
# 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.

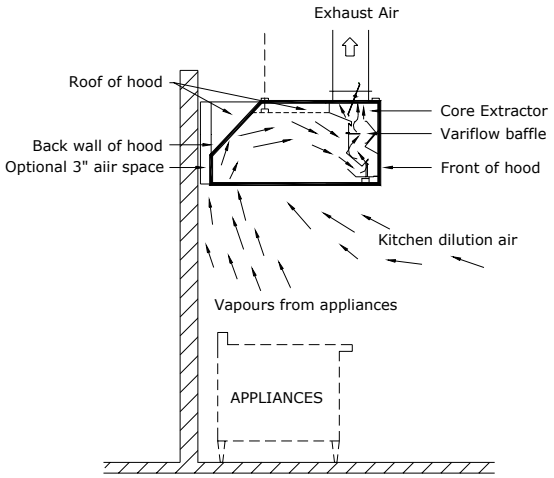
***REV-LOW*** CLEANER DUCTWORK:
maximizes your extraction at all exhaust airflows to capture more grease in hood. It's not a filter hood!

***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.

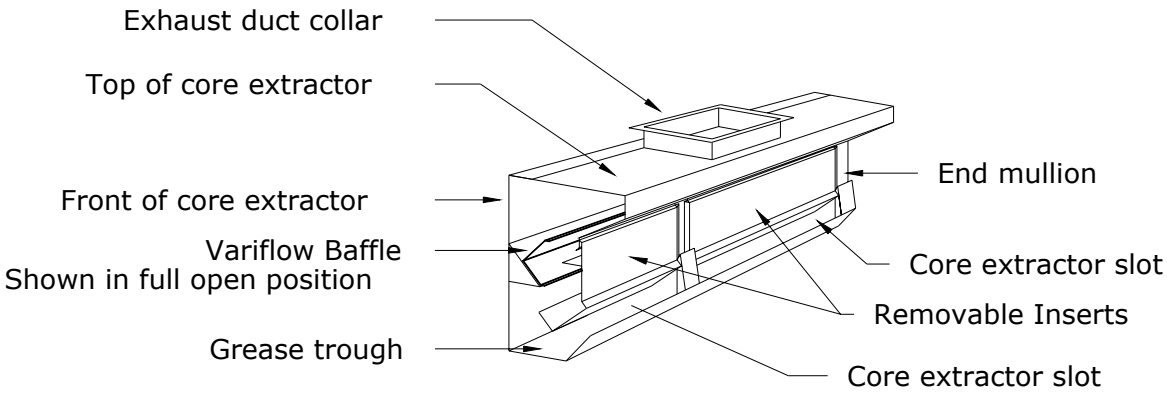
## Operation

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 maximumize 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.

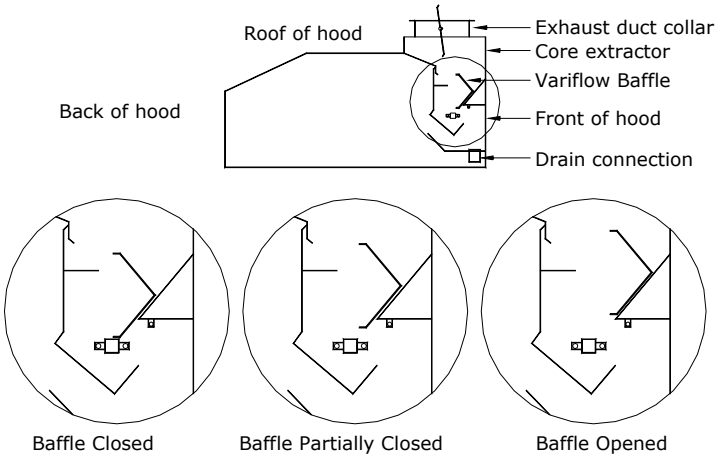



*Section View of Core Extractor for DD-B-F REV LOW Hood*
*Figure 2*

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

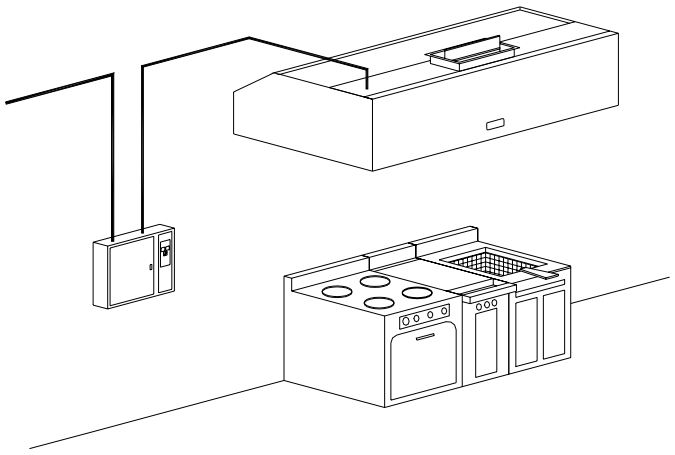
The Spring Air Systems *REV LOW* Hood is available in three basic types

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

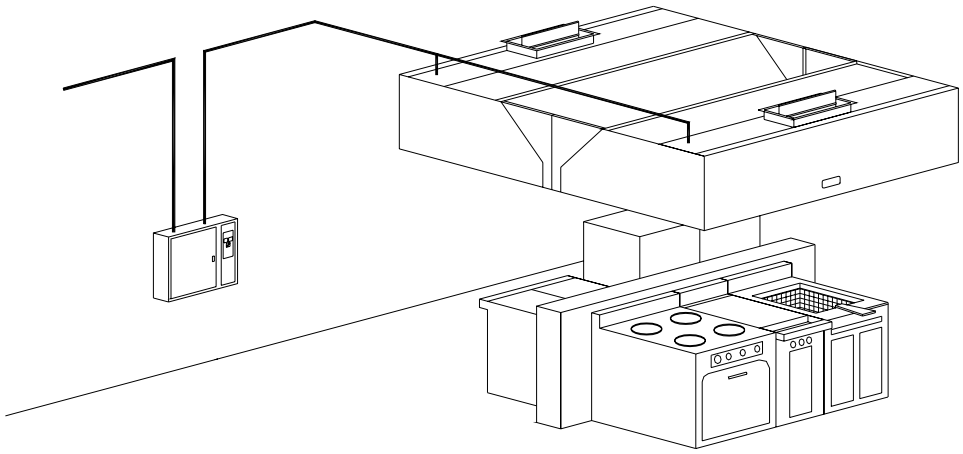
Each type of hood provides varying degrees of grease extraction efficiency, automatic/manual wash, and exhaust fire dampers. For a more detailed description of the types of hood exhaust fire dampers and wash systems refer to the Spring Air Systems “Ventilator Engineering Manual”.

| 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*



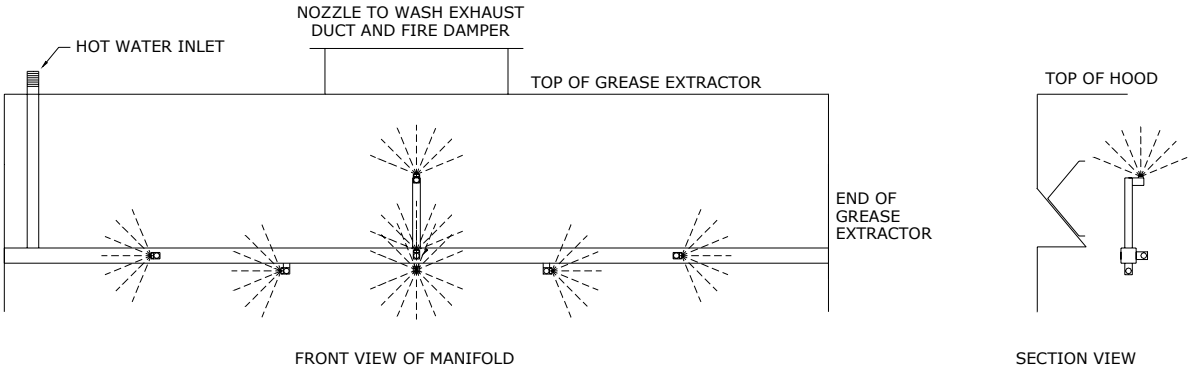
*Typical Water Wash Application Island Rev-Low*
*Two Model HD-BI*
*Figure 4b*

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

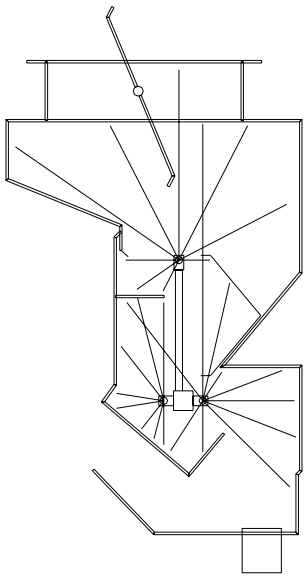
**Automatic Wash: Type “C” and “H:” Ventilators**
SPRING AIR SYSTEMS ventilators are available with either automatic or manual wash systems. All water wash ventilators must be interconnected with a water wash control panel.

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.



*Type "C" and "H" Wash*
*Figure 6*

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)

**Hot Water Flow Required Model**

| Ventilator Length | | Hot Water Flow USGPM | Hot Water Flow USGPM | Hot Water Flow l/s | Hot Water Flow l/s |
|---|---|---|---|---|---|
| ft | mm | @ 40 psi | @ 60 psi | @ 2.76Kpa | @413 Kpa |
| 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 | Cold Water Flow l/s | Ventilator Length | | Cold Water Flow USGPM | Cold Water Flow l/s |
|---|---|---|---|---|---|---|---|
| feet | mm | @ 20 psi | @ 138 Kpa | feet | mm | @ 20 psi | @ 138 Kpa |
| 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***

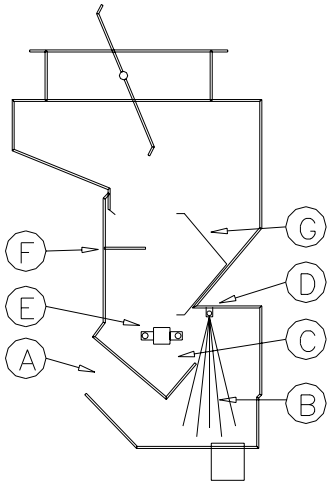
**NOTES:**

*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*

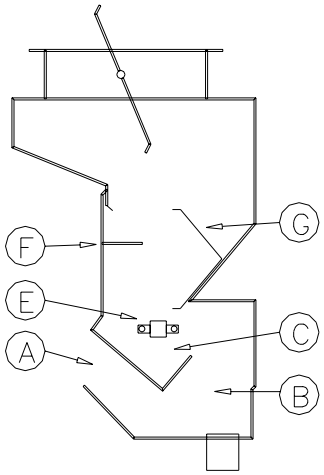
The contaminated exhaust air enters the extractor slot A and flows through a transition zone to the VORTEX CHAMBER B. The cold water spray manifold D sprays a fine cold water mist into the path of the exhaust air. The cold water spray causes the grease particles to cool, congeal and coagulate forming 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.

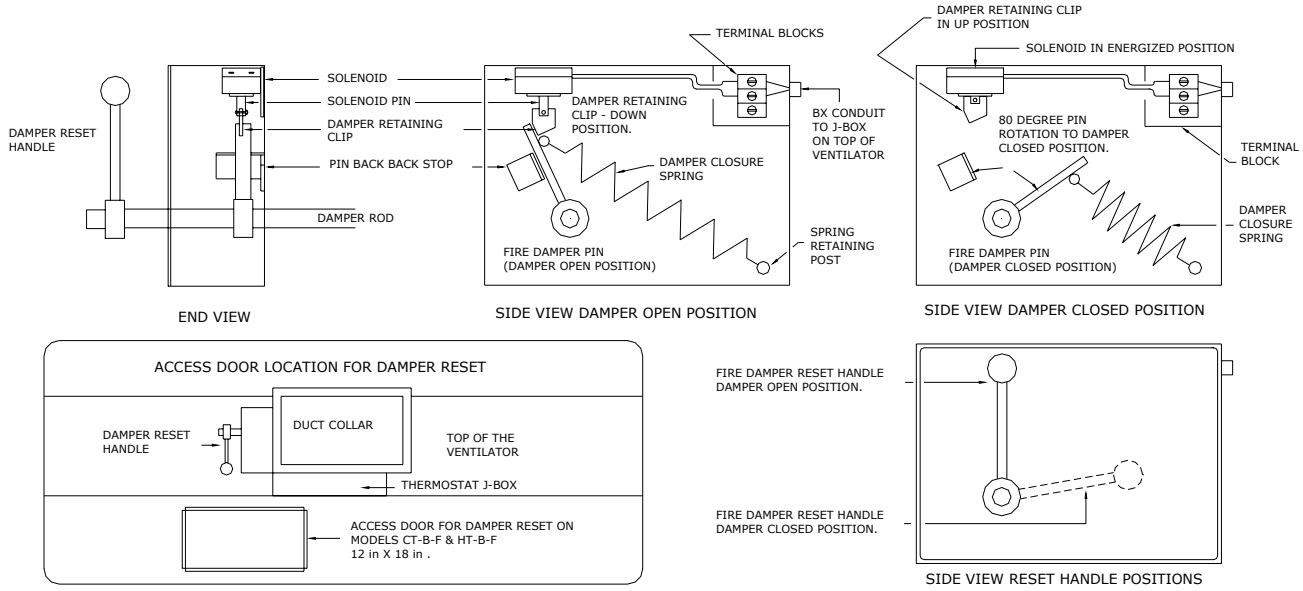
*NOTE: The exhaust fan should remain on after a surface fire suppression system has activated.*

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.

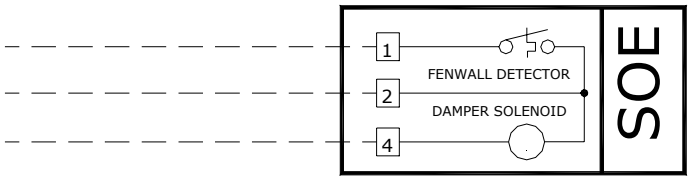
SPRING AIR SYSTEMS has three (3) arrangements of hood and damper assemblies available, arrangement "T", "F", and "D", thermostatic or fusible link activated systems respectively.

**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*



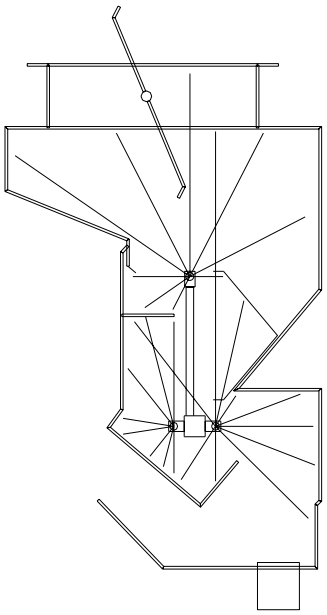

ARRANGEMENT "T" FIRE DAMPER:
THREE (3) WIRES TO EACH SOE ENCLOSURE LOCATED AT EACH EXHAUST DUCT COLLAR ON EVERY HOOD
120V/1/60 - 3 AMPS - WIRE EACH SOE IN PARALLEL.

*"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.



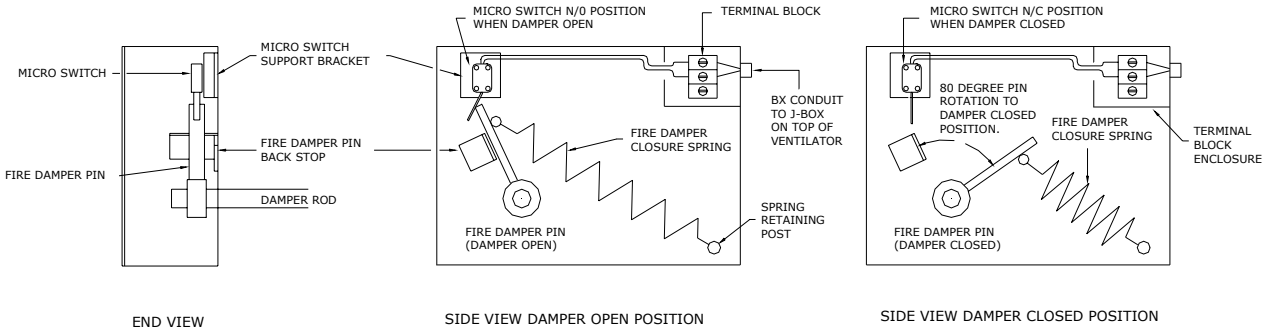
*Arrangement "T" & "F" Activated*
*Figure 11*

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.

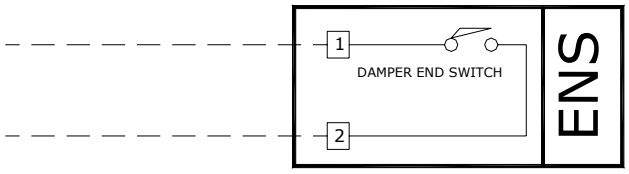
In the event of a fire within the core extractors, the fusible link melts, closing the fire damper against the force of a spring. When the fire damper completely closes, the microswitch is activated and an electrical signal is sent to the water wash control panel.




*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.



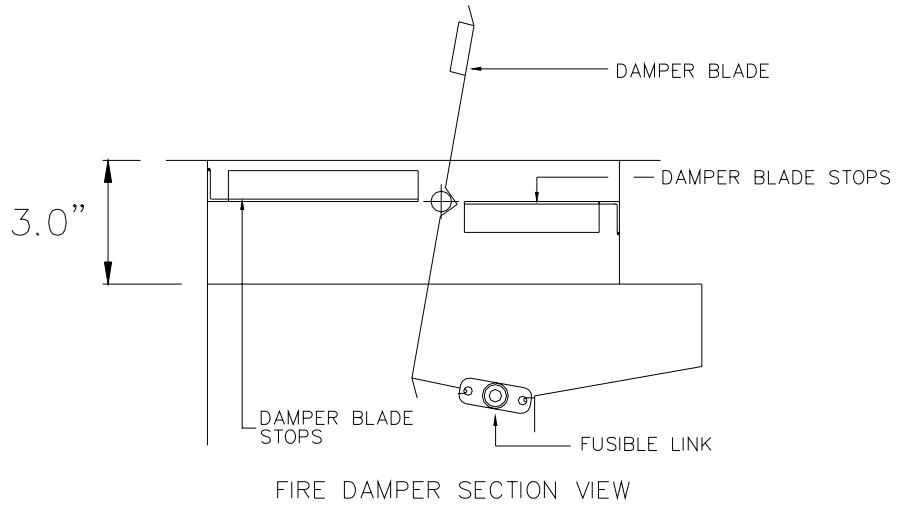

ARRANGEMENT "F" FIRE DAMPERS:
TWO (2) WIRES TO EACH ENS ENCLOSURE LOCATED AT EACH EXHAUST DUCT COLLAR ON EVERY HOOD
120V/1/60 - 1 AMPS. WIRE EACH ENS IN PARALLEL.

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

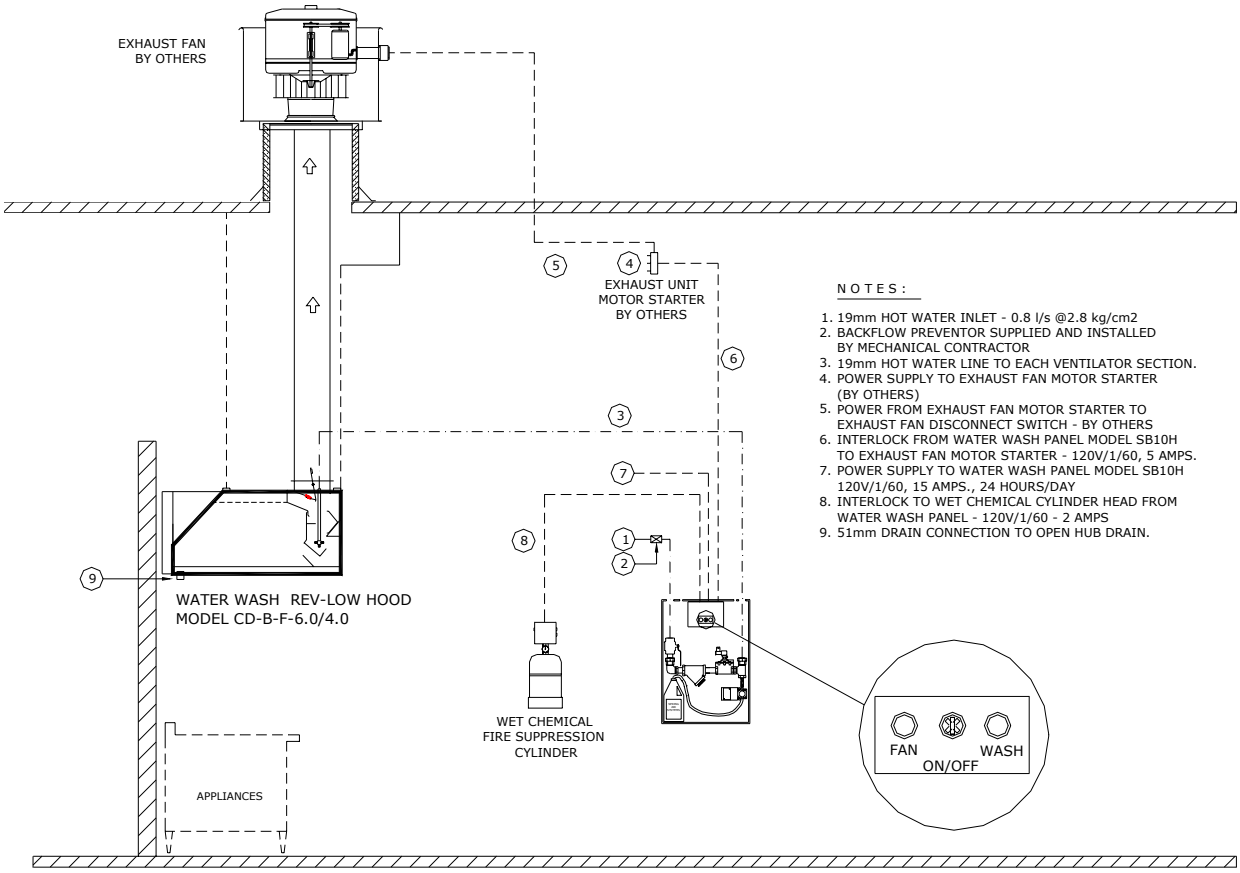
**Arrangement "D": Fusible Link Activated, Dead Weight.**

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

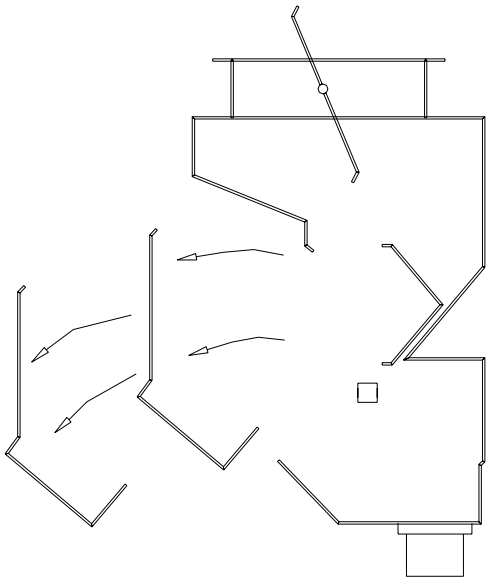
## Manual Wash: Type "D" Ventilator

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.



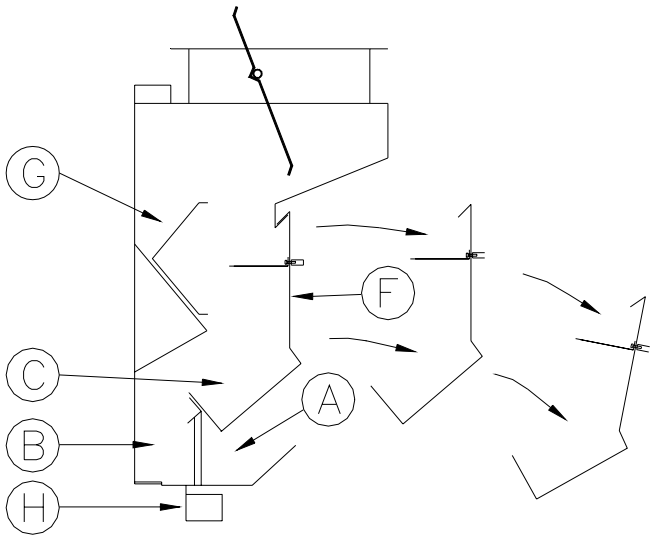
*Type "D" Grease Extractor*
*Figure 15*

## 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.

***TEX = (NEV of appliance No. 1 + NEV of appliance No. 2 + NEV of appliance No. 3 +....)***

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 valve.

***TEX = (NEV of appliance No. 1 + NEV of appliance No. 2 + NEV of appliance No. 3 +....)x 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.

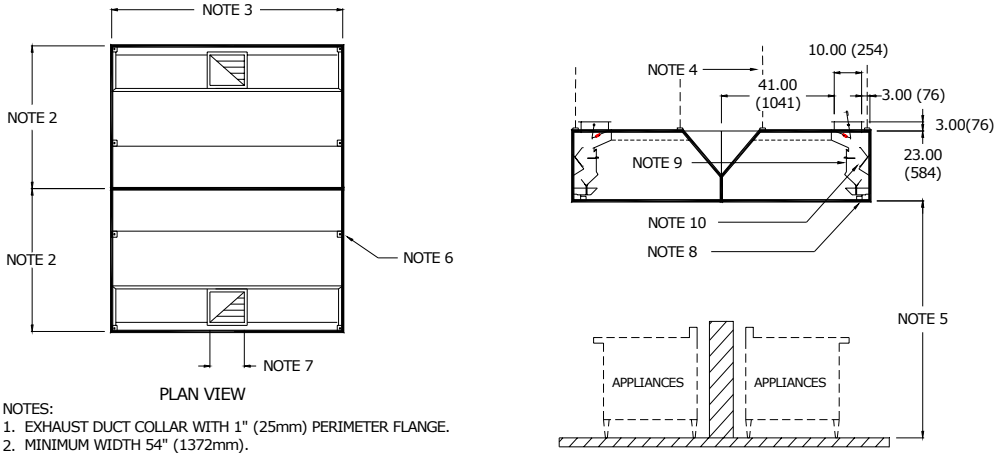
It is important to know the dimensions of each appliance. The NET EXHAUST VOLUME (NEV) decreases and increases proportionally to the length of some appliances. These appliances are indicated in Chart No. 4 with length dimensions. For lengths other than indicated prorate the value in the chart.

## 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).




NOTES:
1. EXHAUST DUCT COLLAR WITH 1" (25mm) PERIMETER FLANGE.
2. MINIMUM WIDTH 54" (1372mm).
3. MAXIMUM LENGTH 14'-0" (4267mm). FOR GREATER LENGTH USE MULTIPLE UNITS.
4. HANGER ROD BY INSTALLER.
5. RECOMMENDED MOUNTING HEIGHT 6'6" (1980) FROM FINISHED FLOOR.
6. TYPICAL HANGER ROD BRACKET LOCATION - 4 SUPPLIED.
7. DUCT LENGTH TO SUIT EXHAUST VOLUME.
8. STAINLESS STEEL GREASE CUP.
9. REMOVEABLE GREASE INSERT.
10. VARIFLOW BAFFLES.

*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)*

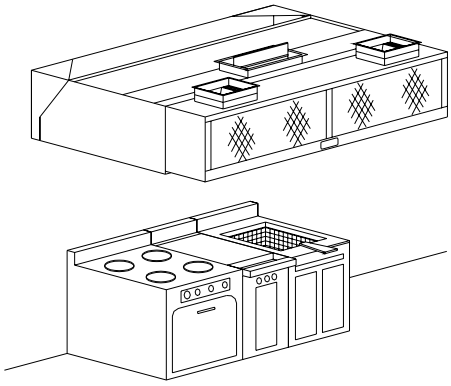
***Chart No. 5***

## 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.

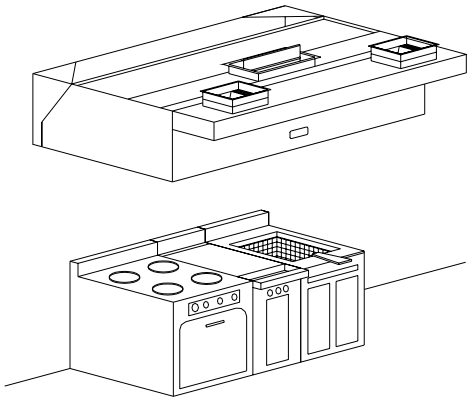
## MP



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 attention and insulation. A fire damper is located at the supply air inlet on top of the ventilator.

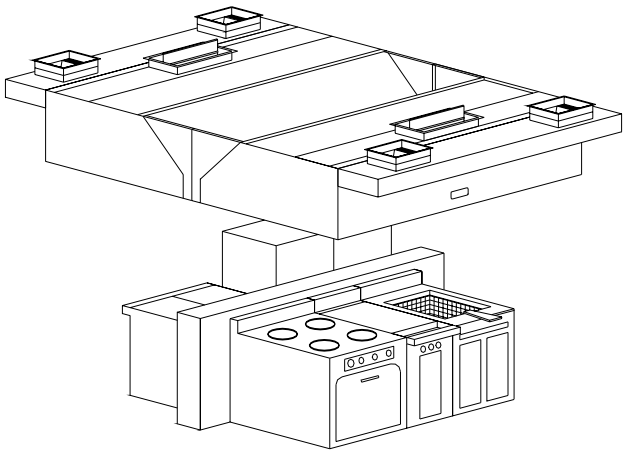
*Model DD-B-F-MP*
*Figure 18*

## 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*

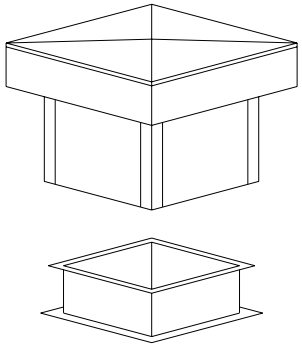
## The *REV LOW* Systems Approach

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

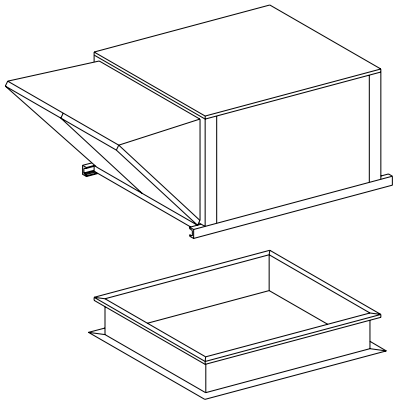
The SFA-V unit is designed and constructed specifically for commercial kitchen applications. The SFA-V is a vertical supply unit that introduces unheated fresh air directly into a duct mounted electric or gas heating unit. The vertical arrangement requires minimum roof space. The roof mounted SFA-V is 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.



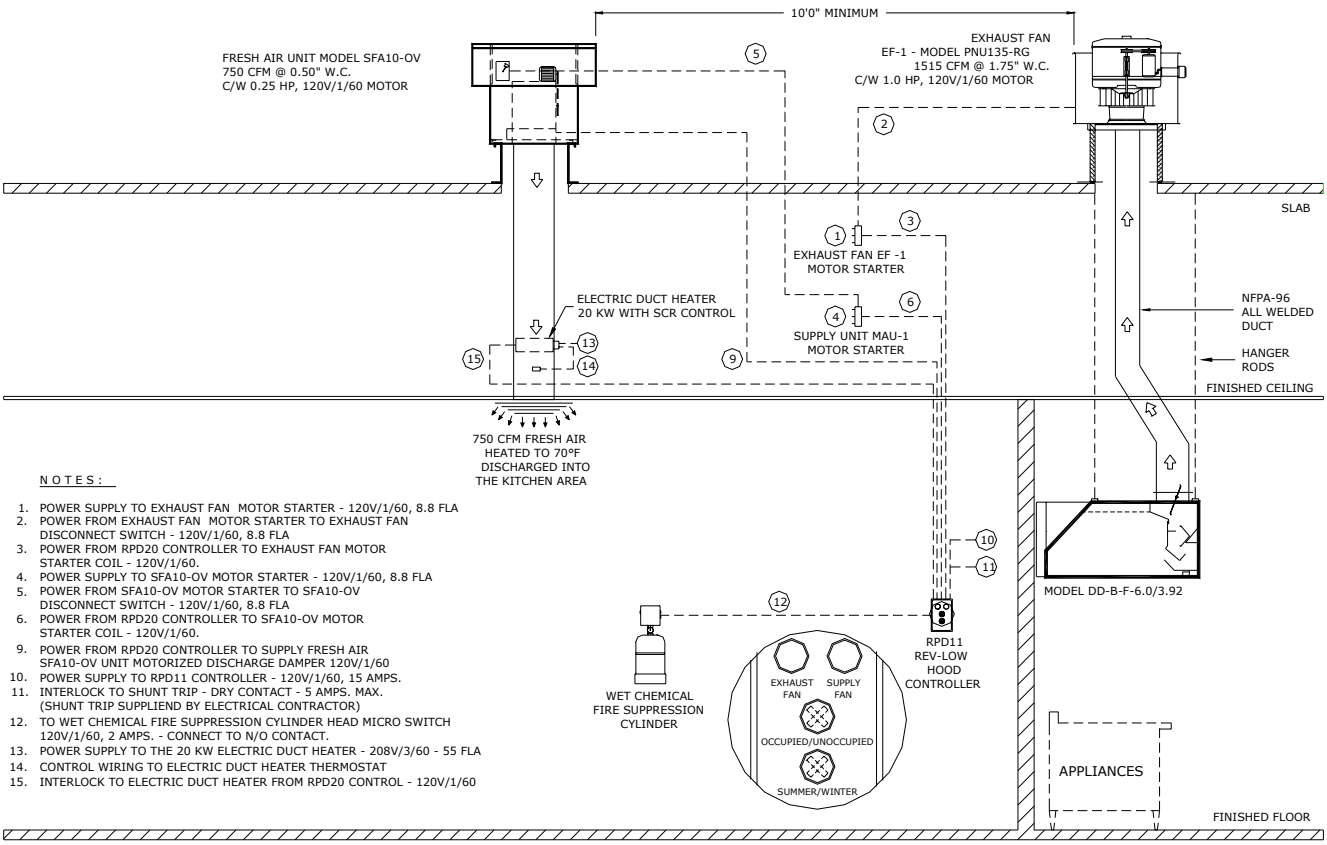
*SFA-OV*
*Figure 21*

### 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*



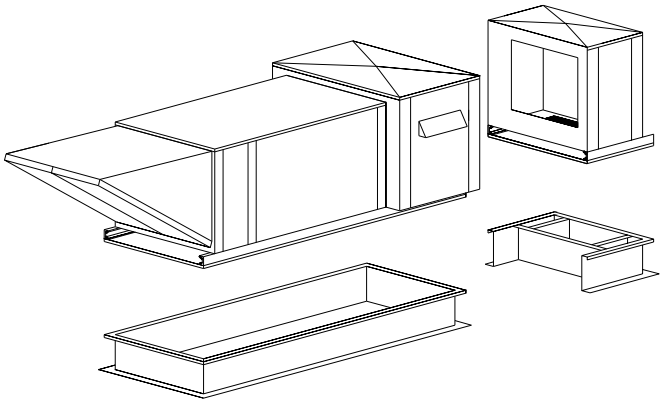

*Typical REV LOW Hood Schematic with electric heating*
*Figure 23*

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:
Heating Capacity (BTU/hr) = Supply Volume (CFM) x 1.09 x (TI - TO)

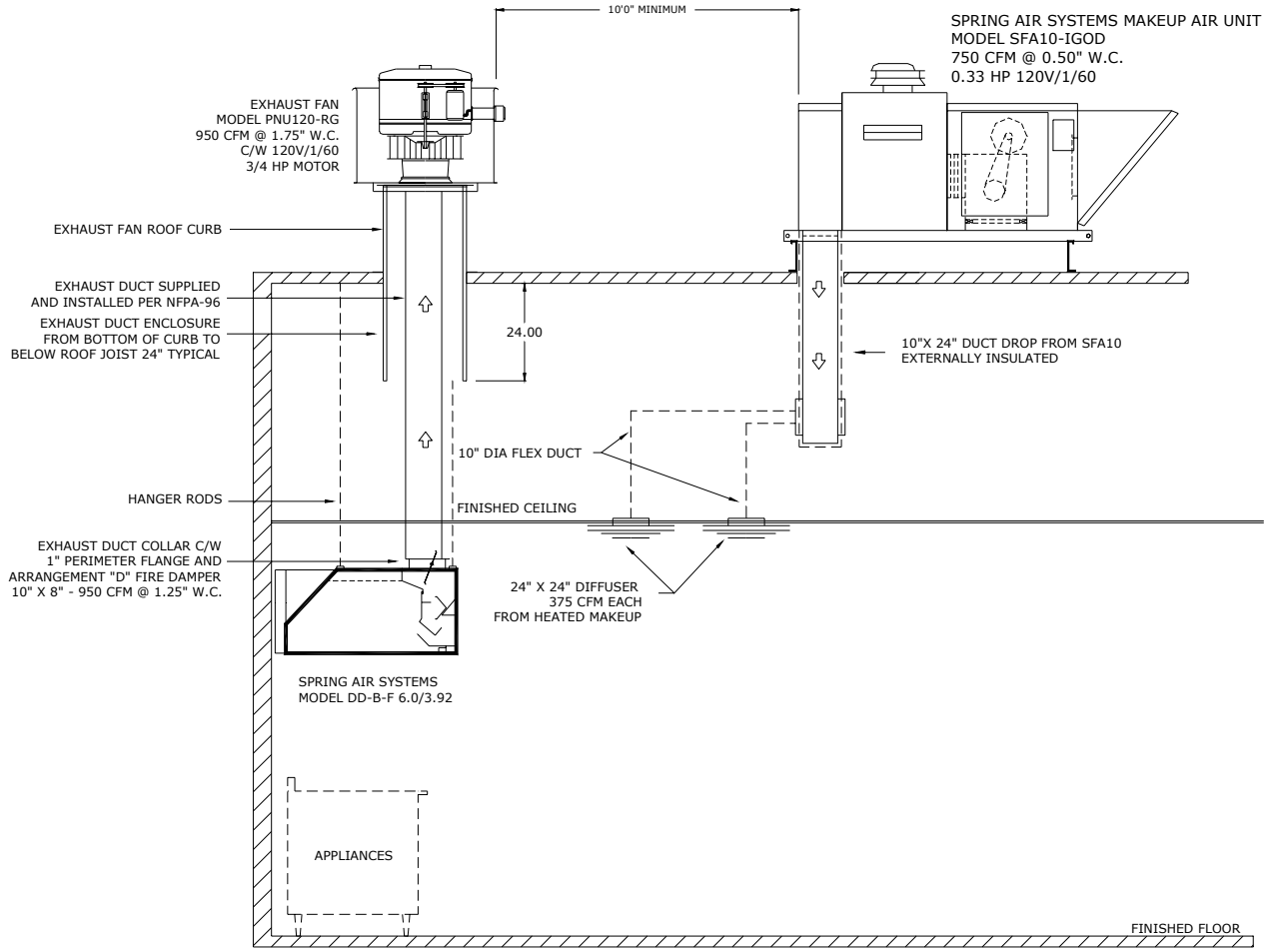
Where: TI = Supply discharge temperature required (F)
TO = Winter design temperature for the area (F)

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"*

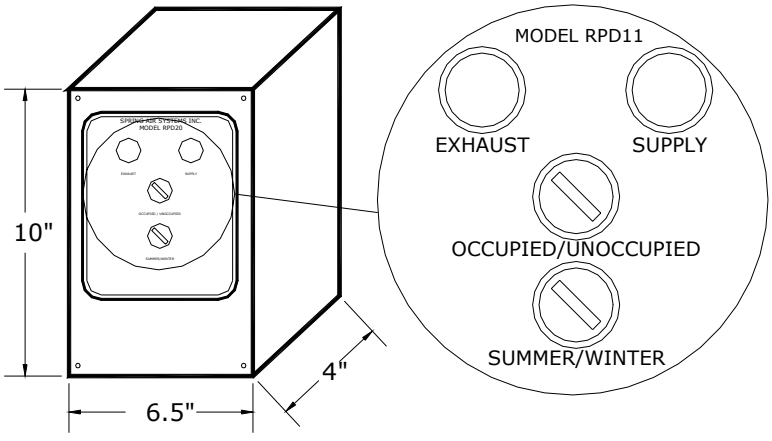
***Chart No. 6***




*Typical REV LOW Hood Schematic with SFA-IGO*
*Figure 25*

## *REV LOW* Hood Controllers

Spring Air Systems Inc. manufacturers 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

Refer to individual specification sheets for the model and type of *REV LOW* hood selected. See Chart No. 1 for a list of the various alternatives available. Refer to the individual specification sheets for SFA models and *REV LOW* hood controllers available.

# *REV-LOW* Work Sheet

| | | | |
|---|---|---|---|
| **Date** | | **Job Name** | |
| **Representative** | | **Job Location** | |
| **Engineering** | | **Food Service** | |

| Item No. | Description of Appliance | Gas/ Electric | Length (in) | NEV* (CFM) |
|---|---|---|---|---|
| | | | | |
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| **Totals** | | | | |

*See chart No. 4 in REV-LOW Engineering Manual

| | |
|---|---|
| **Hood Length (Total Length above + 12" for single row +18" for Island)** | |
| **Minimum CFM (90 CFM/ft x length (ft) or total NEV above)** | |
| **Exhaust Duct Collar (from Chart No. 5 in Engineering Manual)** | |

revlow.doc

***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