FN

Filter Hood

Maintenance Manual

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2013 Update

FN Filter Hood Operating and Maintenance Manual

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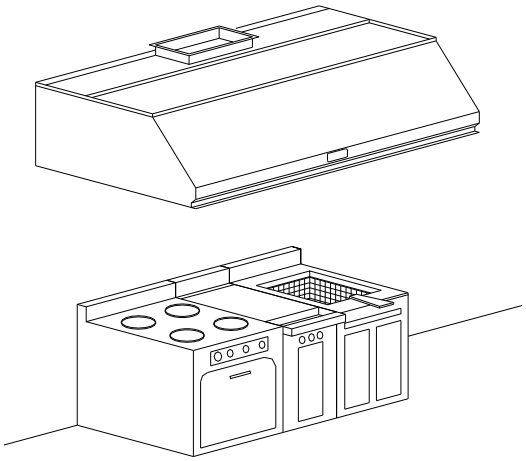
FN Filter Hood Operating and Maintenance Manual

INTRODUCTION

Thank you for selecting a SPRING AIR SYSTEMS INC. commercial kitchen exhaust filter hood. Your system consists of a filter hood and exhaust fan. The exhaust fan may have been supplied by others.

Your SPRING AIR SYSTEMS INC. filter hood was selected to best meet the design requirements of your commercial kitchen application.

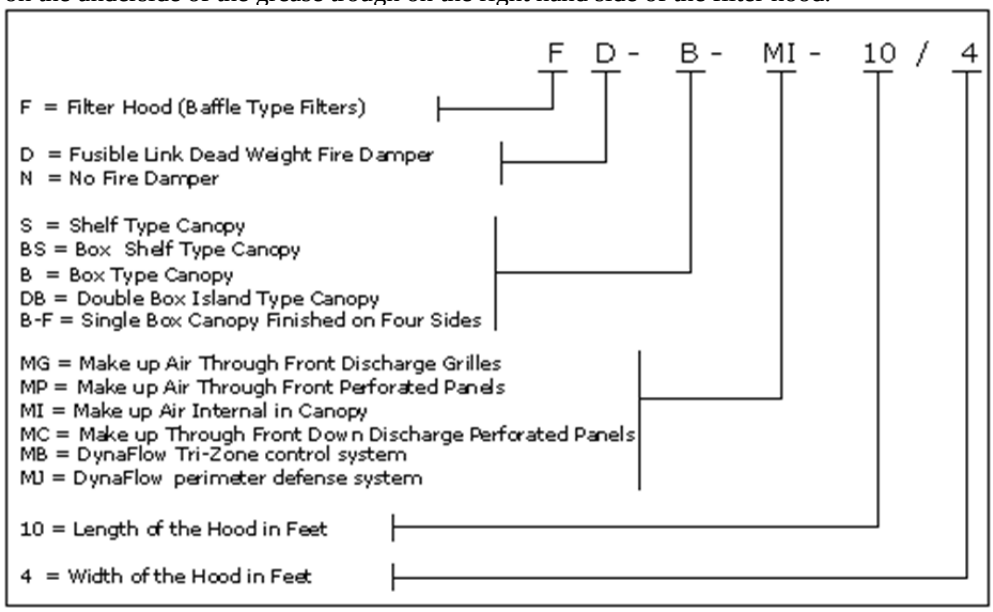


Typical SPRING AIR SYSTEMS Filter FN-B Hood
Figure 1

The exhaust fan is normally controlled by an ON/OFF selector switch located in the kitchen area or mounted on the exhaust fan starter coil electrical enclosure.

SPRING AIR FILTER HOOD MODEL NUMBERS DESIGNATIONS

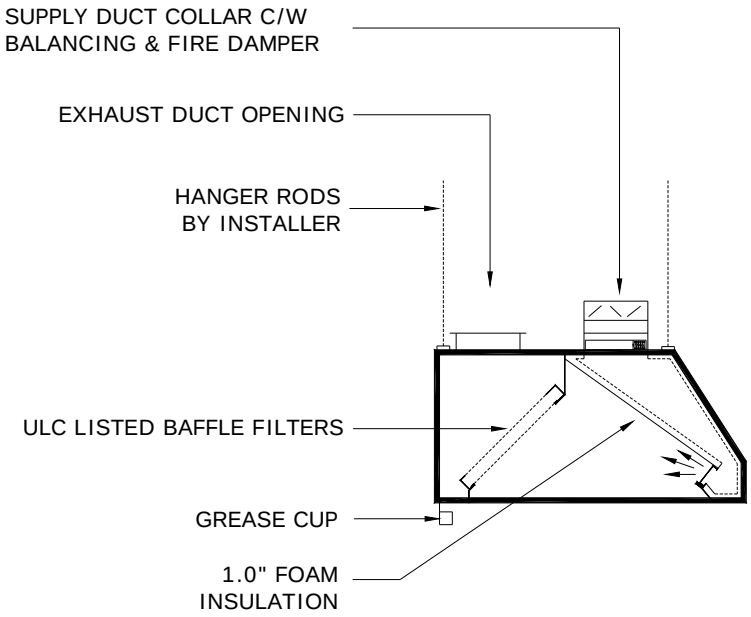
There are numerous types and styles of SPRING AIR SYSTEM filter hoods available. Refer to the ULC label for the complete model number and exhaust flow requirement for your filter hood. The ULC label is located on the underside of the grease trough on the right hand side of the filter hood.



Model Number Designation
Figure 2

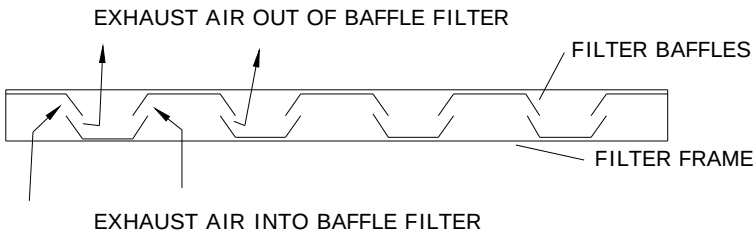
PRINCIPLE OF OPERATION

The contaminated exhaust air rises off the cooking equipment and enters the baffle grease filters within the SPRING AIR SYSTEMS filter hood.



Cross Section of Filter Hood Model FN-B-MI
Figure 3

The exhaust air accelerates through two 90 degree turns within the baffle filters. The liquefied grease then drains down the vertical length of the baffles to the grease trough and into a grease cup. Each grease baffle contains weeping holes to allow the liquid grease to drain into the grease trough



Cross Section of Baffle Filter
Figure 4

Always ensure that the grease filters are installed with the weeping holes down toward the grease trough. The exhaust air travels into the exhaust plenum, fire damper, exhaust duct collar and then into the exhaust ductwork.

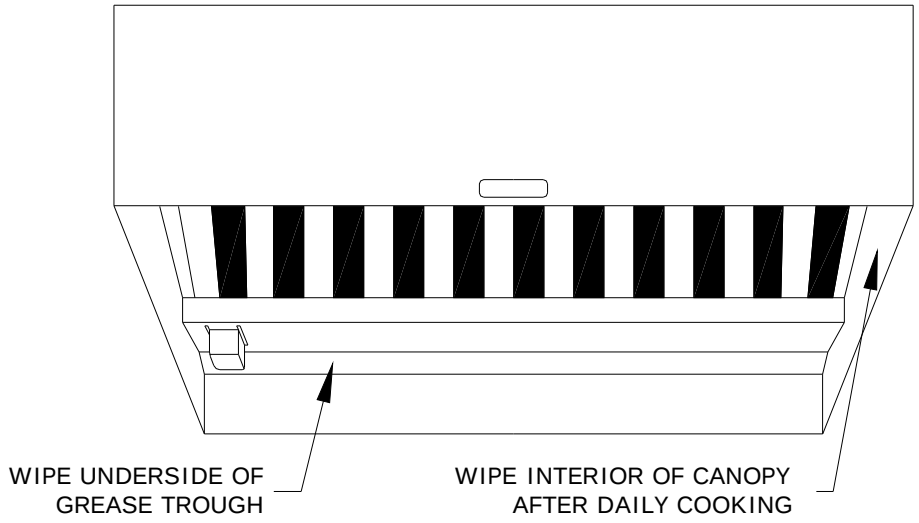
MAINTENANCE SCHEDULE

DAILY:

1. At the end of the cooking day wipe off the interior and exterior of the filter hood canopy and the underside of the grease trough with a damp cloth.

WEEKLY:

1. Remove the grease filters and wash in a mild detergent and water mixture.



Cleaning the Hood Exterior
Figure 5

Wipe off the interior of the filter hood plenum behind the grease filters and the interior and exterior of the grease trough. Remove the grease cup and clean if necessary.

SIX MONTHS

1. Check the exhaust fan belts for alignment, tightness, and wear. Adjust and/or replace.

2. Hoods with makeup air only: remove filter from makeup air discharge and wash in a mild detergent and water mixture.

CLEANING THE EXTERIOR

Normal soil can be removed with a mild detergent and water mixture applied to a cloth.
To remove baked on grease, apply a cleanser to a damp cloth or sponge and rub on the metal in the direction of the polishing lines. DO NOT RUB IN A CIRCULAR MOTION.
Burnt deposits which do not respond can usually be removed by rubbing the surface with SCOTCH-BRITE Scouring pads or Stainless scouring pads. Do not use ordinary steel wool.
Heat tint can be removed by a vigorous scouring in the direction of the polish lines using SCOTCH BRITE or STAINLESS scouring pads in conjunction with a powdered cleanser.

TROUBLE SHOOTING

Low air	(i) Improper exhaust fan rotation.
	(ii) Broken or slipping belt.
	(iii) Exhaust ductwork inspection door open.
	(iv) Obstruction in the ductwork.
No air	(i) Broken belt.
	(ii) Exhaust fan overload tripped.
	(iii) Exhaust fan disconnect open.
	(iv) Exhaust fan motor fuse blown.

HE- High Grease Extraction Efficiency Cascade Filtration

Cascade high efficiency hood filtration captures more grease than standard filters, reduce grease damage, the hassle and expense of duct cleaning, cost much less than other high performance filters, and have lower static pressure.

Cascade is 270% more efficient (at 8 microns capture) then standard filters and removes 33% more grease than standard filters. This will result in less grease build up in the ducts and exhaust fan.

The Cascade is environmentally friendly reducing air pollution and odors. It reduces duct cleaning cut down on caustic cleaning chemicals.
Environmentally Friendly

HE Cascade
Figure 17

Easy Cleaning

Remove the Cascade Module from the hood rack. Rotate the Locking Handles opposite the hinge on the Cascade to open the filter. Open the hinged Cascade and put it in the dishwasher or just spray the inner surfaces with hot water and detergent.

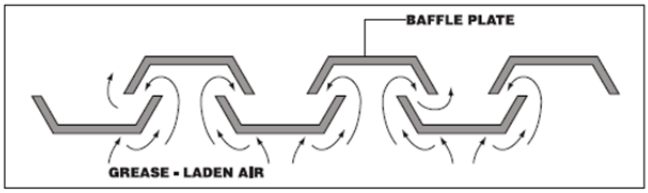
After cleaning just close the Cascade, lock the handles together and put them back in the hood filter rack.

Cascade's locking handles open up the hinged design, allowing wide-open cleaning access.

Cascade shown in the Open Position
Figure 18

EC- Easy Clean Teflon Filters for Heavy Grease Applications.

Grease laden air is drawn into the filter by the exhaust fan. As the air starts through the aerodynamic "V" baffle system, it undergoes a series of compressions, expansions and pressure changes. the heavy grease is deposited safely and quickly on the baffles while the grease-free air passes through the filter and up the exhaust duct. The baffle's smooth surface enables the collected grease to run off into collection troughs without dripping on food utensils or burner surfaces. the ChG.



EC – Easy Clean Teflon
Figure 19

Because Flame Gard® removes grease aerosols from the air stream and drain them away instead of retaining them. there is no build-up of grease in the path of the air Flame Gard® therefore, insures a constancy of air never before achievable with mesh-type filters.

Flame Gard's high rate of grease extraction is aided by our TEFLON® coated baffle. In the same manner that grease rolls off a TEFLON coated pan, it rolls down our baffles, out of the filter and into the hood's remote collection cup. Because FlameGard's filters retain only insignificant amounts of surface grease and do not load, you will have constancy of air flow throughout your operating day.

The FlameGard's filters can be easily cleaned in a pot sink or dishwasher with simple detergent and hot water.

SA- Spark Arrestor Filters for Solid Fuel Appliance.

CLASSIFIED BAFFLE GREASE FILTER MEETS NFPA 96 REQUIREMENT FOR COOKING WITH SOLID FUEL

SPARK ARRESTOR FRAME
The 3/8" X 1/2" SPARK ARRESTOR FRAME MEETS NFPA 211REQUIREMENT FOR SOLID FUEL BURNING APPLIANCES.
The filters are all steel construction, non-loading Teflon coated. If airborne sparks and embers can be generated by the solid fuel cooking operation, spark arrestor devices shall be used prior to the grease removal device to minimize the entrance of these sparks and embers into the grease removal device and into the hood and duct system.

SA- Spark Arrestor Filter
Figure 20

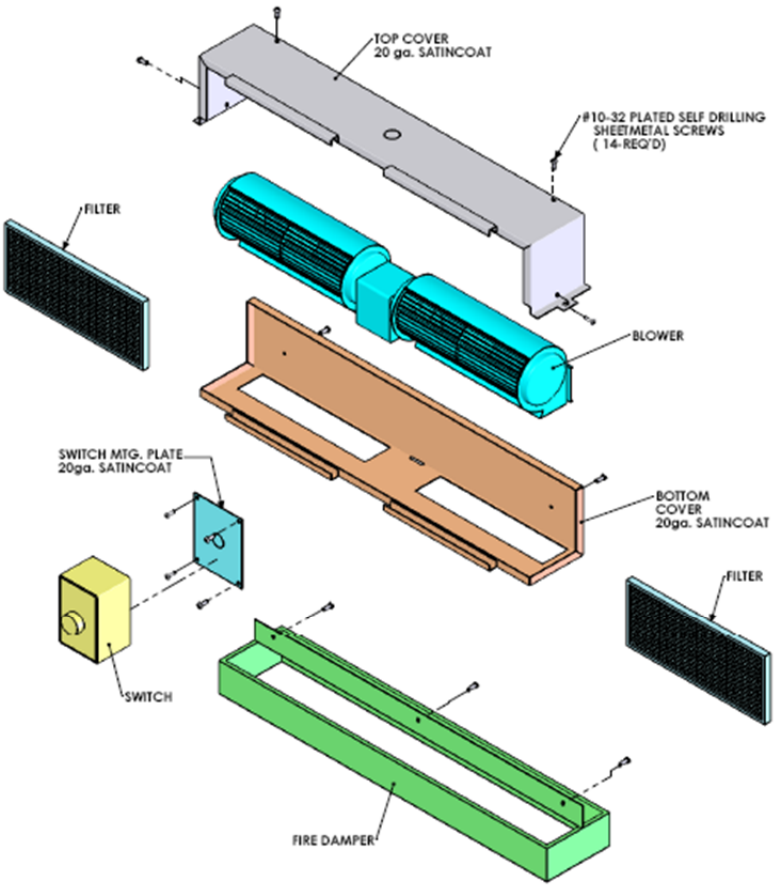
NFPA 211 CHAPTER 1.11.2 (B) STATES:
(b) The arrestor screen shall have heat and corrosion resistance equivalent to 19 gauge (0.011 in.) galvanized steel or 24 gauge (0.024 in.) stainless steel.
(c) Opening shall not permit the passage of spheres having a diameter larger than 1/2 in. (12.7mm) nor block the passage of spheres having a diameter of less than 3/8 in. (9.5mm).

94% EFFICIENT AT GREASE EXTRACTION!
FlameGard's high rate of grease extraction is aided by our TEFLON® coated baffle. In the same manner that grease rolls off a TEFLON coated pan, it rolls down our baffles, out of the filter and into the hood's remote collection cup. Because FlameGard's filters retain only insignificant amounts of surface grease and do not load, you will have constancy of air flow throughout your operating day. In addition,

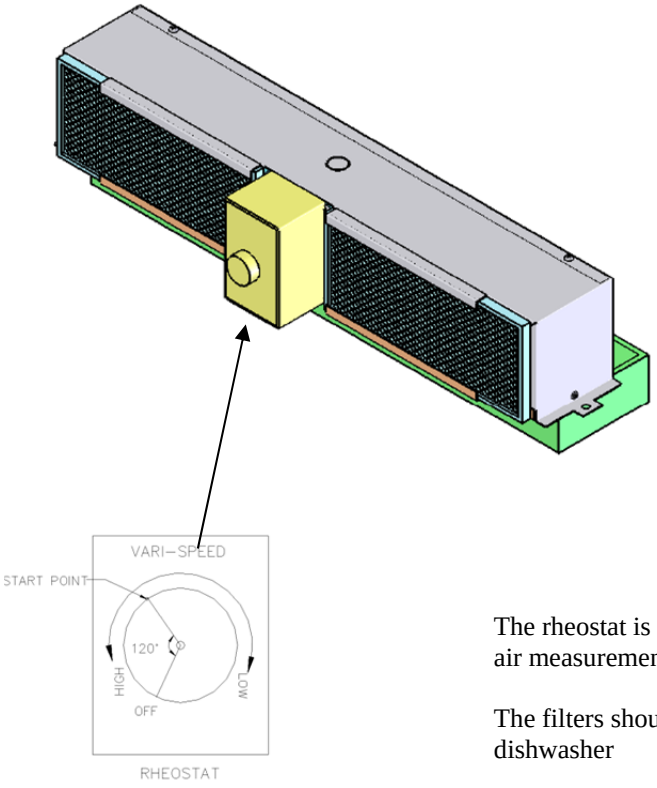
The Spark Arrestor FlameGard's filters must be washed daily to ensure proper operation of your hood filter assembly. They can be easily cleaned in a pot sink or dishwasher with simple detergent and hot water.

MJ- Blower Assembly on Dynaflow MJ hoods.

Every Dynaflow with MJ Perimeter Defense control has one or more MJ Blower assemblies mounted on the top of the MJ plenum. The MJ blower assembly consists of a double shafted 120V/1/60 AC motor with one tangential blower attached to each shaft. The motor/blower sub assembly is inside a protective housing to discharge the air down into the top of the MJ plenum. The MJ blower assembly has two (2) removable washable pre-filters, and a J-box with rheostat mounted on the switch MTG plate. The return air from above the hood enters the washable filters, travels through the tangential blowers and discharges into the MJ plenum through a fusible line fire damper. Each MJ Blower assembly is bolted to four (4) studs on the top of the hood. The fire damper is accessed by removing the 4 bolts and lifting the MJ blower off the hood to reveal the fusible link fire damper.



Exploded View of MJ Blower assembly
Figure 21



Complete MJ Blower assembly
Figure 22

The rheostat is used to adjust the air discharge from the MJ Grille. See the air measurement section of the manual for more detail.

The filters should be removed and wash every two years in a pot sink or dishwasher

Measuring Exhaust Air Flow with VE, HE, EC, and SA Filters

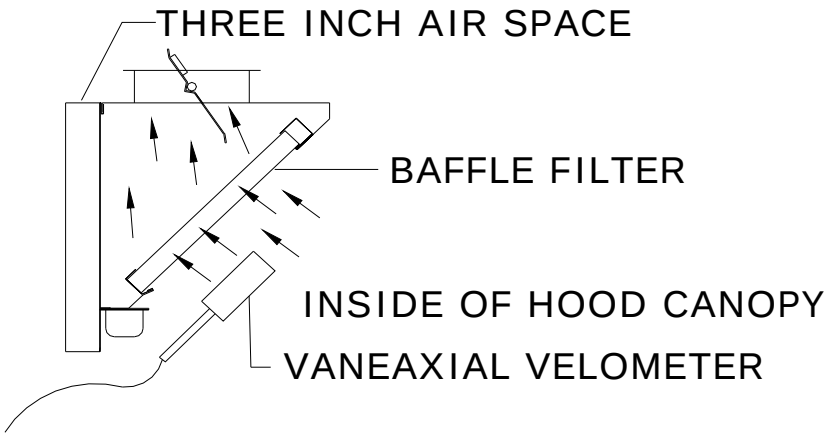
VE= standard grease extraction efficiency Stainless steel baffles.
HE= High grease extraction Efficiency Cascade baffles for Enviro applications and reducing grease discharge from buildings.
EC= Easy Clean Teflon – standard grease extraction efficiency baffles for hot, heavy grease laden appliances.
SA= Spark Arrestor – standard grease extraction efficiency, for solid fuel appliances.

Measuring Instruments:

VANAXIAL VELOMETER

Follow the instruments instruction manual to measure the exhaust volume at each filter. The instrument will either measure the total CFM or average velocity of each filter. Hold the instrument perpendicular to the face of each filter. The Velometer should be within 1" of the filter face for best results. Once the each filter average exhaust velocity has been measure use Chart No.1 to convert Average Filter Face Velocity to CFM.

The total exhaust volume is the sum total of each filter CFM.



Measuring baffle filter exhaust Air with Vanaxial velometer
Figure 24

Average Baffle Filter Face Velocity (fpm) vs. Exhaust Volume per filter (CFM)

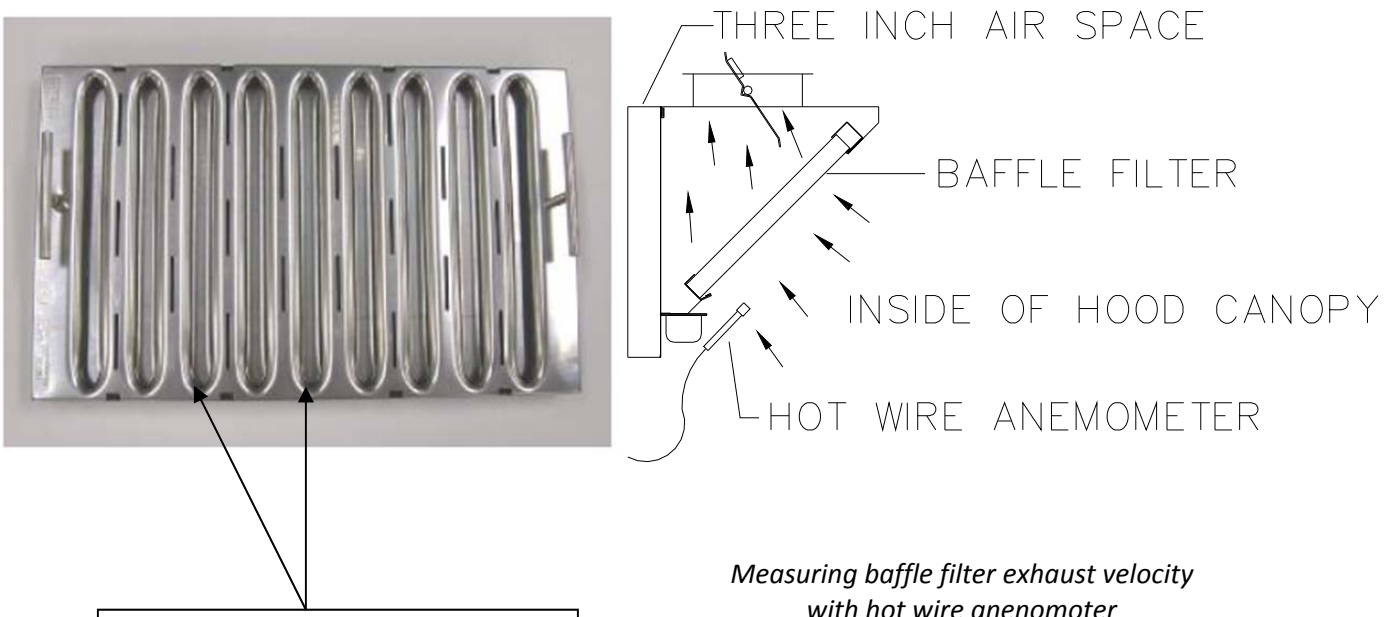
Baffle Filter		Average Filter Velocity					
Size		100 fpm/0.5m/s		200 fpm/1.0m/s		300 fpm/1.5 m/s	
in x in	mm x mm	CFM	l/s	CFM	l/s	CFM	l/s
16 x 16	406 x 406	160	75	320	151	480	226
20 x 16	508 x 406	200	94	400	189	600	283
20 x 20	508 x 508	260	123	520	245	780	368
20 x 25	508 x 635	320	151	640	302	960	453
Baffle Filter		Average Filter Velocity					
Size		400 fpm/0.5m/s		500 fpm/1.0m/s		600 fpm/1.5 m/s	
in x in	mm x mm	CFM	l/s	CFM	l/s	CFM	l/s
16 x 16	406 x 406	640	300	800	375	960	450
20 x 16	508 x 406	800	375	1000	470	1200	565
20 x 20	508 x 508	1040	490	1300	615	1560	740
20 x 25	508 x 635	1280	600	1600	755	1920	905

Chart No. 1

PITOT TUBE OR HOT WIRE ANEMOMETER

Spring Air Systems has factory calibrated the average filter slot velocity VS filter CFM. Measure the average bottom slot velocity of each filter and use Chart No. 2 to convert the slot velocity to total filter CFM.

Each filter has a series of open and closed slots across the face. Hold the instrument perpendicular to each open filter slot at the bottom of the filter. Place the hot wire anemometer directly in the filter slot. Take one reading at the bottom of each slot as shown in Figure 25 below. Calculate the average slot velocity for each filter. Refer to Chart No.2 below for the corresponding filter exhaust volumes. Sum each filter CFM to determine the total hood exhaust volume.



Measuring baffle filter exhaust velocity with hot wire anenomoter
Figure 25

VE/EC/SA STAINLESS STEEL FILTERS
Average Filter Slot Velocity vs. CFM per Filter

Filter Slot	**Filter Size VS CFM per Filter**			
Velocity	**16x16**	**20x16**	**20x20**	**20x25**
(fpm)	(CFM)	(CFM)	(CFM)	(CFM)
100	37	46	58	72
200	74	92	116	145
300	111	139	173	217
400	148	185	231	289
500	185	231	289	361
600	222	277	347	434
700	259	324	405	506
800	296	370	462	578
900	333	416	520	650
1000	370	462	578	723
1100	407	509	636	795
1200	444	555	694	867
1300	481	601	752	939
1400	518	647	809	1012
1500	555	694	867	1084
1600	592	740	925	1156
1700	629	786	983	1228
1800	666	832	1041	1301
1900	703	879	1098	1373
2000	740	925	1156	1445
2100	777	971	1214	1518
2200	814	1017	1272	1590
2300	851	1064	1330	1662
2400	888	1110	1387	1734
2500	925	1156	1445	1807
2600	962	1202	1503	1879
2700	999	1249	1561	1951
2800	1036	1295	1619	2023
2900	1073	1341	1676	2096
3000	1110	1387	1734	2168

Chart No. 2

HE STAINLESS STEEL FILTERS
Average Slot Velocity vs. CFM per Filter

Filter Slot	**Filter Size VS CFM per Filter**			
Velocity	**16x16**	**20x16**	**20x20**	**20x25**
(fpm)	(CFM)	(CFM)	(CFM)	(CFM)
100	44	55	68	86
200	88	109	137	171
300	131	164	205	257
400	175	219	274	342
500	219	274	342	428
600	263	328	411	513
700	307	383	479	599
800	350	438	547	684
900	394	493	616	770
1000	438	547	684	855
1100	482	602	753	941
1200	525	657	821	1026
1300	569	712	889	1112
1400	613	766	958	1197
1500	657	821	1026	1283
1600	701	876	1095	1368
1700	744	931	1163	1454
1800	788	985	1232	1540
1900	832	1040	1300	1625
2000	876	1095	1368	1711
2100	920	1149	1437	1796
2200	963	1204	1505	1882
2300	1007	1259	1574	1967
2400	1051	1314	1642	2053
2500	1095	1368	1711	2138
2600	1138	1423	1779	2224
2700	1182	1478	1847	2309
2800	1226	1533	1916	2395
2900	1270	1587	1984	2480
3000	1314	1642	2053	2566

Chart No. 3

Air Meter

Hold the probe so it is perpendicular to the throat opening and so the tip is about 30mm (3 inches) from the throat. Refer to Chart 1 to set Geo-Baffle.

Setting Air Baffle in Modular Grease Extractor

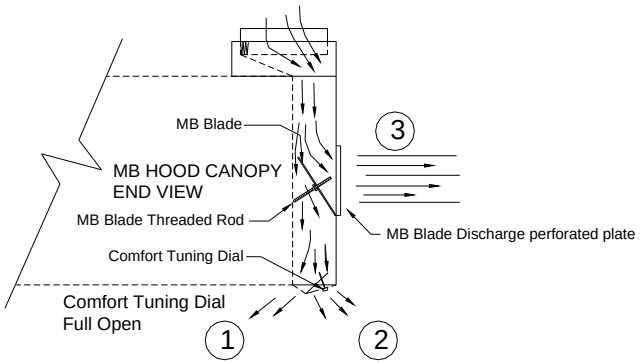
- Loosen the wing nut located in the module air inlet.
- Slide the Geo-Baffle up or down so the top of Geo-Baffle coincides with the number engraved on the side of the module.
- Tighten the wing nut located in the module air inlet.

SIZE 16" x 10" (400mm x 250mm)					SIZE 16" x 16" (400mm x 400mm)				
DAMPER POSITION	DAMPER OPENING HEIGHT		CFM PER MODULE	L/s PER MODULE	DAMPER POSITION	DAMPER OPENING HEIGHT		CFM PER MODULE	L/s PER MODULE
	inch	mm				inch	mm		
OPEN	3.625	92	200	94	OPEN	3.625	92	320	151
5	3.000	76	180	85	5	3.000	76	288	136
4	2.125	54	160	76	4	2.125	54	256	121
3	1.625	41	140	66	3	1.625	41	224	106
2	1.125	29	120	57	2	1.125	29	192	91
1	1.875	48	100	47	1	1.875	48	160	76
CLOSED	0.250	6	80	38	CLOSED	0.250	6	128	60

SIZE 20" x 20" (500mm x 500mm)					SIZE 20" x 25" (500mm x 635mm)				
DAMPER POSITION	DAMPER OPENING HEIGHT		CFM PER MODULE	L/s PER MODULE	DAMPER POSITION	DAMPER OPENING HEIGHT		CFM PER MODULE	L/s PER MODULE
	inch	mm				inch	mm		
OPEN	4.500	114	500	236	OPEN	4.500	114	625	295
5	3.750	95	450	212	5	3.750	95	563	266
4	3.000	76	400	189	4	3.000	76	500	236
3	2.250	57	350	165	3	2.250	57	438	207
2	1.500	38	300	142	2	1.500	38	375	177
1	0.750	19	250	118	1	0.750	19	313	148
CLOSED	0.250	6	200	94	CLOSED	0.250	6	250	118

Chart No. 4

Measuring Dynaflow MB Supply
Dynaflow type hood with Tri-Zone control System



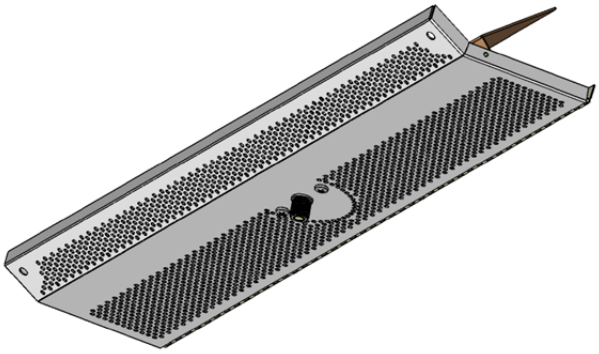
1 Appliance Region 2 Chef Region 3 Kitchen Ambient Region

Dynaflow MB Three Regions
Figure 28

Each of the three regions must be measured to ensure proper hood operation. The Appliance Region, the Chef Region and the Kitchen Ambient Region as shown in the schematic Figure 28

The Appliance region is measured first.

A. Measuring the Appliance Region

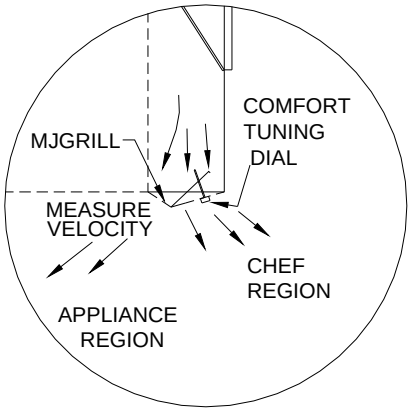


MJGrill Discharge
Figure 29

The Appliance Region and Chef Region discharge is called a MJGrill. The MJGrill is manufactured as a single component shown on the left in Figure 29. The MJGrill includes the Appliance Region discharge, Chef Region discharge, and a adjustable Comfort Tuning Dial. The Comfort Tuning Dial proportions the amount of fresh air to the Chef Region.

The Comfort Tuning Dial on the MJ Grill has two colored dots; red and blue. The Comfort Tuning Dial proportions the volume of air to the chef. Turning the Comfort Tuning Dial towards the red dot provides less air to the Chef Region and turning the Comfort Tuning Dial towards the blue dot provides more air to the Chef Region.

Comfort Tuning Dial
Figure 30



Measuring the Appliance Region
Figure 31

To measure the Appliance Region air velocity rotate the Comfort Tuning Dial towards the red dot, counterclockwise to shut off air to the Chef Region. Now measure the velocity from the MJGrill perforated discharge towards the inside of the hood in the Appliance Region. The measurement can be made with a Hot Wire Anemometer or Vane Axial Velometer. The required air velocity is indicated below in Chart No. 5."Hood Appliances VS Appliance Region Face Velocity"

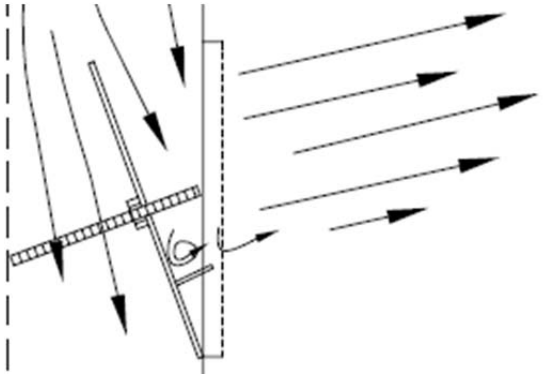
If the velocity is too high or low the MB Blade must be adjusted to increase or decrease the velocity to the Appliance Region.

Appliances Rating VS Appliance Region Face Velocity

Appliance Rating	Hood Length (ft)	Discharge Velocity (fpm)	
		FRONT	SIDE FLOW
		Set point	Set point
Heavy	9 - 14	500	450
	6 - 9	500	450
	4 - 6	550	450
	Up to 4	550	450
Medium/Light	9 - 14	450	400
	6 - 9	450	400
	4 - 6	450	450
	Up to 4	450	450

Chart No.5

B. Adjusting the MB Blade to change velocity at the appliance region.



Adjusting the MB Blade Threaded Rod
Figure 32

Open the MB Blade Face Discharge Grill on the front of the MB plenum located above the MJGrill that requires adjustment. The MB Blade perforated discharge grill is secured with four (4) Philips screws. Once the MB Blade discharge grill is removed in the center of the MB Blade is a threaded MB Blade adjustable Rod. To increase the velocity to the MJGrill below, rotate the threaded MB Blade Rod clockwise. To decrease the velocity to the MJGrill below, rotate the MB Blade Rod counter-clockwise. Measure the MJGrill discharge velocity after each adjustment until the correct velocity as indicated in Chart No. 5 "Hood Appliances VS Appliance Region Face Velocity is achieved.

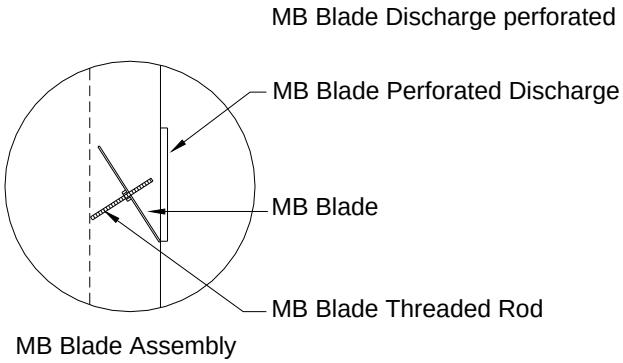
C. Adjusting the air velocity to the Chef Region

Comfort Tuning Dial
Figure 33

The amount of air directed to the Chef Region is a personal decision. When commissioning an MB hood system we recommend the following:

- *Heavy Appliances, Charbroilers, and Woks:* Rotate the Comfort Tuning Dial towards the blue dot to fully for maximum Chef Air.
- *Medium Appliances, Griddles, and Ranges*: Rotate the Comfort Tuning Dial towards the blue dot about three or four rotations clockwise.
- *Light Appliances, Ovens, and Kettles:* Rotate the Comfort Tuning Dial towards the red dot to fully close the air to the Chef Region.

D. Measuring the Supply Discharge velocity from the MB Blade



Measuring MB Blade Perforated Discharge
Figure 34

There are two sizes of MB Blade Discharge Grills.

MBFront41x06 with a perforated discharge dimension of 41.5" wide x 6" high. The face area is 1.38sq feet

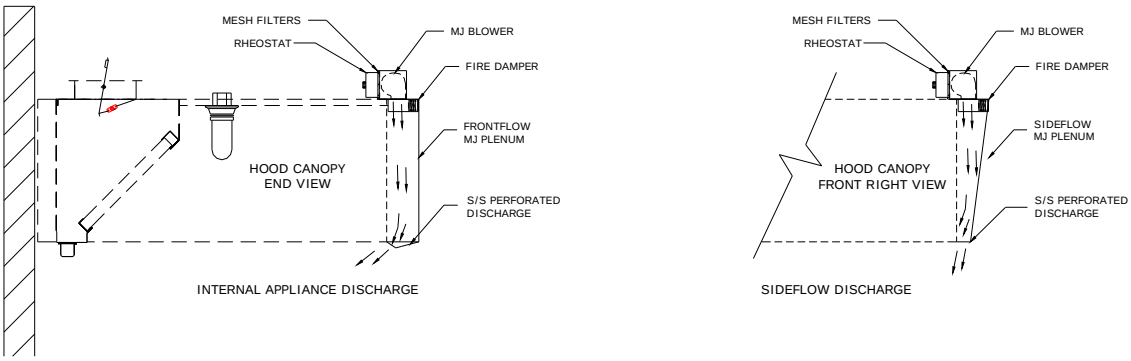
MBFront33x06 with a perforated discharge dimension of 33" wide x 6" high. The face area is 1.1 sq feet

When using a hot wire anemometer take 12 velocity readings at each discharge grill. Take 6 readings across the length and 2 rows. See Chart No. 6 "MB Face Velocity (fpm) VS MB Front volume (CFM)". below to convert the average velocity reading per grille to CFM.

MB Front Face Velocity (fpm) VS MB Front volume (CFM)

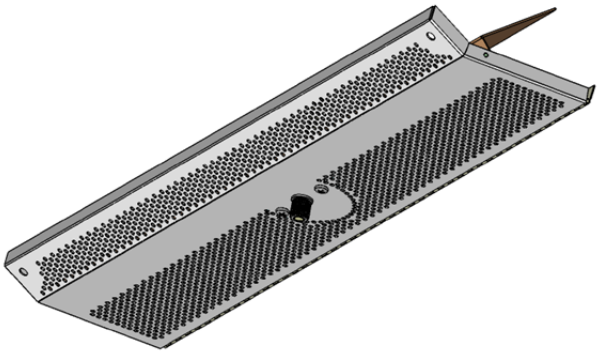
Average Face Velocity (fpm)	MBFront41x-6 (CFM)	MBFront33x06 (CFM)
50	69	55
75	104	83
100	138	110
125	173	138
150	207	165
175	242	193
200	276	220
225	311	248
250	345	275
275	380	303
300	414	330
325	449	358
350	483	385
375	518	413
400	552	440
425	587	468
450	621	495
475	656	523
500	690	550
525	725	578
550	759	605
600	828	660
625	863	688
650	897	715
675	932	743
700	966	770
725	1001	798

Chart No. 6



Measuring MJGrill Appliance Region
Figure 35

A. Measuring the Appliance Region

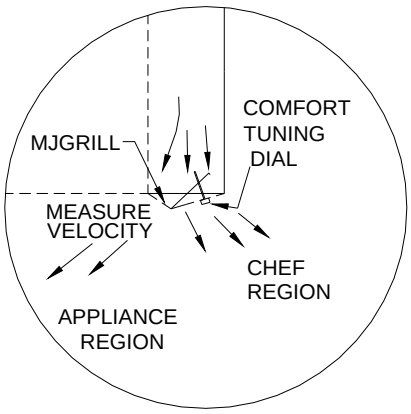


MJGrill with Comfort Tuning Dial
Figure 36

The Appliance Region and Chef Region discharge is called the MJGrill. The MJGrill is manufactured as a single component shown on the left in Figure 28. The MJGrill includes the Appliance Region discharge, Chef Region discharge, and a adjustable Comfort Tuning Dial. The Comfort Tuning Dial proportions the amount of air to the Chef Region.

The Comfort Tuning Dial on the MJ Grill has two colored dots; red and blue. The Comfort Tuning Dial proportions the volume of air to the chef. Turning the Comfort Tuning Dial towards the red dot provides less air to the Chef Region and turning the Comfort Tuning Dial towards the blue dot provides more air to the Chef Region.

Comfort Tuning Dial
Figure 37



Measuring the Appliance Region
Figure 38

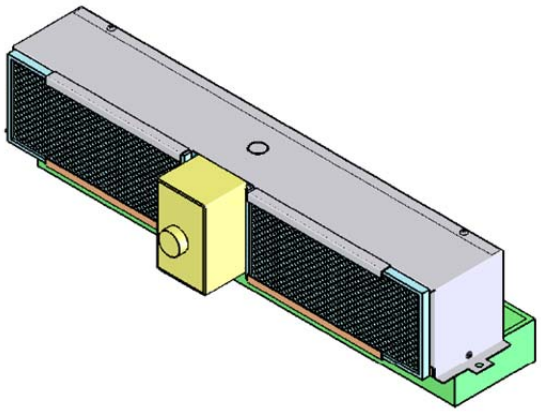
To measure the Appliance Region air velocity rotate the Comfort Tuning Dial towards the red dot, counterclockwise to shut off air to the Chef Region. Now measure the velocity from the MJGrill perforated discharge towards the inside of the hood in the Appliance Region. The measurement can be made with a Hot Wire Anemometer or Vane Axial Velometer. The required air velocity is indicated below in Chart No. 7 Hood Appliances VS Appliance Region Face Velocity. If the velocity is too high or low the MJ Blower must be adjusted to increase or decrease the velocity to the Appliance Region.

Appliances Rating vs. Appliance Region Face Velocity

Appliance Rating	Hood Length (ft)	Discharge Velocity (fpm)	
		FRONT	SIDE FLOW
		Set point	Set point
Heavy Appliances	9 - 14	500	450
	6 - 9	500	450
	4 - 6	550	450
	Up to 4	550	450
Medium and Light Appliances	9 - 14	450	400
	6 - 9	450	400
	4 - 6	450	450
	Up to 4	450	450

Chart No.7

B. Adjusting the MJ Blower to change the appliance region velocity



Adjusting the MB Blade Threaded Rod
Figure 39

The MJ blower assembly is located on top of the MJ plenum. Each hood has one or more MJ Blower assemblies. To adjust the air flow of the MJ blower rotate the rheostat in the middle of the MJ blower assembly. Rotating the knob clockwise increases the air flow and rotating the knob counter clockwise decreases the amount of air into the plenum. Adjust the know until the correct velocity is measured one the MJ Grill appliance discharge.

C. Adjusting the air velocity to the Chef Region

Comfort Tuning Dial
Figure 40

The amount of air directed to the Chef Region is a personal decision. When commissioning an MJ hood system we recommend the following:
Heavy Appliances, Charbroilers, and Woks: Rotate the Comfort Tuning Dial towards the blue dot three (3) rotations clockwise.
Medium Appliances, Griddles, and Ranges: Rotate the Comfort Tuning Dial towards the blue dot one (1) rotations clockwise.
Light Appliances, Ovens, and Kettles: Rotate the Comfort Tuning Dial towards the red dot to fully close the air to the Chef Region.

NOTE: Check to make sure that the Appliance Region velocity does not decrease below the required velocity after adjusting the Chef Region air with Comfort Tuning Dial.

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