Therefore, operating point falls at 60% (15500 ÷ 25942) of the WOV. Referring to the L_{WK} table for Size VBBB 36, the specific sound power levels can be read as follows:

L_{WK} = 38 37 35 29 26 22 17 12

2. How to determine M

The value of M can be taken from the tables on page C-318 once Total Pressure (TP) is calculated.

Total Pressure (TP) = Static Pressure (SP) + Velocity Pressure (VP) (All pressure operating density.)

VP = (Outlet Velocity) ÷ 4005)² x density factor.

In our example VP = (2024 ÷ 4005)² x 0.625 = 0.16.

Therefore, TP = 2.5 + 0.16 = 2.66.

Thus, for 15500 CFM and 2.66" TP, M works out to be 51.

M can also be calculated using the formula, M = 10 log CFM + 20 log TP.

3. Combining L_{WK} and M gives sound power levels.

Thus, Octave Band

	1	2	3	4	5	6	7	8
SPL =	38	37	35	29	26	22	17	12
	<u>51</u>	<u>51</u>	<u>51</u>	<u>51</u>	<u>51</u>	<u>51</u>	<u>51</u>	<u>51</u>
	89	88	86	80	77	73	68	63

L_{wk} Value for Model VBBB - SWSI

Size 12 & 13

Sizes 15 & 16

RPM	% WOV	OCTAVE BAND							
		1	2	3	4	5	6	7	8
4200	90	36	45	47	50	48	46	44	38
	80	33	42	43	46	44	41	39	33
	70	31	41	42	45	42	39	37	31
	60	31	41	42	44	41	38	36	30
3900	50	31	40	41	39	37	35	34	28
	90	37	46	47	50	48	46	44	37
	80	34	43	44	46	43	41	38	32
	70	32	42	42	45	42	39	36	29
3600	60	32	41	42	44	40	38	36	29
	50	32	41	40	39	37	35	34	27
	90	38	46	48	50	47	46	43	36
	80	35	43	44	46	43	40	38	30
3300	70	33	42	43	45	41	38	36	28
	60	33	41	42	44	40	38	35	28
	50	33	41	40	39	36	35	33	26
	90	39	46	48	50	47	46	42	35
3000	80	36	43	45	46	42	40	37	29
	70	35	42	43	45	40	38	35	27
	60	35	41	43	44	39	37	34	27
	50	34	41	40	39	36	35	33	25
2700	90	41	46	49	50	46	45	42	34
	80	37	43	45	46	41	40	36	28
	70	36	42	44	45	39	38	34	26
	60	36	41	43	44	39	37	34	25
2400	50	36	41	39	39	36	35	32	23
	90	43	47	50	50	47	46	42	34
	80	40	44	47	46	42	41	37	28
	70	39	42	45	44	40	39	35	26
2100	60	39	42	44	43	39	39	35	26
	50	38	41	40	39	36	36	33	24
	90	46	48	51	50	48	48	43	34
	80	43	44	48	45	43	43	38	28
1800	70	41	43	46	43	41	41	36	26
	60	41	43	45	42	40	40	35	26
	50	40	42	42	39	37	38	34	24
	90	48	49	51	50	50	49	43	33
1500	80	45	45	47	45	44	44	38	28
	70	43	44	46	43	42	42	36	26
	60	43	44	45	42	42	42	36	25
	50	42	43	42	39	39	40	35	24
1200	90	49	51	51	50	51	49	42	32
	80	46	47	47	45	46	45	38	27
	70	44	46	45	43	44	43	36	25
	60	44	45	45	42	43	43	36	25
900	50	43	44	42	39	41	42	34	23
	90	50	52	50	51	52	49	41	31
	80	46	48	46	45	48	45	37	26
	70	45	47	44	43	46	44	35	24
600	60	45	47	43	42	45	43	35	23
	50	44	46	42	39	43	42	34	22
	90	51	53	51	53	54	49	39	29
	80	47	50	46	48	49	45	35	24
300	70	46	48	43	45	48	44	33	22
	60	46	48	43	45	47	43	33	21
	50	45	47	41	42	46	43	32	20
	90	52	52	52	54	52	45	35	24
150	80	48	47	46	49	49	41	30	19
	70	47	46	44	47	47	40	29	17
	60	47	45	43	46	47	39	28	17
	50	46	44	40	43	46	39	27	15

RPM	% WOV	OCTAVE BAND							
		1	2	3	4	5	6	7	8
3900	90	44	41	42	49	46	43	41	40
	80	44	40	39	44	41	38	35	34
	70	44	39	38	43	40	37	35	33
	60	44	39	38	42	38	36	34	32
3600	50	43	39	37	39	36	33	32	30
	90	44	41	44	49	46	43	41	40
	80	43	39	40	44	40	38	35	34
	70	43	39	39	43	39	37	34	33
3300	60	43	39	38	42	38	35	33	32
	50	43	39	37	39	35	33	32	30
	90	43	41	45	49	45	43	41	40
	80	43	39	41	44	39	37	35	34
3000	70	43	39	40	43	38	36	34	33
	60	43	39	39	42	37	35	33	32
	50	42	38	37	39	34	33	31	30
	90	43	41	46	49	44	43	41	40
2700	80	42	39	42	44	39	37	35	34
	70	42	38	41	43	38	36	34	33
	60	42	38	40	42	37	35	33	32
	50	42	38	38	39	34	33	31	30
2400	90	42	41	47	49	45	43	41	39
	80	41	38	42	44	39	38	36	34
	70	41	38	42	43	39	37	35	33
	60	41	38	40	41	37	36	34	32
2100	50	41	37	38	39	35	34	32	30
	90	42	41	47	48	45	44	41	39
	80	40	38	42	43	40	39	36	34
	70	40	37	42	42	39	38	36	33
1800	60	40	37	40	41	38	37	35	32
	50	40	37	38	38	36	35	33	30
	90	41	41	47	47	46	45	41	38
	80	39	38	42	42	41	40	37	33
1500	70	39	38	41	42	40	39	36	32
	60	39	37	40	40	39	38	35	31
	50	39	37	38	38	37	37	33	29
	90	41	42	47	47	46	45	41	36
1200	80	39	39	42	42	42	41	36	31
	70	38	38	41	42	41	40	35	30
	60	38	38	40	40	40	39	35	29
	50	38	37	39	38	38	38	33	28
900	90	41	43	48	48	47	45	40	34
	80	38	39	43	43	43	41	35	29
	70	38	38	42	42	42	40	34	28
	60	38	38	41	41	41	40	33	27
600	50	38	38	39	39	40	38	32	26
	90	41	43	48	47	47	44	37	31
	80	38	39	44	44	44	41	33	26
	70	38	38	43	43	43	40	32	25
300	60	38	38	42	42	43	39	31	24
	50	38	38	40	40	42	38	29	23
	90	41	45	48	47	47	41	34	28
	80	39	42	44	44	44	37	30	23
150	70	38	41	43	43	43	37	29	22
	60	38	40	42	42	42	36	28	22
	50	38	39	40	40	41	34	27	21

Values shown are for inlet L_{wkI} specific sound power levels for: Installation Type B; free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

L_{wk} Value for Model VBBB - SWSI

Size 18 & 24

Sizes 27 & 33

RPM	% WOV	OCTAVE BAND							
		1	2	3	4	5	6	7	8
3600	90	43	42	41	44	45	40	37	31
	80	41	40	38	39	41	36	33	27
	70	41	40	38	39	40	35	32	26
	60	41	40	37	38	39	33	30	24
	50	41	40	36	36	38	30	27	22
3300	90	43	42	41	44	45	40	37	30
	80	40	39	38	40	41	36	32	26
	70	40	39	38	40	40	35	31	25
	60	41	39	37	38	39	32	29	23
	50	41	39	36	37	38	29	26	21
3000	90	42	42	41	45	45	39	36	29
	80	40	39	38	40	40	35	31	25
	70	40	39	37	40	40	34	31	24
	60	41	39	37	39	38	32	28	22
	50	41	39	35	37	37	29	26	20
2700	90	42	42	41	45	44	39	35	28
	80	40	39	38	41	39	35	31	23
	70	40	39	37	40	39	34	30	23
	60	40	38	36	39	37	31	28	21
	50	41	38	35	38	35	29	25	19
2400	90	42	41	42	45	43	38	35	26
	80	40	38	38	41	38	34	30	22
	70	40	38	38	40	38	33	29	22
	60	40	38	36	39	36	31	27	20
	50	40	38	35	38	34	28	24	18
2100	90	43	42	43	45	42	38	34	25
	80	41	39	39	41	38	34	29	21
	70	41	39	39	40	37	33	28	21
	60	41	39	38	39	35	31	26	20
	50	41	38	37	37	32	28	24	18
1800	90	44	43	44	45	41	38	32	24
	80	41	40	40	41	37	33	28	20
	70	41	40	40	40	36	33	27	20
	60	41	39	39	38	34	31	25	19
	50	41	39	38	37	31	28	23	18
1500	90	45	44	45	44	41	37	30	22
	80	42	41	41	40	37	32	26	19
	70	42	41	40	40	36	32	26	18
	60	42	40	39	38	34	30	24	18
	50	42	40	38	35	31	28	23	17
1200	90	45	45	44	43	40	35	28	20
	80	43	41	40	39	36	31	25	17
	70	43	41	40	39	35	30	24	16
	60	43	41	39	36	33	29	23	16
	50	43	40	37	34	31	27	22	15
900	90	46	45	44	43	39	33	26	17
	80	43	41	40	39	34	29	22	13
	70	43	41	40	38	34	28	22	13
	60	43	40	38	36	32	27	21	13
	50	43	40	35	33	30	26	20	12
600	90	46	45	44	41	36	29	21	12
	80	42	41	40	36	31	25	17	8
	70	42	40	39	36	31	25	17	8
	60	42	39	37	34	29	24	16	8
	50	41	37	34	31	28	23	16	7

RPM	% WOV	OCTAVE BAND							
		1	2	3	4	5	6	7	8
3000	90	50	48	46	46	39	39	37	32
	80	45	44	43	43	35	35	32	28
	70	45	43	42	42	34	34	31	26
	60	42	40	40	40	30	30	27	22
	50	41	39	39	40	29	28	25	20
2700	90	50	47	46	46	39	39	37	31
	80	45	43	43	42	35	35	32	27
	70	45	42	42	42	34	33	30	25
	60	42	39	40	40	30	29	26	21
	50	41	38	39	39	29	28	24	19
2400	90	50	46	46	45	39	39	36	30
	80	45	42	43	41	35	34	31	26
	70	45	41	42	40	34	33	30	24
	60	42	39	40	38	30	29	25	20
	50	41	38	40	36	29	27	24	19
2100	90	50	46	46	43	39	39	35	29
	80	45	42	43	39	35	34	30	24
	70	45	41	42	38	34	33	29	23
	60	42	38	40	35	30	29	24	19
	50	41	37	40	34	29	27	23	18
1800	90	49	46	46	41	39	38	34	27
	80	45	42	43	37	35	33	29	23
	70	44	41	42	36	34	32	28	22
	60	41	39	40	33	30	28	23	18
	50	40	38	40	31	29	26	22	17
1500	90	48	46	47	40	39	37	32	25
	80	44	43	43	36	35	32	28	21
	70	43	42	42	35	34	31	26	20
	60	40	40	41	31	30	27	22	17
	50	39	39	40	29	28	25	21	16
1200	90	47	47	46	41	39	36	30	23
	80	43	44	42	38	35	32	26	20
	70	43	43	41	36	34	31	25	19
	60	41	42	39	33	30	27	22	17
	50	40	41	38	31	29	26	20	15
900	90	47	47	45	41	38	34	27	21
	80	44	44	42	38	34	30	24	19
	70	44	44	41	37	33	29	24	18
	60	43	42	38	33	30	27	21	16
	50	42	42	37	32	29	25	20	16
600	90	49	48	45	40	38	30	26	20
	80	45	44	41	35	33	27	22	16
	70	45	44	40	35	33	26	22	16
	60	44	42	38	32	31	24	20	14
	50	44	41	36	31	29	23	19	14
300	90	48	45	40	38	30	26	20	14
	80	44	41	35	33	27	22	16	10
	70	44	40	35	33	26	22	16	10
	60	42	38	32	31	24	20	14	9
	50	41	36	31	29	23	19	14	8

Values shown are for inlet L_{wk1} specific sound power levels for: Installation Type B; free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

L_{wk} Value for Model VBBB - SWSI

Size 36

RPM	% WOV	OCTAVE BAND							
		1	2	3	4	5	6	7	8
2100	90	45	44	42	46	41	39	34	28
	80	40	39	37	41	36	33	29	22
	70	39	38	35	40	35	32	27	21
	60	38	36	32	36	31	28	23	18
	50	38	36	32	36	31	28	23	18
1800	90	45	43	43	46	40	38	33	26
	80	40	37	38	41	35	33	27	21
	70	39	37	37	40	33	31	26	20
	60	38	35	34	36	29	27	22	17
	50	38	35	34	36	29	27	22	17
1500	90	45	41	45	45	39	37	31	24
	80	39	36	41	41	34	31	26	19
	70	39	35	39	39	33	30	24	18
	60	38	32	36	36	29	26	20	15
	50	38	32	36	36	29	26	20	15
1200	90	45	41	46	43	39	35	29	21
	80	39	36	41	38	34	30	24	17
	70	39	35	40	37	32	28	22	16
	60	37	31	36	33	28	24	19	14
	50	37	31	36	33	28	24	19	14
900	90	46	46	45	39	37	32	26	18
	80	41	41	41	34	31	27	20	14
	70	40	40	40	33	30	26	20	13
	60	38	37	35	29	26	22	17	12
	50	38	37	35	29	26	22	17	12
600	90	48	47	42	37	34	28	21	14
	80	44	42	37	32	29	23	17	10
	70	43	41	36	30	28	22	16	10
	60	40	37	31	27	25	20	14	9
	50	40	37	31	27	25	20	14	9
300	90	47	41	37	34	28	21	15	8
	80	42	37	31	29	23	17	11	4
	70	41	35	30	28	22	16	10	4
	60	37	31	27	25	20	14	9	4
	50	37	31	27	25	20	14	9	4
100	90	38	35	31	24	17	11	4	-3
	80	33	29	25	19	13	7	0	-6
	70	32	28	24	19	13	6	0	-6
	60	28	25	22	17	12	6	1	-4
	50	28	25	22	17	12	6	1	-4

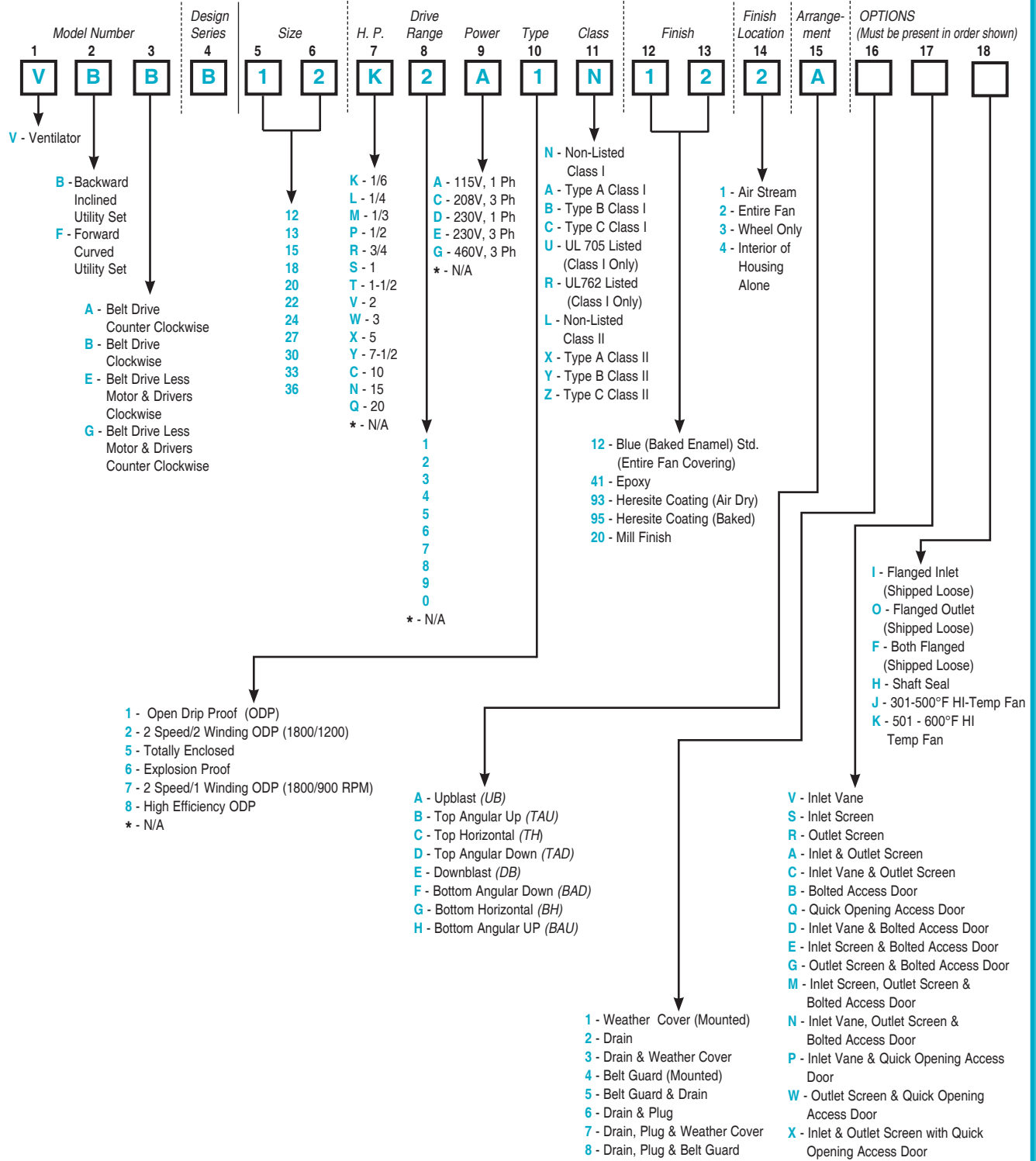
Values shown are for inlet L_{wkI} specific sound power levels for: Installation Type B; free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

M Capacity Fraction

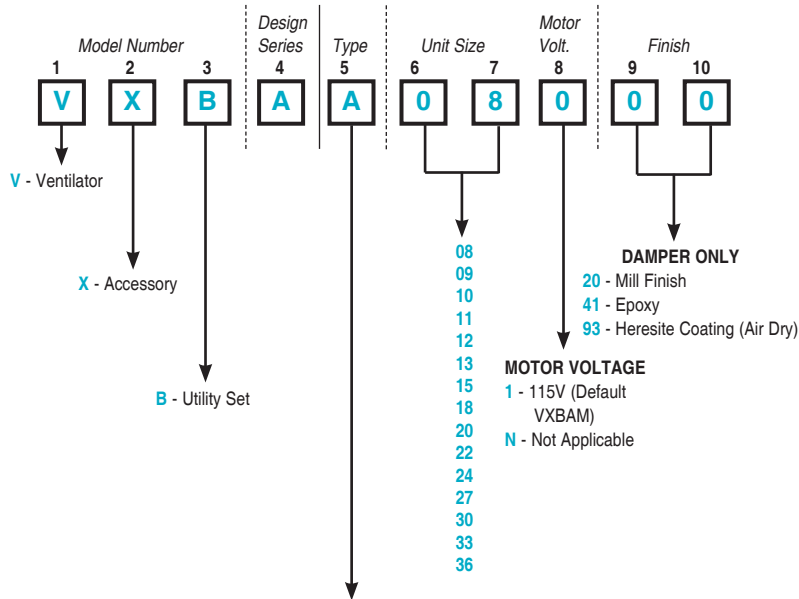
CFM	TOTAL PRESSURE AT DENSITY																		
	1/4	3/8	1/2	5/8	3/4	7/8	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2
100	8	11	14	16	18	19	20	22	24	26	28	30	31	32	33	34	35	36	36
150	10	13	16	18	19	21	22	24	25	28	30	31	33	34	35	36	37	37	38
200	11	14	17	19	21	22	23	25	27	29	31	33	34	35	36	37	38	39	39
300	13	16	19	21	22	24	25	27	28	31	33	34	36	37	38	39	40	40	41
500	15	18	21	23	24	26	27	29	31	33	35	37	38	39	40	41	42	43	43
750	17	20	23	25	26	28	29	31	32	35	37	38	40	41	42	43	44	44	45
1000	18	21	24	26	28	29	30	32	34	36	38	40	41	42	43	44	45	48	46
1500	20	23	26	28	29	31	32	34	35	38	40	41	43	44	45	46	47	47	48
2000	21	24	27	29	31	32	33	35	37	39	41	43	44	45	46	47	48	49	49
3000	23	26	29	31	32	34	35	37	38	41	43	44	46	47	48	49	59	59	51
5000	25	28	31	33	34	36	37	39	41	43	45	47	48	49	50	51	52	53	53
7500	27	30	33	35	36	38	39	41	42	45	47	48	50	51	52	53	54	54	55
10000	28	31	34	36	38	39	40	42	44	46	48	50	51	52	52	54	55	56	56
15000	30	33	36	38	39	41	42	44	45	48	50	51	53	54	55	56	57	57	58
20000	31	34	37	39	41	42	43	45	47	49	51	53	54	55	56	57	58	59	59
30000	33	36	39	41	42	44	45	47	48	51	53	54	56	57	58	59	60	60	61
50000	35	38	41	43	44	46	47	49	51	53	55	57	58	59	60	61	62	63	63
75000	37	40	43	45	46	48	49	51	52	55	57	58	60	61	62	63	64	64	65
100000	38	41	44	46	48	49	50	52	54	56	58	60	61	62	63	64	65	66	66
150000	40	43	46	48	49	51	52	54	55	58	60	61	63	64	65	66	67	67	68
200000	41	44	47	49	51	52	53	55	57	59	61	63	64	65	66	67	68	69	69

CFM	TOTAL PRESSURE AT DENSITY																		
	7	8	9	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
100	37	38	39	40	42	43	44	45	46	47	48	48	49	50	50	51	51	52	52
150	39	40	41	42	43	45	46	47	48	49	49	50	51	51	52	52	53	53	54
200	40	41	42	43	45	46	47	48	49	50	51	51	52	53	53	54	54	55	55
300	42	43	44	45	46	48	49	50	51	52	52	53	54	54	55	55	56	56	57
500	44	45	46	47	49	50	51	52	53	54	55	55	56	57	57	58	58	59	59
750	46	47	48	49	50	52	53	54	55	56	56	57	58	58	59	59	60	60	61
1000	47	48	49	50	52	53	54	55	56	57	58	58	59	60	60	61	61	62	62
1500	49	50	51	52	53	55	56	57	58	59	59	60	61	61	62	62	63	63	64
2000	50	51	52	53	55	56	57	58	59	60	61	61	62	63	63	64	64	65	65
3000	52	53	54	55	56	58	59	60	61	62	62	63	64	64	65	65	66	66	67
5000	54	55	56	57	59	60	61	62	63	64	65	65	66	67	67	68	68	69	69
7500	56	57	58	59	60	62	63	64	65	66	66	67	68	68	69	69	70	70	81
10000	57	58	59	60	62	63	64	65	66	67	68	68	69	70	70	71	71	72	72
15000	59	60	61	62	63	65	66	67	68	69	69	70	71	71	72	72	73	73	74
20000	60	61	62	63	65	66	67	68	69	70	71	71	72	73	73	74	74	75	75
30000	62	63	64	65	66	68	69	70	71	72	72	73	74	74	75	75	76	76	77
50000	64	65	66	67	69	70	71	72	73	74	75	75	76	77	77	78	78	79	79
75000	66	67	68	69	70	72	73	74	75	76	76	77	78	78	79	79	80	80	81
100000	67	68	69	70	72	73	74	75	76	77	78	78	79	80	80	81	81	82	82
150000	69	70	71	72	73	75	76	77	78	79	79	80	81	81	82	82	83	83	84
200000	70	71	72	73	75	76	77	78	79	80	81	81	82	83	83	84	84	85	85

Utility Sets



▼ Accessories



- A - Damper (Std.) —Automatic
- M - Damper (Std.) — Motorized
- R - Vibration Pads R-I-S
- S - Vibration Pads Spring
- G - Vibration Rails R-I-S
- H - Vibration Rails Spring
- C - Companion Flange Inlet
- F - Companion Flange Outlet
- N - Disconnect, 1 Phase, NEMA 1
- P - Disconnect, 3 Phase, NEMA 2
- V - Disconnect, 1 Phase, NEMA 3R
- W - Disconnect, 3 Phase, NEMA 3R
- B - Damper (HD) — Auto
- L - Damper (HD) — Motorized
- D - RIS Hangers
- E - Spring Hangers
- K - Weather Cover
- J - Belt Guard