



Master Engineering Tables

Exhaust Air Rate Engineering Sheet

Calculating Exhaust Rates (CFM Per Linear Foot)

The quantity of air to be mechanically exhausted through a commercial kitchen cooking line exhaust ventilator is dependent upon the ventilator configuration, the line-up of appliances being exhausted, the volume of the cooking operation, and the nature of the heating source (e.g., gas or electric). These factors are taken into account by the "Minimum Design CFM Exhaust Rates" table below. To use the table, simply select the type of appliance being ventilated at the left most column, and read horizontally across to the appropriate ventilator configuration and appliance heating source. The CFM (cubic feet per minute of air) shown is per linear foot of ventilator length, left-to-right. When more than one type of appliance is being ventilated, determine the CFM exhaust rate for each and apply the largest rate throughout; but, if more than about 25% of continuous cooking appliances can operate at a lower exhaust rate, that ventilator portion may incorporate "Reduced-Throat" baffling to decrease the exhaust rate over that portion. See the **Static Pressure vs. CFM Table** at the back page of this brochure. For example, a wall canopy ventilator over 8'-0" of gas braising pans and 6'-0" of gas ovens, could exhaust at 250 CFM/FT over the braising pans, and at 150 CFM/FT over the ovens, in accordance with this table.

Minimum Design CFM Exhaust Rates

Cooking Equipment	Wall Canopy or One Side of Double Island Line Model C		Single Island Style (Single Cooking Line) Model C-MS-CL		Back Shelf and Pass-Over Styles Models WM, PV, PH	
	CFM/Lin. Ft. Electric Equip.	CFM/Lin. Ft. Gas Equip.	CFM/Lin. Ft. Electric Equip.	CFM/Lin. Ft. Gas Equip.	CFM/Lin. Ft. Electric Equip.	CFM/Lin. Ft. Gas Equip.
Light Duty (non-grease producing)						
Kettles (Under 20 Gal.)	150	150	300	300	-	-
Ovens & Steamers	150	150	300	300	-	-
Conveyor Ovens (S.D.)	150	150	300	300	-	-
Medium Duty (400°F)						
Kettles (Under 60 Gal.)	250	250	300	300	-	-
Braising Pans/Skillets	250	250	300	300	-	-
Fryers	250	250 ¹	300 ²	300 ²	150	250
Pressure Fryers	250	250	300	300	-	-
Griddles	250 ³	250 ³	300 ²	300 ²	150	250
Grooved Griddles	250	250	300	300	250	250
Hot Top Ranges	250	250	400	400	250	250
Open Burner Ranges	-	250 ^{3,4}	-	300 ⁵	-	250
Heavy Duty (600°F)						
Kettles (Over 60 Gal.)	400	400	400	400	-	-
Upright Broilers	250	250	300	300	-	-
Char-broilers	300 ⁶	400 ⁶	400 ⁶	500 ⁷	250	Consult Factory
Woks	-	300 ²	-	500	-	-
Extra Heavy Duty (700°F)						
Solid Fuel-burning Equip.	-	500	-	800	-	-

1 For heavy production fryers, increase to 300 CFM/Lin. Ft.

2 For heavy production, increase to 400 CFM/Lin.Ft.

3 For light-duty cooking, can reduce to 150 CFM/Lin.Ft.

4 For saute operations, increase to 300 CFM/Lin.Ft.

5 For saute operations, increase to 400 CFM/Lin.Ft.

6 Calculate exhaust rate by including a 12" overhang at each end of appliance

7 To exhaust at 500 CFM/Lin. Ft., the amount of broiler surface cannot exceed 50% of the cooking line. Calculate exhaust rate per note 6. Otherwise, must exhaust at 600 CFM/Lin. Ft.



Master Engineering Tables

Static Pressure vs. CFM/Linear Foot Table (W2, W1, and DX Models only)

The table below shows the exhaust air rate, in CFM per linear foot of ventilator length, at various total static pressure drops across the ventilator. Note that the data is for nominal 250 CFM/Ft. extractor (5" nominal depth), nominal 250 CFM/Ft. extractor with "Reduced-Throat" baffling, nominal 400 CFM/Ft. extractor (7" nominal depth), nominal 400 CFM/FT. extractor with "Reduced-Throat" baffling, the MS (multi-slot inlet) extractor, and the MS extractor with "Reduced-Throat" baffling on the heavy inlet slot side.

Multiple ventilator sections which are served by a common exhaust fan will have equal, or nearly equal, total static pressure drops across each of the several ventilator sections. When this is the case, the table below becomes especially helpful in the selection of extractor size and Reduced Throat baffling to achieve equal total static pressure drops across the several ventilator sections under consideration.

Here's an example:

You have two distinct ventilator sections, ducted into a common exhaust fan. The first section serves a battery of hot-top ranges and ovens. Ideally, you would exhaust at the rate of 250 CFM/Ft. over the ranges, and 150 CFM/Ft. over the ovens (by including "Reduced-Throat" baffling). Note that the static pressure drop developed over this section would be 1.33" with a nominal 250 CFM extractor. The second section serves a battery of large kettles which should be exhausted at the rate of 400 CFM/Ft. Note that the static pressure drop developed over this section would be 1.65" with a nominal 400 CFM extractor. A change in design is necessary to get both sections operating at the same total static pressure drop.

In such a situation the 400 CFM/Ft. is controlling, and both ventilators will need to be designed to operate at the higher static pressure drop of 1.65" w.g. At 1.65" pressure drop, it can be seen from the table below that the first section will necessarily operate at 285 CFM/Ft. over the ranges, and 170 CFM/Ft. over the ovens, where Reduced Throat baffling has been installed.

As an alternate possibility, the 400 CFM/Ft. requirement of the second section could be achieved by employing a multiple slot (MS) extractor which would develop 1.50" of static pressure drop at the 400 CFM rate. At this static pressure drop, the first section would exhaust at the rates of 270 and 160 CFM/Ft. This still meets or exceeds the minimum exhaust air rate required for the first section, and a lesser overall exhaust air rate results.

Type of Extractor	Pressure Drop Across Ventilator – Inches W.G.						
	1.33"	1.50"	1.65"	1.70"	2.00"	2.15"	2.40"
250 CFM/Lin. Ft.	250	270	285	300	-	-	-
250 CFM/Lin. Ft. with Reduced-Throat	150	160	170	180	-	-	-
400 CFM/Lin. Ft.	-	-	400	405	450	470	500
400 CFM/Lin. Ft. with Reduced-Throat	-	-	240	245	270	280	300
MS Extractor Heavy/Light	-	400 250/150	425 265/160	435 270/165	480 300/180	500 310/190	530 330/200
MS Extractor Reduced-Throat on heavy side	-	300 150/150	320 160/160	330 165/165	360 180/180	380 190/190	400 200/200

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Air & Water-Side Sizing Tables

																		Wash Water Flow Rates (GPM)							
																		W 2 Series				W 1 Series			
																		250 Extractor		400 & 400MS Extractor		250 Extractor		400 & 400MS Extractor	
																		40 PSI	80 PSI	40 PSI	80 PSI	40 PSI	80 PSI	40 PSI	80 PSI
VENTILATOR LENGTH	150				250				300				400				400 MS				VENTILATOR LENGTH				
	Exhaust CFM @ 150 CFM/Ft.		Supply CFM @ 80% Exh.		Exhaust CFM @ 250 CFM/Ft.		Supply CFM @ 80% Exh.		Exhaust CFM @ 300 CFM/Ft.		Supply CFM @ 80% Exh.		Exhaust CFM @ 400 CFM/Ft.		Supply CFM @ 80% Exh.		Exhaust CFM @ 400 CFM/Ft.		Supply CFM @ 80% Exh.						
	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES		CFM	DUCT SIZE INCHES	CFM	DUCT SIZE INCHES
3'-0"	450	10 x 4	360	12 x 11	750	10 x 6	600	12 x 11	900	10 x 7	720	12 x 15	1200	10 x 10	960	12 x 15	1200	10 x 10	600	12 x 11	360	12 x 11			
3'-6"	525	10 x 4	420	12 x 11	875	10 x 7	700	12 x 15	1050	10 x 8	840	12 x 15	1400	10 x 11	1120	12 x 19	1400	10 x 11	700	12 x 15	420	12 x 11			
4'-0"	600	10 x 5	480	12 x 11	1000	10 x 8	800	12 x 15	1200	10 x 10	960	12 x 15	1600	10 x 13	1280	12 x 19	1600	10 x 13	800	12 x 15	480	12 x 11			
4'-6"	675	10 x 5	540	12 x 11	1125	10 x 9	900	12 x 15	1350	10 x 11	1080	12 x 19	1800	10 x 14	1440	12 x 24	1800	10 x 14	900	12 x 15	540	12 x 11			
5'-0"	750	10 x 6	600	12 x 11	1250	10 x 10	1000	12 x 15	1500	10 x 12	1200	12 x 19	2000	12 x 13	1600	12 x 24	2000	12 x 13	1000	12 x 15	600	12 x 11			
5'-6"	825	10 x 7	660	12 x 11	1375	10 x 11	1100	12 x 19	1650	10 x 13	1320	12 x 19	2200	12 x 15	1760	12 x 28	2200	12 x 15	1100	12 x 19	660	12 x 11			
6'-0"	900	10 x 7	720	12 x 15	1500	10 x 12	1200	12 x 19	1800	10 x 14	1440	12 x 24	2400	12 x 16	1920	12 x 28	2400	12 x 16	1200	12 x 19	720	12 x 15			
6'-6"	975	10 x 8	780	12 x 15	1625	10 x 13	1300	12 x 19	1950	10 x 16	1560	12 x 24	2600	12 x 17	2080	12 x 33	2600	12 x 17	1300	12 x 19	780	12 x 15			
7'-0"	1050	10 x 8	840	12 x 15	1750	10 x 14	1400	12 x 24	2100	10 x 17	1680	12 x 28	2800	12 x 19	2240	12 x 33	2800	16 x 14	1400	12 x 24	840	12 x 15			
7'-6"	1125	10 x 9	900	12 x 15	1875	10 x 15	1500	12 x 24	2250	10 x 18	1800	12 x 28	3000	12 x 20	2400	12 x 37	3000	16 x 15	1500	12 x 24	900	12 x 15			
8'-0"	1200	10 x 10	960	12 x 15	2000	10 x 16	1600	12 x 24	2400	10 x 19	1920	12 x 28	3200	12 x 21	2560	12 x 37	3200	16 x 16	1600	12 x 24	960	12 x 15			
8'-6"	1275	10 x 10	1020	12 x 19	2125	10 x 17	1700	12 x 28	2550	10 x 20	2040	12 x 33	3400	12 x 23	2720	12 x 37	3400	16 x 17	1700	12 x 28	1020	12 x 19			
9'-0"	1350	10 x 11	540 ea.	(2) 12 x 11	2250	10 x 18	900 ea.	(2) 12 x 15	2700	10 x 22	1080 ea.	(2) 12 x 19	3600	12 x 24	1440 ea.	(2) 12 x 24	3600	16 x 18	900 ea.	(2) 12 x 15	540 ea.	(2) 12 x 11			
9'-6"	1425	10 x 11	570 ea.	(2) 12 x 11	2375	10 x 19	950 ea.	(2) 12 x 15	2850	10 x 23	1140 ea.	(2) 12 x 19	3800	12 x 25	1520 ea.	(2) 12 x 24	3800	16 x 19	950 ea.	(2) 12 x 15	570 ea.	(2) 12 x 11			
10'-0"	1500	10 x 12	600 ea.	(2) 12 x 11	2500	10 x 20	1000 ea.	(2) 12 x 15	3000	10 x 24	1200 ea.	(2) 12 x 19	4000	12 x 27	1600 ea.	(2) 12 x 24	4000	16 x 20	1000 ea.	(2) 12 x 15	600 ea.	(2) 12 x 11			
10'-6"	1575	10 x 13	630 ea.	(2) 12 x 11	2625	10 x 21	1050 ea.	(2) 12 x 19	3150	10 x 25	1260 ea.	(2) 12 x 19	4200	12 x 28	1680 ea.	(2) 12 x 28	4200	16 x 21	1050 ea.	(2) 12 x 19	630 ea.	(2) 12 x 11			
11'-0"	1650	10 x 13	660 ea.	(2) 12 x 11	2750	10 x 22	1100 ea.	(2) 12 x 19	3300	10 x 26	1320 ea.	(2) 12 x 19	4400	12 x 29	1760 ea.	(2) 12 x 28	4400	16 x 22	1100 ea.	(2) 12 x 19	660 ea.	(2) 12 x 11			
11'-6"	1725	10 x 14	690 ea.	(2) 12 x 15	2875	10 x 23	1150 ea.	(2) 12 x 19	3450	10 x 28	1380 ea.	(2) 12 x 24	4600	12 x 31	1840 ea.	(2) 12 x 28	4600	16 x 23	1150 ea.	(2) 12 x 19	690 ea.	(2) 12 x 15			
12'-0"	1800	10 x 14	720 ea.	(2) 12 x 15	3000	10 x 24	1200 ea.	(2) 12 x 19	3600	10 x 29	1440 ea.	(2) 12 x 24	4800	12 x 32	1920 ea.	(2) 12 x 28	4800	16 x 24	1200 ea.	(2) 12 x 19	720 ea.	(2) 12 x 15			
12'-6"	1875	10 x 15	750 ea.	(2) 12 x 15	3125	10 x 25	1250 ea.	(2) 12 x 19	3750	12 x 25	1500 ea.	(2) 12 x 24	5000	12 x 33	2000 ea.	(2) 12 x 28	5000	16 x 25	1250 ea.	(2) 12 x 19	750 ea.	(2) 12 x 15			
13'-0"	1950	10 x 16	780 ea.	(2) 12 x 15	3250	10 x 26	1300 ea.	(2) 12 x 19	3900	12 x 26	1560 ea.	(2) 12 x 24	5200	12 x 35	2080 ea.	(2) 12 x 33	5200	16 x 26	1300 ea.	(2) 12 x 19	780 ea.	(2) 12 x 15			
13'-6"	2025	10 x 16	810 ea.	(2) 12 x 15	3375	10 x 27	1350 ea.	(2) 12 x 24	4050	12 x 27	1620 ea.	(2) 12 x 24	5400	12 x 36	2160 ea.	(2) 12 x 33	5400	16 x 27	1350 ea.	(2) 12 x 24	810 ea.	(2) 12 x 15			
14'-0"	2100	10 x 17	840 ea.	(2) 12 x 15	3500	10 x 28	1400 ea.	(2) 12 x 24	4200	12 x 28	1680 ea.	(2) 12 x 28	5600	14 x 32	2240 ea.	(2) 12 x 33	5600	16 x 28	1400 ea.	(2) 12 x 24	840 ea.	(2) 12 x 15			
14'-6"	2175	10 x 17	870 ea.	(2) 12 x 15	3625	10 x 29	1450 ea.	(2) 12 x 24	4350	12 x 29	1740 ea.	(2) 12 x 28	5800	14 x 33	2320 ea.	(2) 12 x 33	5800	16 x 29	1450 ea.	(2) 12 x 24	870 ea.	(2) 12 x 15			
15'-0"	2250	10 x 18	900 ea.	(2) 12 x 15	3750	10 x 30	1500 ea.	(2) 12 x 24	4500	12 x 30	1800 ea.	(2) 12 x 28	6000	14 x 34	2400 ea.	(2) 12 x 37	6000	16 x 30	1500 ea.	(2) 12 x 24	900 ea.	(2) 12 x 15			
15'-6"	2325	10 x 18	930 ea.	(2) 12 x 15	3875	12 x 25	1550 ea.	(2) 12 x 24	4650	12 x 32	1860 ea.	(2) 12 x 28	6200	16 x 31	2480 ea.	(2) 12 x 37	6200	16 x 31	1550 ea.	(2) 12 x 24	930 ea.	(2) 12 x 15			
16'-0"	2400	10 x 19	960 ea.	(2) 12 x 15	4000	12 x 26	1600 ea.	(2) 12 x 24	4800	12 x 32	1920 ea.	(2) 12 x 28	6400	16 x 32	2560 ea.	(2) 12 x 37	6400	16 x 32	1600 ea.	(2) 12 x 24	960 ea.	(2) 12 x 15			
		S.P.= 1.33" W.G.		S.P.= .15" W.G.		S.P.= 1.33" W.G.		S.P.= .15" W.G.		S.P.= 1.70" W.G.		S.P.= .15" W.G.		S.P.= 1.65" W.G.		S.P.= .15" W.G.		S.P.= 1.50" W.G.					S.P.= .15" W.G.		

Air-Side Notes

- The above table applies to the W2, W1 and DX Series of ventilators. Refer to individual cut-sheets for the DF-Series (conventional baffle filter hoods) data.
- When Reduced-Throat baffling is employed, CFM and air collar sizes won't match table ventilator lengths. In such cases, find the next higher CFMs in the table and use corresponding duct collar sizes, or equivalents.
- Exhaust duct collar sizes are based on approximately 1800 FPM. This complies with The Uniform Mechanical Code, The BOCA National Mechanical Code, and NFPA Bulletin 96.
- Supply duct sizes are based on velocities not to exceed 1000 FPM.
- Supply air CFMs in table not for use with short cycle internal discharge scheme. Consult factory.

Solid Fuel Burning Equipment Note

Ventilators over solid fuel burning equipment, such as mesquite broilers, preferably are of the water-wash type. Furthermore, such ventilators preferably include an internal constant cold water misting manifold to douse any live embers which may enter the ventilator/exhaust duct system. Misting flow rate is approximately 1.5 GPH per foot of manifold length.

Pipe size - 1/2" cold water supply required to the control cabinet.

Water Pressure - 40 psi (2.8 kg/cm²) flow pressure. The control cabinet is equipped with an adjustable pressure regulator.

Water Consumption - 1.5 gph/lineal ft. (18.63 LM/lineal meter) of ventilator.

Hot Water Washing Notes

- Water Temp.: 140°F. min. to 180°F. max
- Flow Pressure: 40 PSI min. to 80 PSI max.
- Wash Cycle Length: Normally range between 3 and 10 minutes, depending on water temp./pressure, type of cooking, and detergent used. Use short period initially and inspect baffles for grease build up.

Hot Water-Wash Inlet Pipe Sizing

W 2 Series		W 1 Series		Pipe Inlet Size
250 Extractor	400 & 400MS Extractor	250 Extractor	400 & 400MS Extractor	
Up to 4'-0"	—	Up to 10'-0"	—	1/2"
4' to 10'	Up to 7'-6"	10' to 20'	Up to 12'	3/4"
10' to 18'	7'-6" to 14'	20' to 40'	12' to 22'	1"
18' to 36'	14' to 27'	40' to 70'	22' to 43'	1-1/4"
36' to 50'	27' to 38'	—	43' to 60'	1-1/2"

*For ventilator lengths exceeding the 1.50" pipe limitation, use sequence washing. Refer to model FWC Controller specification sheet.

Drain Line Sizing

W 2 Series		W 1 Series		Drain Stub Size
250 Extractor	400 & 400MS Extractor	250 Extractor	400 & 400MS Extractor	
Up to 12'	Up to 10'	Up to 20'	Up to 14'	1-1/2"
12' to 24'	10' to 20'	20' to 32'	14' to 32'	2"
24' and Over	20' and Over	32' and Over	32' and Over	Use 2 Drains