



REV-LOW
ENGINEERING MANUAL

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REV-LOW Engineering Manual

Introduction

Spring Air Systems Inc. commercial REV LOW hoods have been designed and constructed in accordance with the National Building Code, the National Fire Protection Association (NFPA-96) and listed by Underwriters Laboratories of Canada. In addition the Spring Air Systems REV LOW hoods meet all provincial and municipal code requirements.

The Spring Air Systems REV LOW hood is fabricated from stainless steel with No. 4 finish on all exposed surfaces. All edges are ground and polished. All hoods are manufactured to stringent quality standards and are guaranteed to enhance the appearance of any commercial kitchen.

What is a REV LOW hood?

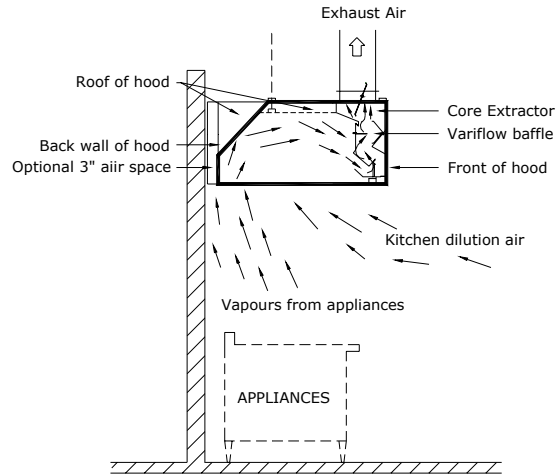
The REV LOW hood is a revolutionary idea in commercial kitchen ventilator design. REV LOW allows the exhaust flow to be field adjusted from 90 cfm/ft to 450 cfm/ft over each appliance without effecting the overall efficiency of the grease extractor. Your kitchen will exhaust the lowest minimum required to ventilate the appliances located under the hood. After your kitchen is complete, appliances can be relocated, added, or removed from under the hood! It's a simple adjustment to fine tune your ventilator to provide excellent smoke capture with maximum grease extraction. The REV LOW hood is available in two types; a water wash and dry grease extractor. The water wash hood is automatically cleaned in place at the end of each cooking day. The REV LOW dry extractor is manually cleaned. The dry extractor has inserts that are removed daily and washed in your dishwasher or pot sink.

Why REV-LOW?

- REV-LOW** VALUABLE FUEL DOLLAR SAVINGS:
minimizes the total exhaust by adjusting the REV-LOW hood to suit individual appliances.
- REV-LOW** CLEANER DUCTWORK:
maximizes your extraction at all exhaust airflows to capture more grease in hood. It's not a filter hood!
- REV-LOW** FLEXIBILITY:
add, remove or move appliances anytime. VARIFLOW baffles are easily adjusted without special tools to balance any cooking bank.
- REV-LOW** MULTIPLE HOOD BALANCING:
Multiple hoods connected to a single exhaust fan can be easily balanced.

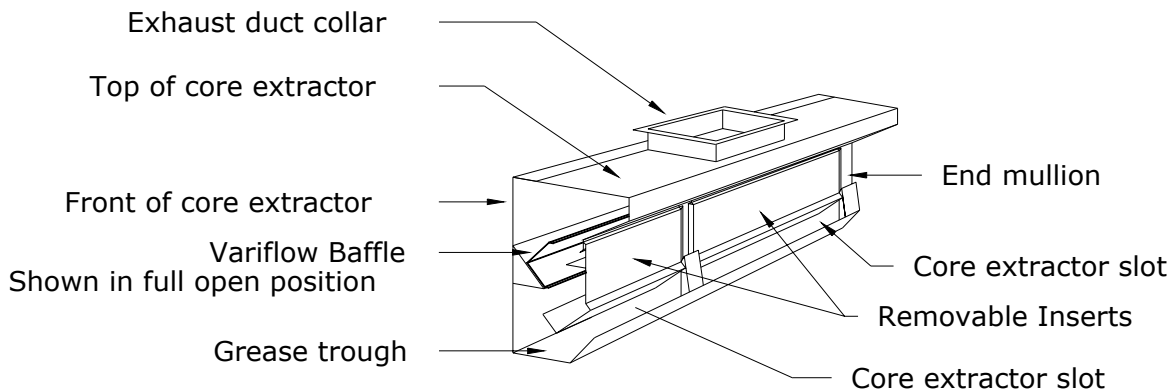
Operation

A commercial kitchen cooking line consists of many different appliances depending on the type of restaurant or institution. In every commercial kitchen the cooking vapours which comprise of grease, smoke, and products of combustion rise off the cooking surface. Natural convection forces drive the cooking vapours up towards the back wall as shown in figure 1 below. The kitchen dilution air is entrained into the cooking vapours and the air mixture generally follows the profile of the back and top of the hood. The mixture of grease, smoke, products of combustion, lint, dirt and kitchen dilution air proceed along the roof of the hood and follow a path down towards the core extractor slot (the core extractor slot extends along the length of the hood). Most of the air mixture enters the slot and a small amount rolls back into the hood canopy to meet the main air stream again.



The *REV LOW Hood Model DD-B-F*
Figure 1

Optimizing the amount of air mixture that enters the core extractor slot is the key to the *REV LOW* system. The *REV LOW* hood must incrementally maximize the amount of the air mixture that enters the slot and minimize the amount of roll back into the canopy as the total amount of the air mixture deviates along the length of the cooking lineup.

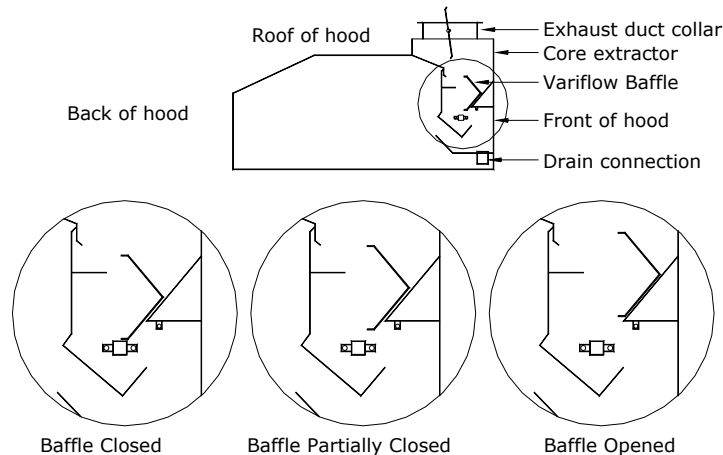


Section View of Core Extractor for *DD-B-F REV LOW Hood*
Figure 2

The *REV LOW* accomplishes this complicated process with a unique core extractor profile that contains a series of specially designed *VARIFLOW* baffles located along length of the core extractor. See Figure 2 above. The *VARIFLOW* baffles are adjusted prior to shipment to allow the optimum amount of the air mixture to enter the core extractor slot and thereby minimize roll back into the hood canopy. For instance the *VARIFLOW* baffles located above a charbroiler are opened to the maximum 450 CFM/ft position and the *VARIFLOW* baffles located above ovens or steamers are closed to the minimum 90 CFM/ft position. This variable adjustment along the length of each hood provides an exhaust system that truly minimizes the amount of exhaust air to properly ventilate any kitchen line up.

VARIFLOW Baffles

The most important component for the successful operation of a *REV LOW* hood is the core extractor that contains the *VARIFLOW* baffles. The core extractor profile has been designed to facilitate the smooth flow of cooking vapours and dilution air from the roof of the hood, down along the front of the core extractor and into the core extractor slot. The *VARIFLOW* baffles are located inside the core extractor along the entire length. The *VARIFLOW* baffles are adjustable to provide between a 90 CFM/ft to 450 CFM/ft flow rate into the core extractor slot. The *VARIFLOW* baffles are adjustable without any special tools by lifting off the core extractor removable insert and hand adjusting the position of the baffle. Just set the position of the *VARIFLOW* baffle to match the appliance located below. See Figure 3 for isometric view of



VARIFLOW baffles.

Section View of *REV LOW* Water Wash Hood with Detail of Variflow Baffle
Figure 3

Benefits

A *Spring Air Systems Inc. REV LOW* Hood system provides numerous benefits to the owners/operator of a commercial or institutional restaurant.

1. More comfortable kitchen environment.
2. Lower annual heating cost with little or no capital cost increase.
3. Lower annual air conditioning costs and possible reduced capital cost for air conditioning equipment.

More Comfortable Kitchen Environment

The *Spring Air REV LOW Hood System* provides excellent smoke capture using the absolute minimum net exhaust air from the restaurant. The system can be interlocked with the kitchen makeup air unit and the building air conditioning units to energize the economizers and provide a balanced supply and exhaust system. Reduced drafts will provide more comfortable temperatures throughout the kitchen.

Low Heating Costs

The *Spring Air REV LOW Hood System* is designed to minimize the net exhaust air from the building. Less net exhaust means less heating of fresh air or supply air into the building.

Lower Air Conditioning Costs

The *Spring Air REV LOW Hood System* is designed to minimize the amount of conditioned supply air required in the store. By reducing the conditioned air into the store, the required air conditioning load is reduced and the air conditioning operating cost will consequently decrease.

Model Number Designation

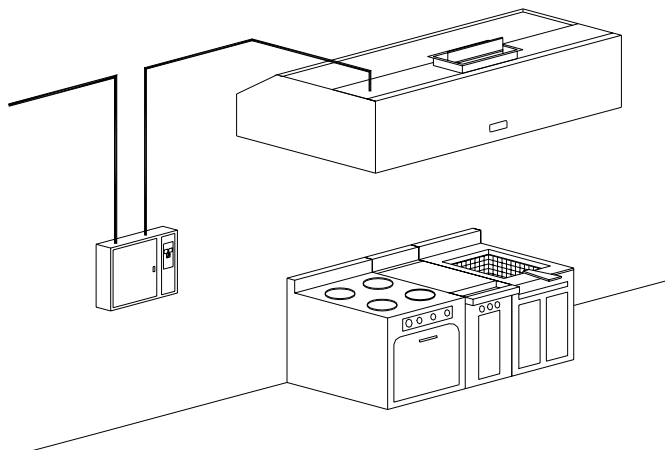
The Spring Air Systems *REV LOW* Hood is available in three basic types

1. Continuous cold water spray/hot water wash - "C"
2. Hot water wash - "H"
3. Dry Ventilator - "D"

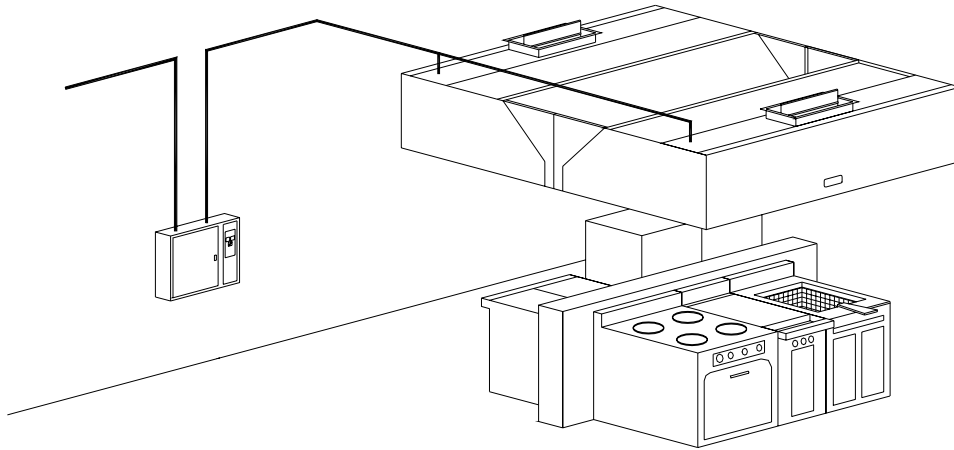
Each type of hood provides varying degrees of grease extraction efficiency, automatic/manual wash, and exhaust fire dampers. For a more detailed description of the types of hood exhaust fire dampers and wash systems refer to the Spring Air Systems "Ventilator Engineering Manual".

Model No.	Description
DD-B-F	Single row box canopy, dry extractor with fusible link dead weight fire damper
CD-B-F	Single row box canopy, continuous cold water spray/hot water wash ventilator with fusible link dead weight fire damper
CF-B-F	Single row box canopy, continuous cold water spray/hot water wash ventilator with fusible link spring loaded fire damper
CT-B-F	Single row box canopy, continuous cold water spray/hot water wash ventilator with thermostatic activated spring loaded fire damper
HD-B-F	Single row box canopy, hot water wash ventilator with fusible link dead weight fire damper
HF-B-F	Single row box canopy, hot water wash ventilator with fusible link spring loaded fire damper
HT-B-F	Single row box canopy, hot water wash ventilator with thermostatic activated spring loaded fire damper
DD-BI	Island box canopy, dry extractor with fusible link dead weight fire damper, installed back to back with another Rev-Low hood
CD-BI	Island box canopy, continuous cold water spray/hot water wash ventilator with fusible link dead weight fire damper, installed back to back with another Rev-Low hood
CF-B-FI	Island box canopy, continuous cold water spray/hot water wash ventilator with fusible link spring loaded fire damper, installed back to back with another Rev-Low hood
CT-B-FI	Island box canopy, continuous cold water spray/hot water wash ventilator with thermostatic activated spring loaded fire damper, installed back to back with another Rev-Low hood
HD-BI	Island box canopy, hot water wash ventilator with fusible link dead weight fire damper, installed back to back with another Rev-Low hood
HF-B-FI	Island box canopy, hot water wash ventilator with fusible link spring loaded fire damper, installed back to back with another Rev-Low hood
HT-B-FI	Island box canopy, hot water wash ventilator with thermostatic activated spring loaded fire damper, installed back to back with another Rev-Low hood

Chart No. 1



*Typical Water Wash Application Single Row Wall Mounted Rev-Low
Model HD-B-F
Figure 4a*



*Typical Water Wash Application Island Rev-Low
Two Model HD-BI
Figure 4b*

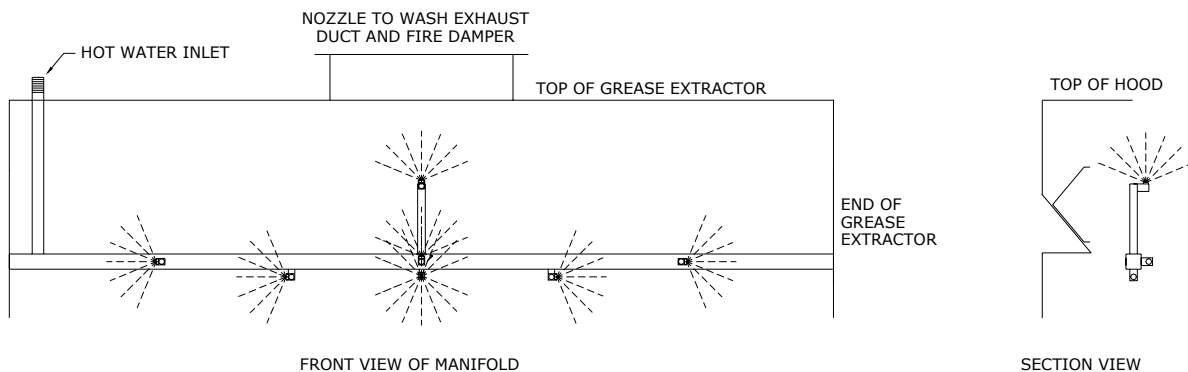
The type “H” and “C” ventilators require a water wash control panel. Consult the “Ventilator Engineering Manual” or individual water wash panel specification sheets for the proper water wash control panel. The water wash control panel is supplied to provide operation of the exhaust fan, supply unit (Spring Air SFA series), time wash cycle, fire suppression system.

Water Wash *REV LOW* Hoods

Automatic Wash: Type “C” and “H:” Ventilators

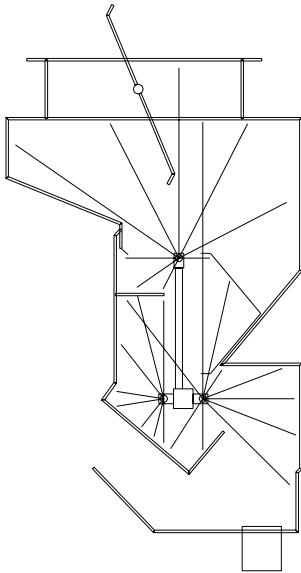
SPRING AIR SYSTEMS ventilators are available with either automatic or manual wash systems. All water wash ventilators must be interconnected with a water wash control panel.

The “C” and “H” ventilators have incorporated a water wash manifold into the high efficiency extractor. Spray nozzles are spaced evenly along the wash manifolds. The hot detergent-water



*Water wash Manifold
Figure 5*

mixture enters the hot water inlet pipe, and travels into the interconnecting pipe to the MANIFOLD E. The water detergent mixture is sprayed uniformly within the interior of the extractor.



The water/detergent mixture washes the grease, lint and dirt into the sloping VORTEX BAFFLE that carries the mixture to the end of the ventilator and into the grease trough.

The mixture travels along the grease trough to the drain. The drain may be located at either end of the ventilator. Multiple ventilators may have individual drains factory manifolds to one common drain. The wash time is adjustable from 0 to 10 minutes. The type "C" is normally set at 2 minutes while the type "H" is set at 3 minutes. Depending on the type of cooking equipment the type "C" usually requires less hot water wash time because of the continuous cold water spray. During fan and cooking operation, the spray continuously carries grease, dirt and lint down the drain which reduces the daily grease build-up.

The hot water required is approximately .9 gpm/ft. of ventilator at 40 psig (see Chart No.2). The cold water continuous spray requires approximately 1.0 gph/ft. of ventilator at 15 psig (see Chart No.3)

Type "C" and "H" Wash
Figure 6

Hot Water Flow Required Model

Ventilator Length		Hot Water Flow USGPM @ 40 psi	Hot Water Flow USGPM @ 60 psi	Hot Water Flow l/s @ 2.76Kpa	Hot Water Flow l/s @413 Kpa
ft	mm				
3.0	914	2.4	2.8	0.14	0.17
3.5	1067	3.1	3.8	0.19	0.23
4.0	1279	3.1	3.8	0.19	0.23
4.5	1372	3.1	3.8	0.19	0.23
5.0	1524	3.1	3.8	0.19	0.23
5.5	1676	3.7	4.5	0.22	0.27
6.0	1829	3.7	4.5	0.22	0.27
6.5	1981	4.3	5.3	0.26	0.32
7.0	2131	4.3	5.3	0.26	0.32
7.5	2286	4.9	6.0	0.30	0.36
8.0	2438	4.9	6.0	0.30	0.36
8.5	2591	5.5	6.7	0.33	0.41
9.0	2743	5.5	6.7	0.33	0.41
9.5	2896	6.7	8.2	0.41	0.50
10.0	3048	6.7	8.2	0.41	0.50
10.5	3200	7.3	8.9	0.44	0.54
11.0	3353	7.3	8.9	0.44	0.54
11.5	3505	7.9	9.7	0.48	0.59
12.0	3658	7.9	9.7	0.48	0.59
12.5	3810	8.5	10.4	0.52	0.63
13.0	3962	8.5	10.4	0.56	0.63
13.5	4115	9.2	11.3	0.56	0.69
14.0	4207	9.2	11.3	0.56	0.69
14.5	4420	9.8	12.0	0.60	0.73
15.0	4772	9.8	12.0	0.60	0.73

Chart No.2

Cold Water Flow Required Model B

Ventilator Length		Cold Water Flow USGPM @ 20 psi	Cold Water Flow l/s @ 138 Kpa	Ventilator Length		Cold Water Flow USGPM @ 20 psi	Cold Water Flow l/s @ 138 Kpa
feet	mm			feet	mm		
3.0	914	0.35	0.02	9.5	2896	0.91	0.05
3.5	1067	0.35	0.02	10.0	3048	0.98	0.06
4.0	1279	0.42	0.02	10.5	3200	1.05	0.06
4.5	1372	0.49	0.03	11.0	3353	1.05	0.06
5.0	1524	0.49	0.03	11.5	3505	1.12	0.07
5.5	1676	0.56	0.03	12.0	3658	1.19	0.07
6.0	1829	0.63	0.04	12.5	3810	1.19	0.07
6.5	1981	0.63	0.04	13.0	3962	1.26	0.08
7.0	2131	0.70	0.04	13.5	4115	1.33	0.08
7.5	2286	0.77	0.05	14.0	4207	1.33	0.08
8.0	2438	0.77	0.05	14.5	4420	1.40	0.08
8.5	2591	0.84	0.05	15.0	4772	1.47	0.09
9.0	2743	0.91	0.05				

Chart No. 3

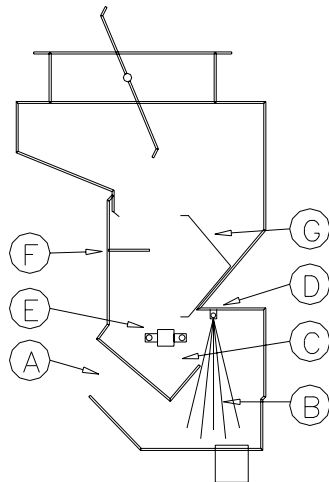
NOTES:

- a) All types "C" and "H" water wash ventilators have 3/4" (19 mm) hot water connections.
- b) Hot water pressure required is 40 to 60 psi (276 to 413 Kpa).
- c) Hot water temperature required is 120F to 180F (49 to 82C).
- d) All type "C" ventilators have 1/2" (13 mm) cold water inlet connection.
- e) All drain connections are 2" (52 mm) diameter and recommended piped to an open hub drain.

Water Wash REV LOW Hoods

TYPE "C" Core Extractors - Water Wash

The SPRING AIR SYSTEMS type "C" core extractor has the highest grease extraction efficiency available in a water wash ventilator.



*Type "C" Extractor
Figure 7*

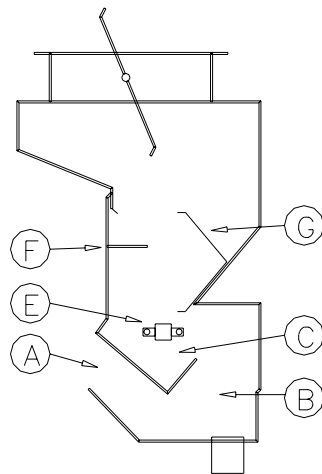
The contaminated exhaust air enters the extractor slot A and flows through a transition zone to the VORTEX CHAMBER B. The cold water spray manifold D sprays a fine cold water mist into the path of the exhaust air. The cold water spray causes the grease particles to cool, congeal and coagulate forming larger grease globules. The larger heavier globules are more readily removed through centrifugal force as the exhaust air accelerates through a complete 270 degree turn around the VORTEX BAFFLE C. The grease, dirt and lint are deposited on the VARIFLOW BAFFLE G and the VORTEX BAFFLE C. The VARIFLOW BAFFLE D is also adjustable along the length of the grease extractor to provide varying exhaust airflows. The sloping VORTEX BAFFLE C drains the collected grease to the end of the ventilator into a grease trough.

The cold water spray extends from the entrance to the exit of the VORTEX CHAMBER B which provides a secondary coverage as the exhaust air enters the secondary grease extraction chamber. The exhaust air continues into the secondary extraction chamber which contains an additional baffle, F. Residual grease is deposited on the secondary baffle as the exhaust air

gyrates through the secondary chamber. After leaving the secondary chamber the exhaust air enters the ventilator fire damper and duct collar and discharges into the ductwork.

TYPE "H" Core Extractors - Water Wash

The SPRING AIR SYSTEMS type "H" core extractor is a high efficiency water wash grease extractor.



Type "H" Extractor
Figure 8

The contaminated air enters the extractor slot A and flows through the transition zone to the VORTEX CHAMBER B. The exhaust air accelerates through a complete 270 degree turn around the VORTEX BAFFLE C. Centrifugal force causes the grease, dirt and lint particles to deposit on the PRIMARY VARIABLE FLOW BAFFLE G and the VORTEX BAFFLE C. The *VARIFLOW* BAFFLE D adjustable for varying exhaust flows along the length of the extractor. The sloping VORTEX BAFFLE C drains the collected liquid grease to the end of the ventilator and into the grease trough.

The exhaust air continues into the secondary extraction chamber which contains an additional baffle, F. Residual grease is deposited on the secondary baffle as the exhaust air gyrates through the secondary chamber. After leaving the secondary chamber the exhaust air enters the ventilator fire damper and duct collar and discharges into the exhaust ductwork.

Hood and Damper Assemblies

THE SURFACE FIRE SUPPRESSION SYSTEM is always installed in commercial kitchens. They are required by national and local code. The surface fire suppression system is a wet chemical or a water sprinkler system. In the event of a fire on the cooking surface electric thermostat or fusible links activates the system. These systems must be UL/ULC listed.

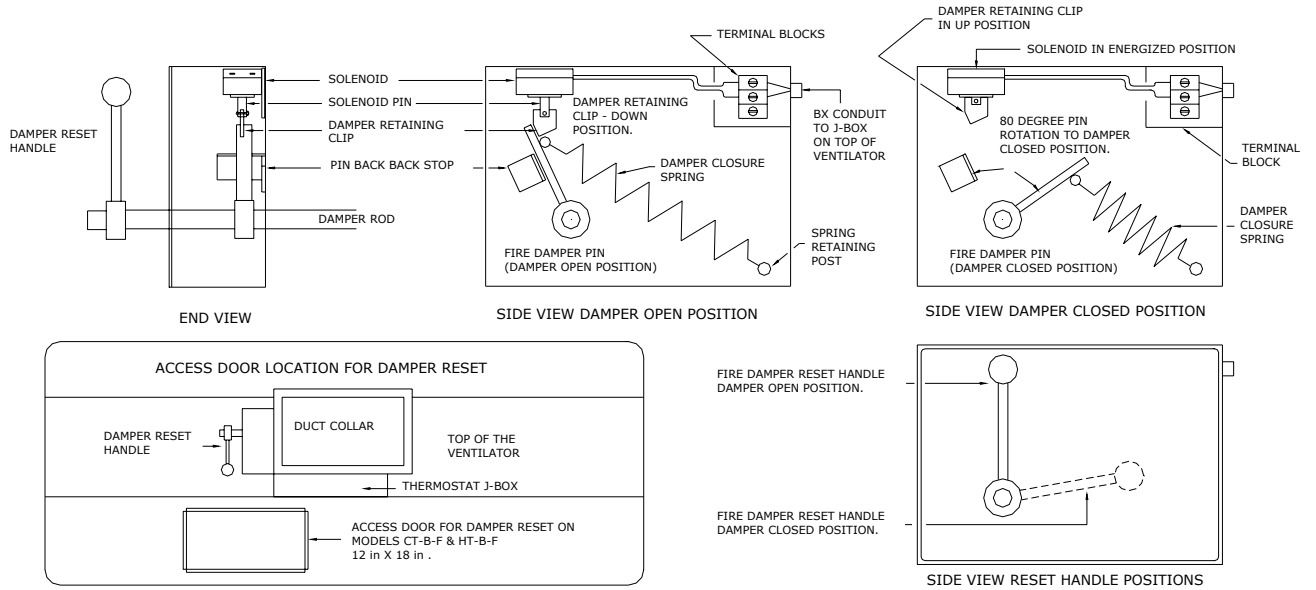
NOTE: The exhaust fan should remain on after a surface fire suppression system has activated.

A properly designed hood and damper assembly is UL/ULC listed to impede the spread of fire from the kitchen hood into the exhaust duct. The UL/ULC listed hood and damper assembly is an important part of the kitchen ventilation system.

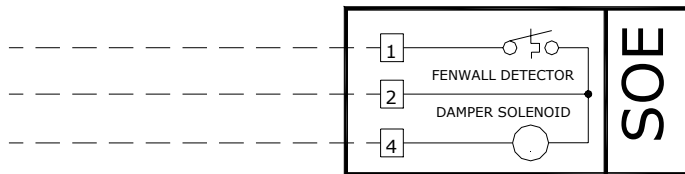
SPRING AIR SYSTEMS has three (3) arrangements of hood and damper assemblies available, arrangement "T", "F", and "D", thermostatic or fusible link activated systems respectively.

Arrangement "T" : Thermostat Activated

The arrangement "T" hood and fire damper assembly consists of a thermostatically activated spring loaded fire damper electrically connected to the water wash control panel by three wires.



Arrangement "T" Fire Damper SOE Enclosure
Figure 9



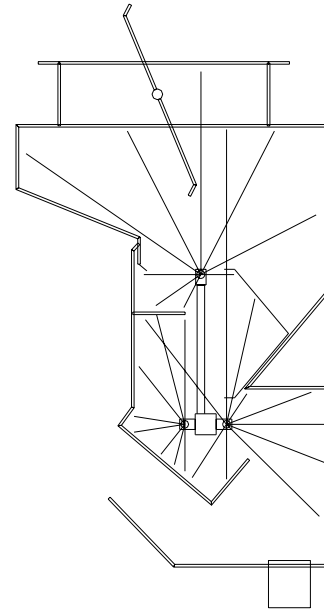
ARRANGEMENT "T" FIRE DAMPER:
 THREE (3) WIRES TO EACH SOE ENCLOSURE LOCATED
 AT EACH EXHAUST DUCT COLLAR ON EVERY HOOD
 120V/1/60 - 3 AMPS - WIRE EACH SOE IN PARALLEL.

"T" Electrical Wiring at SOE Enclosure
Figure 10

In the event of a fire within the core extractor the thermostat will activate at 360F (182C). The thermostat energizes a solenoid which pulls the fire damper pin releasing the fire damper. The spring loaded fire damper closes tight against the blade stops.

As the fire damper shuts an electric signal is sent to the water wash control panel. Once the signal reaches the water wash control panel the exhaust fan shuts off, shunt trip contacts close, and the hot water solenoid valve energizes to flood the interior of the grease extractor. The hot water spray and closed fire damper provide an effective fire barrier to impede the spread of fire into the exhaust duct work.

After the fire has been extinguished, the fire damper is manually reset by rotating a lever on the outside of the SOE, FIRE DAMPER JUNCTION BOX.



Arrangement "T" & "F" Activated
Figure 11

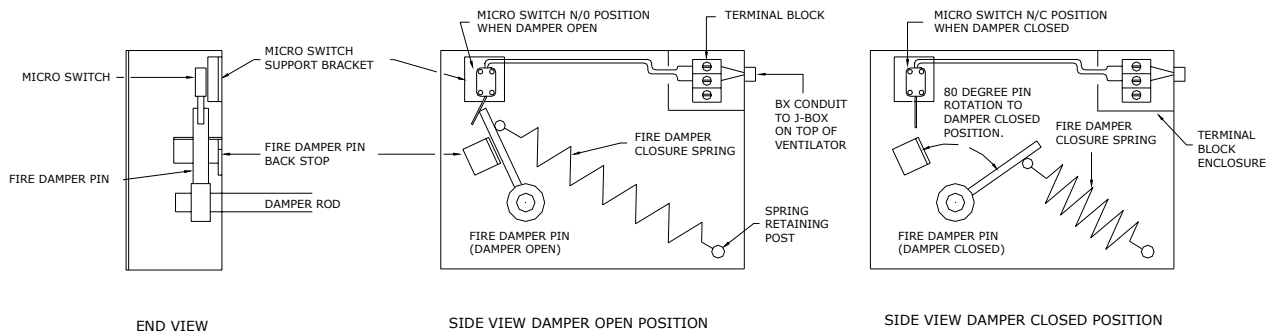
The arrangement "T" has three advantages:

1. The damper is spring loaded to provide a positive closure and seal when closed.
2. The thermostat set at 360F (182C) responds quickly to activate the spring in the event of a fire.
3. The fire damper can be periodically tested by pushing the fire test button in the control panel. The damper will activate as if in a fire condition and can be manually reset.

Arrangement "F": Fusible Link Activated, Spring Loaded.

The arrangement "F" hood and fire damper assembly consists of a fusible link fire damper and a damper end switch interlocked electrically to the water wash control panel with two wires.

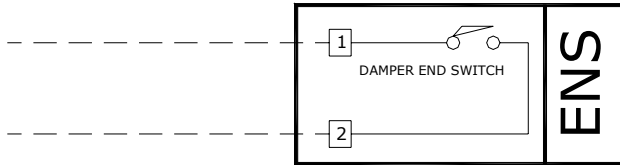
In the event of a fire within the core extractors, the fusible link melts, closing the fire damper against the force of a spring. When the fire damper completely closes, the microswitch is activated and an electrical signal is sent to the water wash control panel.



Arrangement "F" Fire Damper
Figure 12

When the signal reaches the control panel the exhaust fan is shut off, the building fire alarm contact close and the hot water solenoid valve is energized, flooding the interior of the grease extractor with water. The water spray and closed fire damper provide an effective barrier to impede the spread of fire into the exhaust duct work.

After the fire has been extinguished, the fire damper must be reset. Open the front access door of the grease extractor and replace the fusible link.



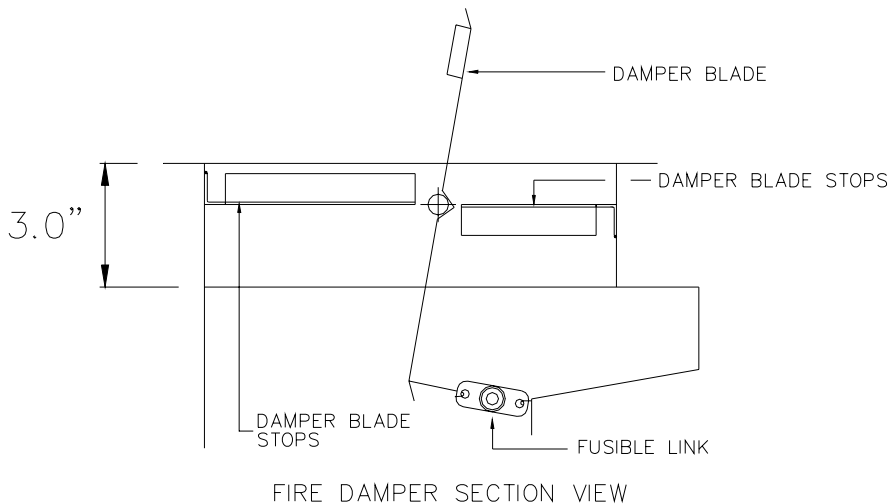
ARRANGEMENT "F" FIRE DAMPERS:
TWO (2) WIRES TO EACH ENS ENCLOSURE LOCATED AT EACH EXHAUST DUCT COLLAR ON EVERY HOOD 120V/1/60 - 1 AMPS. WIRE EACH ENS IN PARALLEL.

*Arrangement "F" Fire Damper ENS Enclosure
Figure 13*

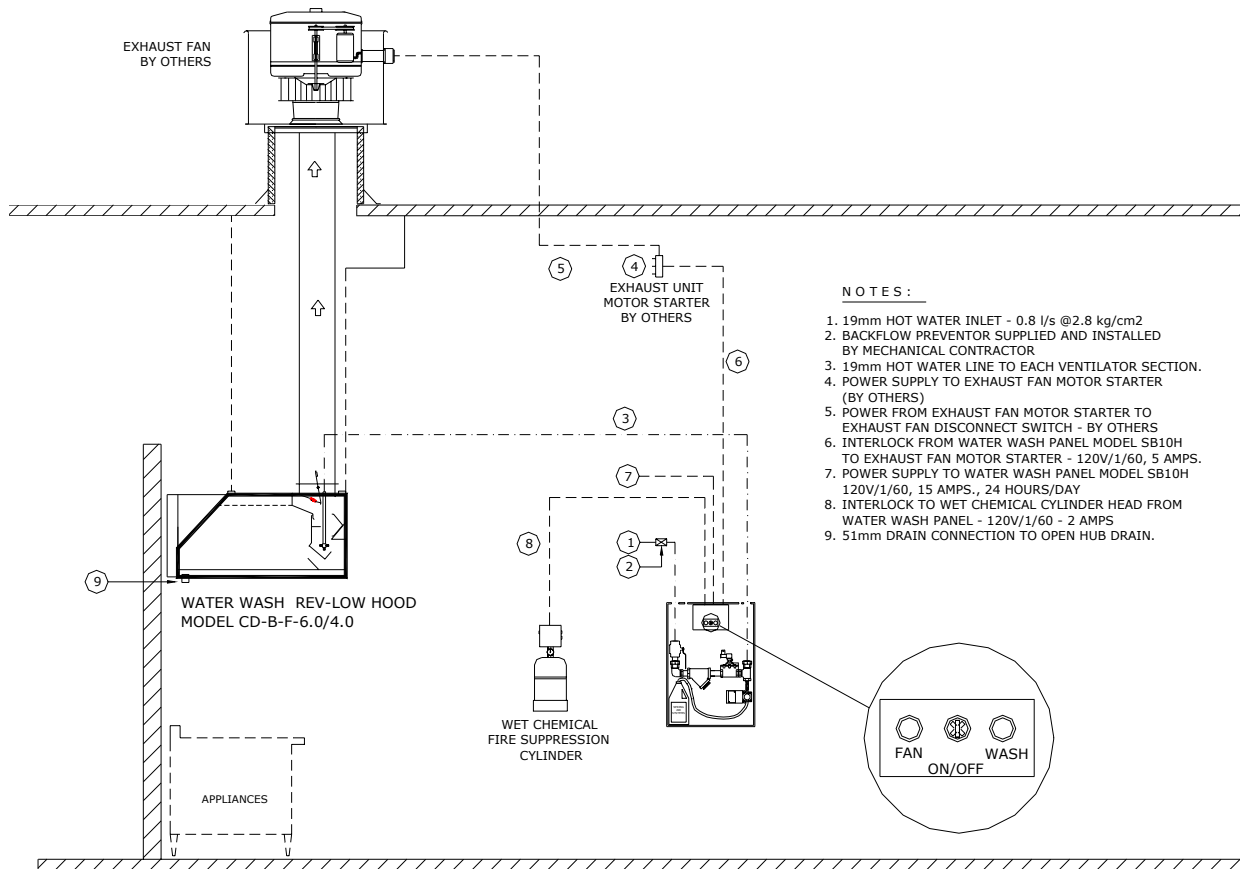
Arrangement "D": Fusible Link Activated, Dead Weight.

The arrangement "D" hood and damper assembly system consists of a fusible link damper mounted in the exhaust duct collar.

In the event of a fire within the grease extractor the fusible link melts closing the fire damper against the force of a dead weight mounted on the damper blade. The closed damper impedes the spread of fire into the exhaust ductwork. After the fire has been extinguished the fire damper must be reset. To reset the fire damper the fusible link is replaced. Open the access door on the front of the ventilator. Pull the fire damper open and replace the fusible link to secure the damper in place. The fusible link should be examined periodically in accordance with the NFPA-96 (SPRING AIR SYSTEMS recommends inspection every six months.)



*Arrangement "D" Fire Damper cross Section
Figure 13B*



Typical Water Wash Rev-Low Schematic
Figure 14

Figure 14 above shows a water wash Rev-low field piping and wiring schematic. The hood is a HD-B; a hot water wash hood with a dead weight fusible link fire damper. The water wash panel is mounted about 42" (1067 mm) off the finished floor. A water line from a hot water tank is connected to the inlet of the water wash panel. An interconnecting water line is piped from the outlet of the wash panel to the 3/4" (19 mm) inlet of the Rev-low hood. A 2" (52 mm) drain on the hood is connected to an open hub drain and then to a grease interceptor. The panel is powered by 120V/1/60 - 15 amp service. Interconnecting wiring includes power to the remote motor starter, interlock to the wet chemical cylinder head, and optional power to the supply fan and supply fresh air damper. All control wiring is 120V/1/60.

The water wash hood washes in place at the end of each cooking day. For more detail information covering the water wash control panels available please refer to the Spring Air Systems "Ventilator Engineering Manual" or the individual water wash panel specification sheets.

Dry REV LOW Hoods - DD-B-F

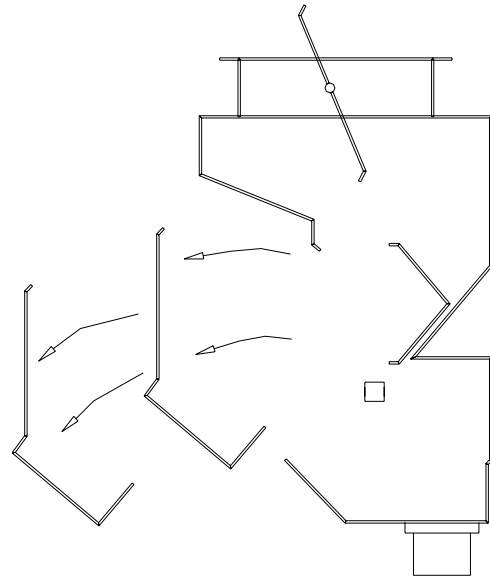
Manual Wash: Type “D” Ventilator

The type “D” incorporates a core extractor similar to type “H” but without the wash manifolds. The type “D” is recommended for light to medium cooking applications where grease is minimal.

The liquefied grease collects on internal baffles as described in the “Grease Extractor” section of the manual. The baffles are designed to drain the liquefied grease to the end of the ventilator and into the grease trough and grease cup.

To clean the grease extractor, the front access door and grease cup are removed and manually washed in a kitchen sink.

The two interior baffles and grease trough should be wiped down with a damp cloth soaked in a water and mild detergent mixture. If the cooking application generates high temperatures, the grease trough may require additional cleaning and/or scraping to remove baked-on solidified grease.



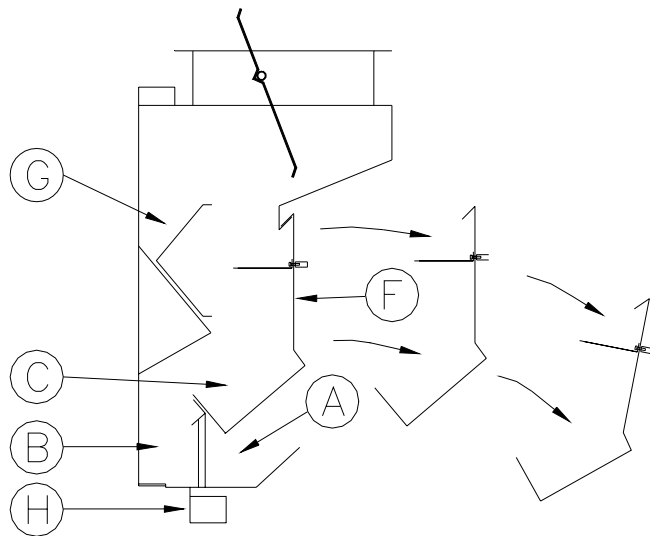
Type “D” Grease Extractor
Figure 15

TYPE “D” GREASE EXTRACTOR

The SPRING AIR SYSTEMS type “D” core extractor is a high efficiency extractor. The type “D” core extractor removes grease, dirt and lint through centrifugal force. The core extractor chamber is manually washed by removing the front access door and wiping the interior with a damp cloth.

The contaminated exhaust air enters the slot A and flows through the transition zone to the VORTEX CHAMBER B. The exhaust air accelerates through a complete 270 degree turn around the VORTEX BAFFLE C. Centrifugal force causes the grease, dirt and lint particles to deposit on the PRIMARY VARIABLE FLOW BAFFLE G and VORTEX BAFFLE C. The sloping VORTEX BAFFLE C drains collected grease to the end of the ventilator into the grease cup H.

The exhaust air continues into the secondary extraction chamber which contains an additional baffle, F. Residual grease is deposited on the secondary baffle as the exhaust air gyrates through the secondary chamber.



Type “D” Extractor
Figure 16

REV LOW Exhaust Air Calculations

Single Row Wall Mount

The Revlow Hood exhaust air formula is as follows:

Once the cooking line up has been established, the TOTAL EXHAUST (TEX) is calculated by adding each individual NEV valve.

$$\text{TEX} = (\text{NEV of appliance No. 1} + \text{NEV of appliance No. 2} + \text{NEV of appliance No. 3} + \dots)$$

Refer to Chart No. 4 for EXHAUST FLOW RATE (EFR) for the various types of Spring Air Systems hoods.

The TOTAL EXHAUST (TEX) is determined by adding the NET EXHAUST VOLUME (NEV) CFM (l/s) for each individual cooking appliance. The NET EXHAUST VOLUME (NEV) for individual appliances varies depending on the amount of smoke, particulate, and grease generated, the surface temperature and whether the appliance is gas or electric. Gas appliances require higher NEV because of the high flue gas temperatures. Chart No. 4 includes typical "NEV" values for most cooking applications. Consult the factory if an appliance is not listed.

It is important to know the dimensions of each appliance. The NET EXHAUST VOLUME (NEV) decreases and increases proportionally to the length of some appliances. These appliances are indicated in Chart No. 4 with length dimensions. For lengths other than indicated prorate the value in the chart.

WARNING

The REV LOW method is an excellent guide to assist in calculating the TOTAL EXHAUST (TEX) volumes, but consideration must be made for the conditions within the kitchen. i.e. location of the hood to doors, windows, and pass through which might create a draft. Consult the factory when unusual site conditions exist.

The complete kitchen ventilation system must be balanced, such that a minimum of 80% continuous heated makeup air is provided through a dedicated makeup air systems or the kitchen A/C units. It is good engineering practice to provide this heated fresh air into the kitchen space. The heated fresh air should not exceed 90 percent of the total exhaust volume.

Determining REV LOW Hood Dimensions

Hood Length:

The hood length should equal the width of all the cooking appliances to be covered by the hood plus allow and additional 6" (152 mm) overhang on either end of the cooking line up.

Hood Width: Single Row Wall Mounted

The hood width should be equal the depth of the largest appliance from the wall plus allow for an additional 12" (305 mm) overhang from the front of the appliance. The hood should be a minimum 47" (1194).

**Net Exhaust Air (NEV) Volume Chart
For All REV LOW hoods**

Cooking Appliances		Net Exhaust Volume	
Description	Length (in)	Electric CFM	Gas CFM
Charbroiler 24	24	900	1125
Charbroiler 30	30	1100	1325
Charbroiler 34	34	1300	1600
Charbroiler 36	36	1440	1800
Charbroiler 48	48	1600	2000
Charbroiler 60	60	1800	2250
Charbroiler 72	72	2250	2800
Chicken broaster 20	20	200	200
Chicken broaster 30	30	300	300
Conveyor Oven one deck 90	90	325	430
Conveyor Oven two deck 90	90	430	575
Comb. Wood/Gas Brick Oven 48	48	-	1200
Donut Fryer 32	32	285	430
Donut Fryer 72	72	320	480
Fry Top 36	36	300	340
Fryer Pitco model 14	17	-	150
Fryer 15	15	-	190
Fryer 16	16	100	200
Fryer 18	18	125	250
Fryer 24	24	150	300
Griddle 24	24	200	225
Griddle 36	36	250	275
Gyro 18	18	-	175
Hot Top Range 48	48	700	880
Kettle one with stand 28	28	130	130
Kettle Single 45	45	250	250
Microwave 24	24	30	-
Oven 38	38	180	225
Pasta Cooker 18	18	150	150
Pizza Oven 60	60	260	325
Rotisserie Oven 42	42	550	750
Rotisserie Oven 66	66	960	1250
Range stock pot 24	24	255	300
Range two burner regular duty 12	12	180	225
Range four burner regular duty 24	24	275	315
Range six burner regular duty 36	36	415	475
Salamander Broiler 36	36	270	350
Spreader 12	12	10	10
Steamer 30	30	150	-
Solid Fuel 36"	36	-	1800
Solid Fuel - 60"	60	-	2400
Tilting Skillet 42	42	370	500
Toaster 18	18	50	50
Wok - one hole 30	30	-	500
Wok - two hole 60	60	-	850
Wok - three hole 90	90	-	1400
Woodstone Oven 64	64	-	400
Upright Broiler 2 shelf 36	36	540	700
Upright Broiler 3 shelf 36	36	810	1050
Warming Lamp 18	18	30	30

Chart No. 4

Island REV LOW Hoods

The Island Revlow Hood exhaust air formula is as follows:

Once the cooking line up has been established, the TOTAL EXHAUST (TEX) is calculated by adding each individual NEV value.

$$TEX = (NEV \text{ of appliance No. 1} + NEV \text{ of appliance No. 2} + NEV \text{ of appliance No. 3} + \dots) \times 1.20$$

Refer to Chart No. 4 for EXHAUST FLOW RATE (EFR) for the various types of Spring Air Systems hoods.

The TOTAL EXHAUST (TEX) is determined by adding the NET EXHAUST VOLUME (NEV) CFM (l/s) for each individual cooking appliance and then multiplying by a factor of 1.25. The NET EXHAUST VOLUME (NEV) for individual appliances varies depending on the amount of smoke, particulate, and grease generated, the surface temperature and whether the appliance is gas or electric. Gas appliances require higher NEV because of the high flue gas temperatures. Chart No.4 includes typical "NEV" values for most cooking applications. Consult the factory if an appliance is not listed.

It is important to know the dimensions of each appliance. The NET EXHAUST VOLUME (NEV) decreases and increases proportionally to the length of some appliances. These appliances are indicated in Chart No. 4 with length dimensions. For lengths other than indicated prorate the value in the chart.

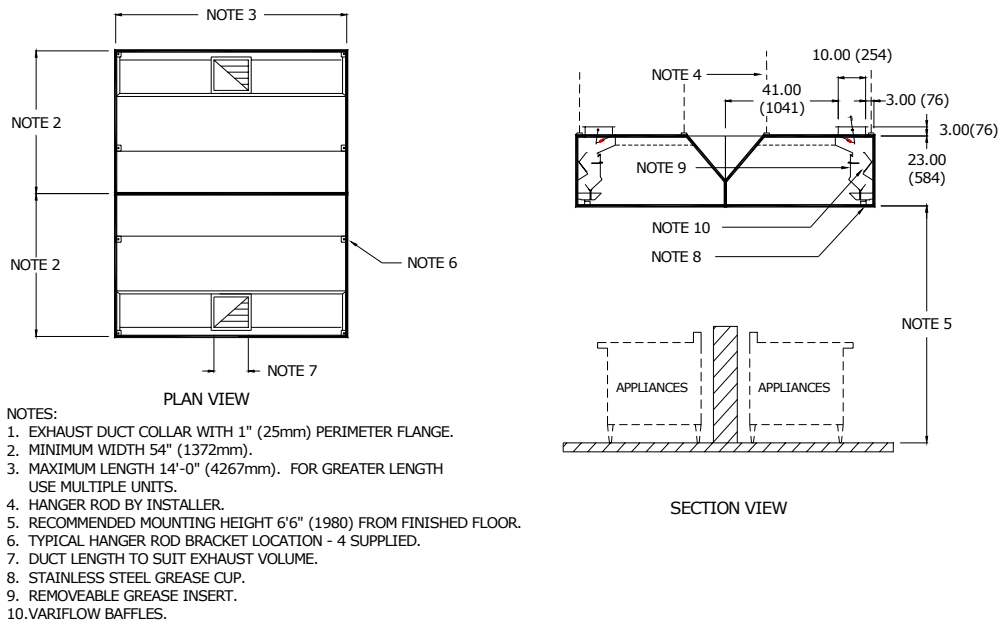
Determining REV LOW Island Hood Dimensions

Hood Length:

The hood length should equal the width of all the cooking appliances to be covered by the hood plus allow and additional 9" (230 mm) overhang on either end of the cooking line up.

Hood Width: Island REV LOW

The hood width should be equal the depth of the largest appliance from the wall plus allow for an additional 12" (305 mm) overhang from the front of the appliance. Each hood should be a minimum 54" (1372mm).



Typical Island REV LOW dimensional drawing model DD-B-F-I
Two Hoods shown

Figure 17

REV LOW Exhaust Volume Vs Exhaust Duct Size

Exhaust Volume		Duct Collar Size		Exhaust Volume		Duct Collar Size	
CFM	l/s	W x L in x in	W x L mm x mm	CFM	l/s	W x L in x in	W x L mm x mm
450	212	10 x 4	254 x 102	3500	1652	10 x 33.5	254 x 851
500	236	10 x 4.5	254 x 114	3625	1711	10 x 34.5	254 x 876
625	295	10 x 6.0	254 x 152	3750	1770	10 x 36.0	254 x 914
750	354	10 x 7.0	254 x 178	3875	1829	10 x 37.0	254 x 940
875	413	10 x 8.0	254 x 203	4000	1888	14 x 27.0	356 x 686
1000	472	10 x 9.5	254 x 241	4125	1947	14 x 28.0	356 x 711
1125	531	10 x 10.5	254 x 267	4250	2006	14 x 29.0	356 x 737
1250	590	10 x 12.0	254 x 305	4375	2065	14 x 30.0	356 x 762
1375	649	10 x 13.0	254 x 330	4500	2124	14 x 30.5	356 x 775
1500	708	10 x 14.0	254 x 356	4625	2183	14 x 31.5	356 x 800
1625	767	10 x 15.5	254 x 394	4750	2242	14 x 32.5	356 x 826
1750	826	10 x 16.5	254 x 419	4875	2301	14 x 33.0	356 x 838
1875	885	10 x 18.0	254 x 457	5000	2360	14 x 34.0	356 x 864
2000	944	10 x 19.0	254 x 483	5125	2419	14 x 35.0	356 x 889
2125	1003	10 x 20.	254 x 508	5250	2475	14 x 36.0	356 x 914
2250	1062	10 x 21.5	254 x 546	5375	2537	14 x 36.5	356 x 927
2375	1121	10 x 22.5	254 x 572	5500	2596	14 x 37.5	356 x 953
2500	1180	10 x 24.0	254 x 610	5625	2655	14 x 38.5	356 x 978
2625	1239	10 x 25.0	254 x 635	5750	2714	14 x 39.0	356 x 991
2750	1298	10 x 26.0	254 x 660	5875	2773	14 x 40.0	356 x 1016
2875	1357	10 x 27.5	254 x 699	6000	2832	14 x 41.0	356 x 1041
3000	1416	10 x 28.5	254 x 724	6125	2891	14 x 42.0	356 x 1067
3125	1475	10 x 30.0	254 x 762	6250	2950	14 x 42.5	356 x 1080
3250	1534	10 x 31.0	254 x 787	6375	3008	16 x 38.0	406 x 965
3375	1593	10 x 32.0	254 x 813	6500	3067	16 x 39.0	406 x 991

1. If exact exhaust volume is not indicated use duct size closest to required exhaust.
2. Model B water wash hoods and dry extractors have 1.5" W.C. (0.38kPa) for exhaust flow rates from 90 to 450 CFM/ft (140 to 700 l/s/m)

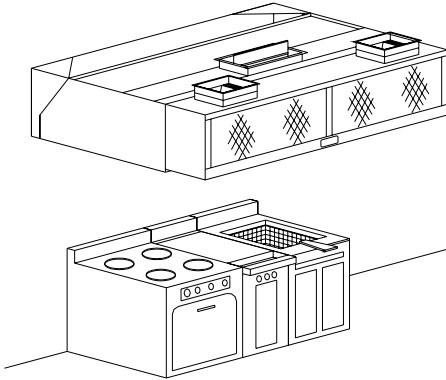
Chart No. 5

Make Up Air/Supply Air

Introducing fresh air back into the kitchen is generally recommended as good engineering practice. The amount of make up air should not exceed the total exhaust to maintain a negative pressure within the kitchen. Inadequate amounts of fresh replacement air will result in cold drafts, hot spots, poor hood smoke capture and generally uncomfortable working conditions within the kitchen and uncomfortable environment in the dining room for the customers.

One excellent method of introducing makeup air is through a make up air plenum built into the ventilator. SPRING AIR SYSTEMS has two optional make up air arrangements; MP and MC. Directing the make up air through the exhaust hood ensures the correct quantity of make up air and good air distribution.

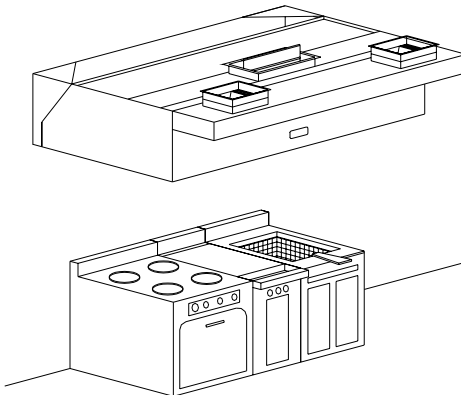
MP



The make up air is discharged into the kitchen through a perforated panel located on the front of the Rev-Low ventilator. This method provides very low discharge velocity. The fresh air is heated to 55F (13C). The total supply is 80% to 90% of the total exhaust air volume. The make up air plenums have 1/2" foam insulation on the interior surfaces for sound attenuation and insulation. A fire damper is located at the supply air inlet on top of the ventilator.

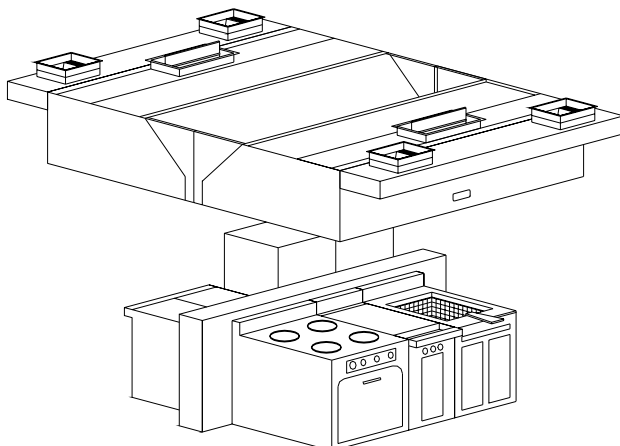
*Model DD-B-F-MP
Figure 18*

MC



The make up air is discharged into the kitchen down through a perforated panel located on the front of the Rev-Low ventilator. The fresh air is directed down toward the floor in front of the cooking appliances. This method is best suited for warm climates. The fresh air is tempered to 55F (13C) and between 70% to 80% of the total exhaust air volume. A fire damper is located at the supply air inlet on top of the ventilator.

*Model DD-B-F-MC
Figure 19*



*Two Models DD-B-F-I-MC
Figure 20*

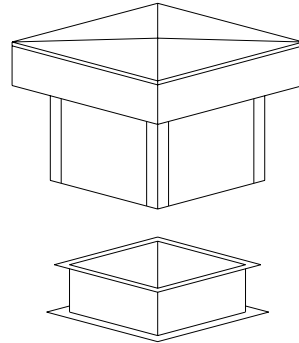
The **REV LOW** Systems Approach

The Spring Air Systems **REV LOW** Hood does not work alone. A good commercial kitchen exhaust fan, supply unit, and hood controller are required.

Spring Air Systems Inc. designs a supply unit especially for the **REV LOW** hoods; the SFA series. The SFA is available in a vertical or horizontal arrangement, indoor or outdoor and with integral gas reheat and remote gas and electric reheat.

SFA-OV Unheated Makeup Air Unit

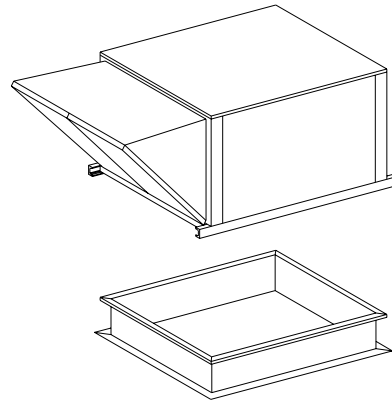
The SFA-V unit is designed and constructed specifically for commercial kitchen applications. The SFA-V is a vertical supply unit that introduces unheated fresh air directly into a duct mounted electric or gas heating unit. The vertical arrangement requires minimum roof space. The roof mounted SFA-V is complete with filters, supply fan motorized discharge damper and end switch, fan motor, belts, drives and perimeter curb. Supply air capacities range from 500 to 8,000 CFM. The SFA-OV is used in conjunction with a remote indoor gas fired duct heater or electric heating coil.



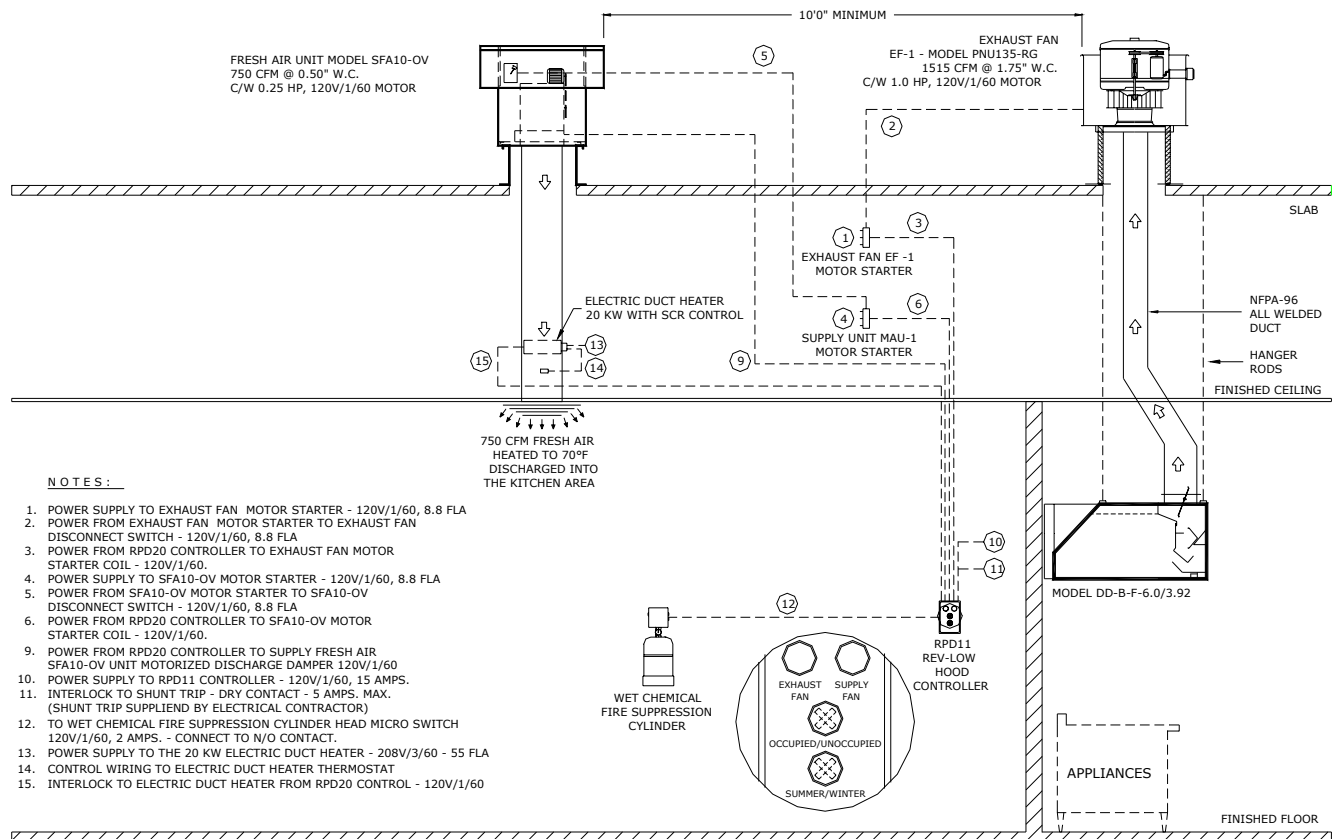
*SFA-OV
Figure 21*

SFA-OH Unheated Makeup Air Unit

The SFA-OH unit is designed and constructed specifically for commercial kitchen applications. The SFA-OH is a horizontal supply unit that introduces unheated fresh air directly into a duct mounted electric or gas heating unit. The roof mounted SFA-OH is complete with filters, supply fan motorized inlet damper and end switch, fan motor, belts, drives and perimeter curb. Supply air capacities range from 500 to 8,000 CFM. The SFA-OH is used in conjunction with a remote indoor gas fired duct heater or electric heating coil.



*SFA-OH
Figure 22*



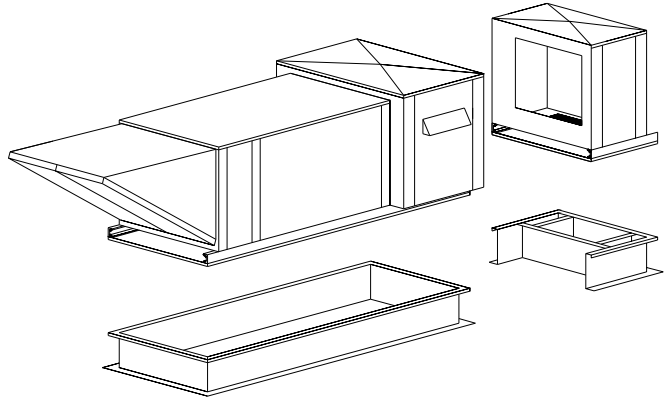
Typical REV LOW Hood Schematic with electric heating
Figure 23

The kitchen and dining room must be balanced to provide a proper system. The schematic shows a *typical* 100% exhaust, with 80% fresh air supplied directly to the kitchen through some type of heating unit. This heat can be supplied by a electric duct heater as shown above or gas, steam or hot water. The remaining 20% required to balance the restaurant must be supplied through the dining room air conditioning unit(s) economizer or through some other makeup air unit. (Such as a Spring Air Systems SFA-IGO Unit)

SFA-IGO Heated Makeup Air Unit

General

The SFA-IGO is an indirect, gas-fired make-up air unit for commercial applications. The unit is designed to introduce 100% fresh air into a commercial building. When the amount of heated makeup air required exceed the air conditioning unit capacity use the SFA-IGO. The SFA-IGO is roof-mounted on a perimeter curb or sleeper with optional turndown plenum. Supply air capacities range from 500 to 8000 CFM with burners from 80,000 to 600,000 BTU/hr output.



Typical SFA-IGO

Figure 24

Heating Capacity:

The total heating required is equal to the following:

$$\text{Heating Capacity (BTU/hr)} = \text{Supply Volume (CFM)} \times 1.09 \times (T_I - T_O)$$

Where: T_I = Supply discharge temperature required (F)
 T_O = Winter design temperature for the area (F)

Use the Chart No. 6 below for selection of burner required.

SFA-IGO BURNER ENGINEERING DATA				
HEATER SIZE	BTU/HR		GAS PIPE CONNECTION (IN)	NATURAL GAS FLOW (SCFH)
	INPUT	OUTPUT		
100	⁽¹⁾ 100,000	80,000	3/4	100
150	⁽²⁾ 150,000	120,000	3/4	150
200	200,000	⁽³⁾ 160,000	3/4	200
250	250,000	187,000	3/4	250
300	300,000	225,000	3/4	300
350	350,000	262,500	3/4	350
400	400,000	300,000	3/4	400

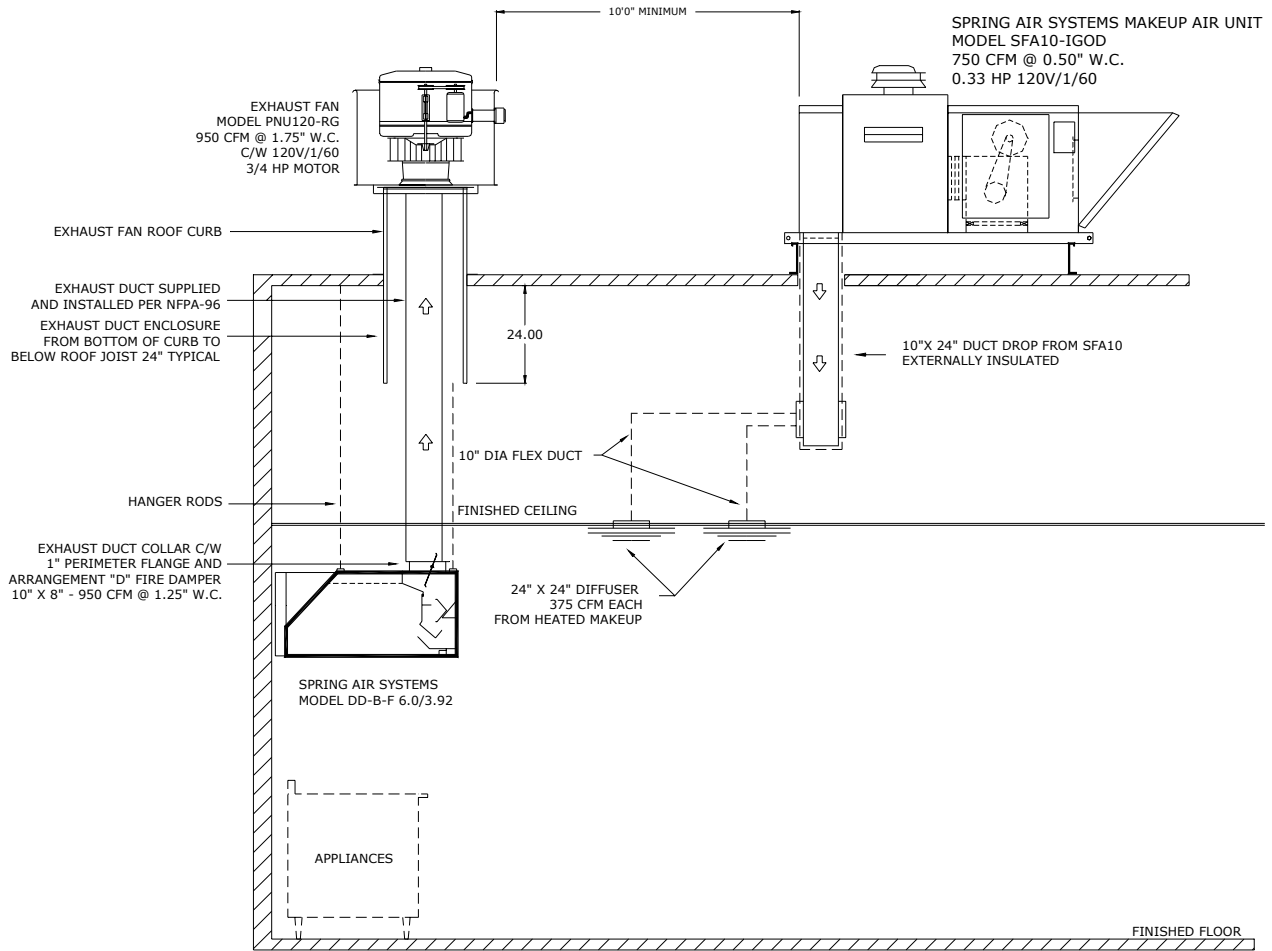
⁽¹⁾ Not available with power vent.

⁽²⁾ 112,500 BTU/hr with power vent.

⁽³⁾ 150,000 BTU/hr with power vent.

⁽⁴⁾ All units require the following clearances: Front: 48" Bottom: 0" Sides: 24" Rear: 6"

Chart No. 6

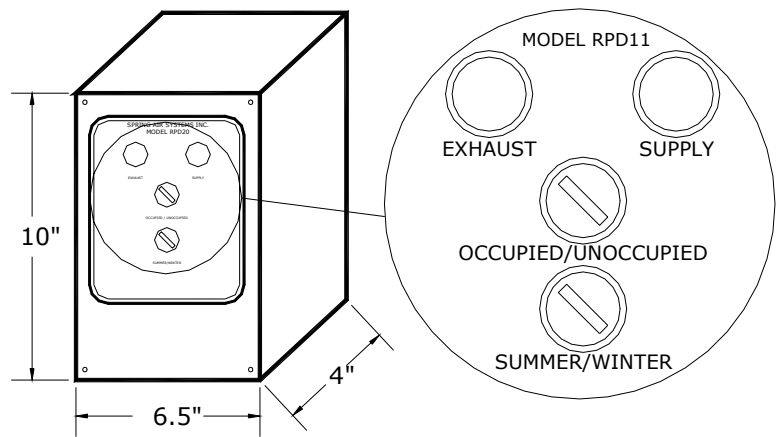


Typical REV LOW Hood Schematic with SFA-IGO

Figure 25

REV LOW Hood Controllers

Spring Air Systems Inc. manufactures a REV LOW Hood Controller model RPD11 (For use with gas or electric duct heaters) for complete single switch operating of the exhaust/supply system. The operator rotates the selector switch to the occupied position and the exhaust and supply fans energize, the fresh air damper opens, and the air conditioning unit economizers open (optional). In addition, the panels may be interlocked to the shunt trip, surface fire suppression system or building management system. Spring Air Systems can also supply the motor starters from stock.



RPD11 Controllers

Figure 26

Specification

Other Fine Products From

SPRING AIR SYSTEMS...

Water Wash Ventilators

- Hot Water Wash
- Cold Water Spray/Hot Water Wash
- Water Wash Control Panels

Dry Ventilators

REV-LOW Hood

Filter Hoods

Surface Fire Suppression

Commercial Kitchen Exhaust Fans

Kitchen Enviro Systems

- KES - 100% Exhaust

Commercial Kitchen Supply Units

Bio Spray Hoods

Compensating Hoods