CADEXAIR

EXPERTISE & INNOVATION

KES Unit Maintenance Manuel

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KES ENVIRO OPERATION AND MAINTENANCE MANUAL

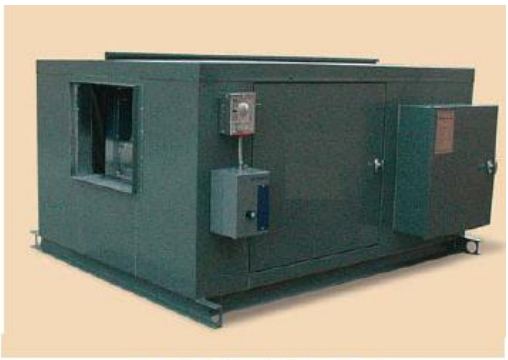
INTRODUCTION
Thank you for purchasing a Cadexair commercial kitchen ventilation product. Please read the complete “KES Enviro Operation and Maintenance Manual” prior to installation, commissioning or operating a KES unit.

The Cadexair. kitchen Enviro system (KES), Exhaust Cleaning Assembly for Kitchen Exhaust Duct, “Enviro Unit” is ULC and UL listed for use in a commercial kitchen exhaust system. KES units are available in sizes ranging from 1,000 CFM to 40,000 CFM for indoor or outdoor applications.

The primary function of a KES Enviro unit is to filter the grease, lint and dust particles and remove the odor from the exhaust air.

The Underwriters Laboratories Inc. (UL) and Underwriters’ Laboratories of Canada Limited (ULC) listings allow the kitchen exhaust air to be discharge to atmosphere at low levels. Prior to any installation the installer must seek approval from the authorities having jurisdiction.

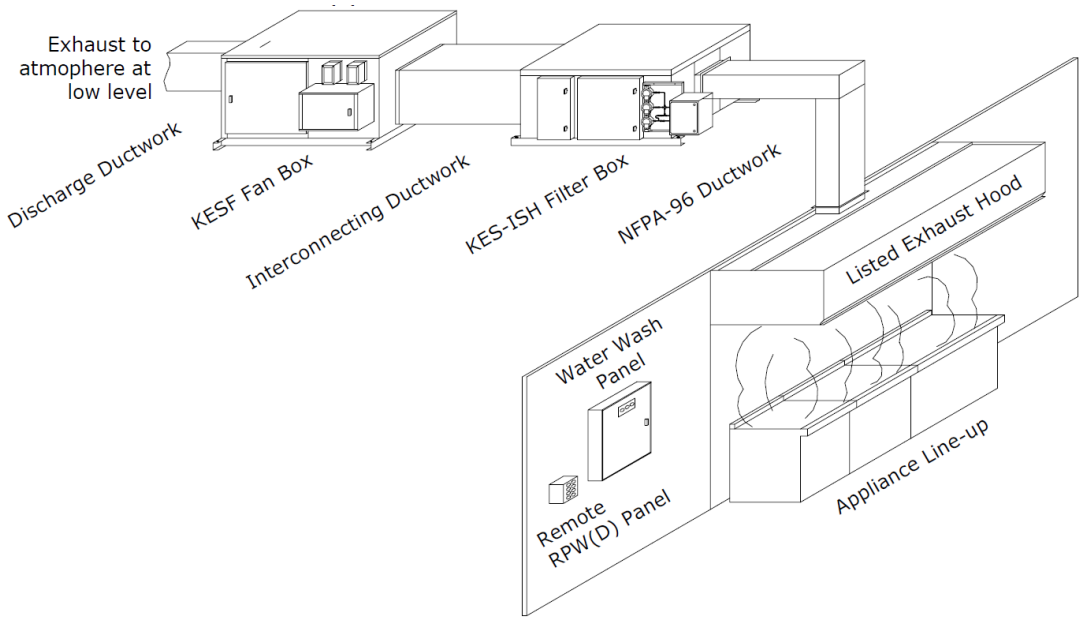
KES-ISH Enviro Filter Box
Figure 1



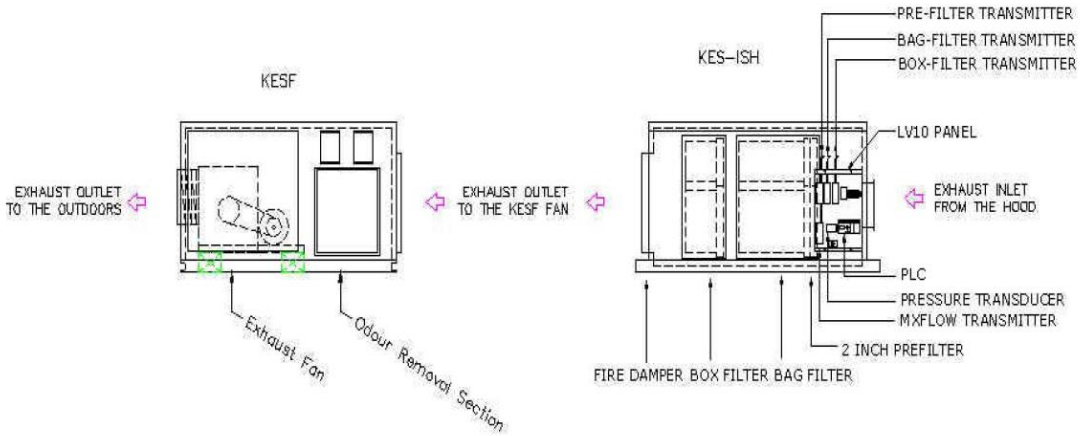
KESF Enviro Fan Box
Figure 2

THE SYSTEM

The grease-laden air rises from the cooking equipment into a UL or ULC exhaust hood. The exhaust hood removes some of the airborne grease particulate. Typically, most micron and submicron particles escape into the exhaust ductwork. The exhaust ducting is connected from the hood to the inlet of the KES Enviro unit. This exhaust ductwork must be supplied and installed in accordance with the NFPA-96 code.



KES System Schematic
Figure 3



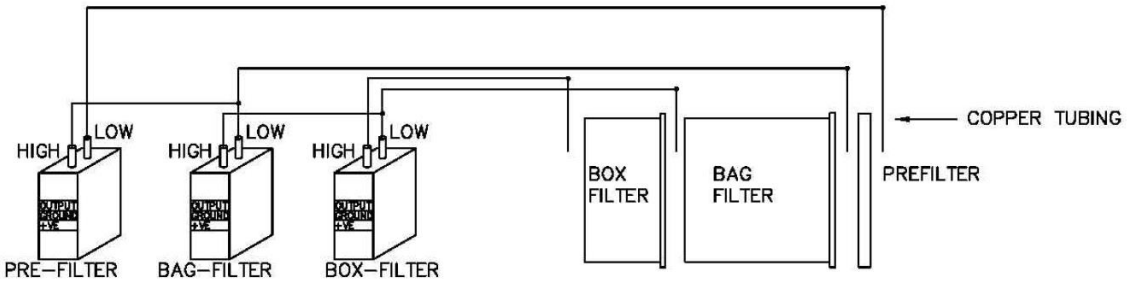
KES-ISH and KESF Enviro components

Figure 4

CONTROL CIRCUIT

Filter Clogged:

During normal operation of the KES unit three-filter stages collect grease, dust, and lint particulate. The type of cooking equipment and the hours of operation determines the useful life of the individual filters.



PRESSURE TRANSMITTERS

P1 – PRE FILTER CLOGGED SWITCH (SET AT 1.0 in. W.C.)
P2 – BAG FILTER CLOGGED SWITCH (SET AT 1.25 in. W.C.)
P3 – BOX FILTER CLOGGED SWITCH (SET AT 1.50 in. W.C.)

P4 – PRE FILTER REMOVED SWITCH (SET AT 0.03 in. W.C.)
P5 – BAG FILTER REMOVED SWITCH (SET AT 0.05 in. W.C.)
P6 – BOX FILTER REMOVED SWITCH (SET AT 0.05 in. W.C.)

Pressure Transmitter Locations
Figure 6

Box Filter probes as viewed from discharge
Figure 7

Pressure transducers determine when the filters are totally used and must be replaced. As the filter reaches the grease loading capacity the static pressure across each filter increases. When the maximum static pressure is reached the transducer activated a PLC output. The exhaust fan shuts off, the “NORMAL” pilot energizes, and the kitchen remote panel annunciates a filter-clogged condition. (The remote panel indicates which stage of filters has clogged; PREFILTER, BAG FILTER, or BOX FILTER.)

The clogged filter must be replaced and the system reset to resume normal operation. If this condition occurs during normally operating hours rotate the OVERRIDE selector switch and the fan will come back on. The systems can run in the OVERRIDE position for about 4 hours. (See the section the OVERRIDE switch) If the system runs longer than 4 hours the fan will shut down. The filters must be changed and the system reset. It is recommended that the filters be changed prior to the filter clogged light energizing. A filter usage chart is attached to record when the filters are being changed. Using this chart, a regular maintenance schedule can be set up to ensure constant uninterrupted operation of the commercial kitchen.

Filter Removed:
Should the bag or box filters be removed during normal operation the KES unit is automatically shutdown. A pressure transducer measuring static pressure across the bag filters and box filters monitors a minimum pressure drop of 0.05" W.C. When the filter is removed the pressure differential falls and the pressure switch is activated. The exhaust fan shuts off, the "FILTER REMOVED" pilot light on the control panel energizes and the screen of the PLC in the control panel has a text message indicating "FILTER REMOVED/LOW EXHAUST. To resume normal operation the filter must be replaced and the system reset. (See the section the OVERRIDE switch)

High Temperature:
In the event of a high temperature in the ductwork leading to the KES unit or within the KES unit a firestat located at the inlet of the KES filter section is activated. When the exhaust air reaches 160 F the firestat is energized. The exhaust fan shuts off, the "NORMAL" pilot goes off, and a "FIRE" pilot energizes on the remote RPD-KD or RPD-KW panel. Should the exhaust temperature continue to rise the fusible link melts and closes the fire damper in the exhaust discharge of the KES filter section. This fire damper is always located between the fan and filter section. The fire damper fusible link is rated at 165 F. Shut off all cooking equipment and notify the fire department. To resume normal operation, replace the fusible link and reset the system.

Override Switch:
In the event that the filter clogged annunciation shuts off the KES unit during a peak cooking time rotate the OVERRIDE SWITCH located on the control panel clockwise. The WARNING pilot light will energize and the FILTER CLOGGED and NORMAL lights will turn off. This is a temporary override to allow for the cooking equipment to be shut off prior to changing the filters. The systems can run in the OVERRIDE position for 4 hours. If the system runs longer than 4 hours the fan will shut down. The filters must be changed and the system reset. It is recommended that the filters be changed prior to the filter clogged light energizing. A filter usage chart is attached to record when the filters are being changed. Using this chart, a regular maintenance schedule can be set up to ensure constant uninterrupted operation of the commercial kitchen. Once the

dirty filter has been replaced rotate the OVERRIDE SWITCH to counter clock wise to resume normal operation.

MXFLOW OPTION

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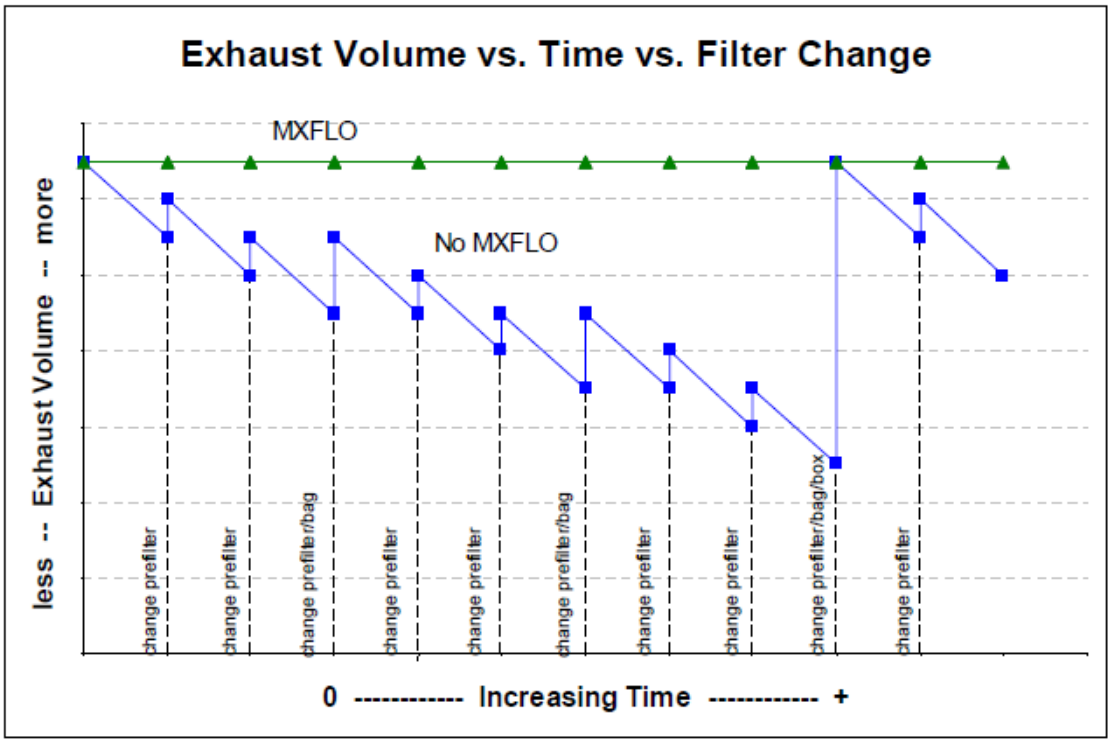
INCREASING FILTER LIFE

MXFLOW is designed to increase filter life while maintaining maximum exhaust volume during the commercial kitchen cooking operation. Immediately after commissioning the KES unit the exhaust air volume is at the highest level. As each of the three filter banks captures grease particulate of micron and submicron size they begin to fill and the air resistance through each filter increases. Even though the KESF unit has a heavy duty, Class II, backward inclined fan the increase in combined resistance (static pressure "W.C.) through each filter will gradually reduce the exhaust volume. In cases where there is very heavy cooking with large quantities of micron and submicron grease particulate the reduced exhaust volume is most noticeable. In some cases the filters may have to be changed not because the filter is clogged but because the combined static pressure resistance through all the filters has reduced the exhaust volume enough to affect smoke capture. This is less of a problem with lighter cooking operations.



In the example above the "No MXFLOW" KES unit exhaust volume (shown in BLUE) gradually drops as the filters become increasingly clogged. Even when the prefilters and bag filters are replace the exhaust volume does not return to maximum because the box filter continues to clog. This drop in exhaust volume generally only represents about 10% of the total exhaust volume. But in some

cases this can be enough to affect the hoods ability to capture smoke adequately. The “MXFLOW” KES unit incorporates a combination pressure transducer/microprocessor and variable speed drive to maintain constant exhaust volume regardless of the increased static pressure through any of the particulate filters. As the pressure across any filter increases and the exhaust volume decreases the pressure transducer/microprocessor senses this change and automatically increases the exhaust fan speed to compensate for this increased static pressure to maintain a constant exhaust volume.

MAXFLOW also allows for one touch exhaust volume adjustment when commissioning the unit; thereby making commissioning a more straightforward process. Additionally, MAXFLOW eliminated the nee to change sheaves. If the exhaust volume has to be field adjusted because of an appliance change or ductwork change the MXFLO provides automatic exhaust volume adjustment, up or down, with the touch of a single button.

Operation

As a filter clogs, the pressure drop through the filter increases, decreasing the exhaust air volume, and decreasing the static pressure measured at the PT. The PT sends a signal to the DMP to increase the static pressure back to the set point by increasing fan speed. The result is a constant exhaust volume until the filters are full and must be replaced.

CHECKING FAN ROTATION

Fan rotation should be checked prior to commission the system. Turn the fan selector switch in to the off position. Turn on the circuit breaker powering the KESF unit. The backward inclined KESF fan must be running backwards such that the fan blades pushing the air from the back of the blade. If the fan is scooping the air change the fan rotation. To correct fan rotation switch two of the high voltage wires on terminals V/T1, U/T2 or W/T3 on the drive or switch two wires at the motor. SHUT OF ALL POWER TO THE KESF BEFORE CORRECTING ROTATION

REPLACEMENT FILTER EQUIVALENTS

PREFILTERS: MERV7 (30% ASHRAE 52-76) - ULC Class II

American Air Filter:
24” x 24” x 2” - AM-AIR Class II
12” x 24” x 2” - AM-AIR Class II

BAG FILTERS: MERV13 (90 - 95% ASHRAE 52 – 76) - ULC Class II

American Air Filter:
24” x 24” x 21” - DRI-PAK - Class II
12” x 24” x 21” - DRI-PAK - Class II

BOX FILTERS: MERV16 (95% DOP/99% ASHRAE 52-76) ULC Class II

American Air Filter:
24” x 24” x 12” - BIOCELL Class II
12” x 24” x 12” - BIOCELL Class II Farr Filter:
24” x 24” x 12” - 6 pocket - 95% DOP Class II
12” x 24” x 12” - 6 pocket - 95% DOP Class II

ODOR MEDIA: 1/8” Activated alumina pellets impregnated with potassium permanganate.

American Air Filter: Permasorb

WHEN TO CHANGE THE KES FILTERS

The Prefilter, Bag filter and Box filter must be changed on a regular basis to maintain the high grease extraction efficiency required by the UL/ULC listing. Once a filter clogged light comes on the filter has reached its grease holding capacity. Further use will restrict exhaust air flow causing hood smoke capture problems and/or cause the clogged filter to blow out into the next filter or the exhaust fan. Therefore, the three particulate filters must be changed before the Filter Clogged lights activate and shut the unit down under normal kitchen operation. This will provide simple uninterrupted operation for your commercial kitchen operation.

Determine the Filter Change Schedule

When the KES unit is turned over to you by the installing contractor immediately change the Prefilters. The Prefilters will probably be full of construction debris and this debris will effect the initial operation of the unit.

PREFILTERS

1. Enter the start-up date on the attached FILTER FREQUENCY CHART. This is the date the Prefilters were changed as well.
2. Run the unit until the Prefilter Clogged lights turns on. When the light comes on the unit will shut down. Immediately turn the Override switch clockwise and put the unit into override. The unit will come back on. Change the prefilters at the end of the shift or the next day before cooking. Write the date that the Prefilters were changed on the FILTER REQUENCY CHART under Filter Change No. 1/Actual.
3. Determine the number of days between the Startup date and the Prefilter Change No. Actual date. Subtract two days from this number. Add the this number of days to the last actual prefilter change and enter this new prefilter schedule date in the schedule under Filter Change No. 2/Schedule. Change the Prefilters on this new date. If the Filter light activates before this new date reduce the number of days to the next scheduled change by one day.

BAG FILTERS

1. Run the unit until the Bag Filter Clogged lights turns on. When the light comes on the unit will shut down. Immediately turn the Override switch clockwise and put the unit into override. The unit will come back on. Change the Bag filters at the end of the shift or the next day before cooking. Write the date that the Bag filters were changed on the FILTER REQUENCY CHART under Filter Change No. 1/Actual.
2. Determine the number of days between the Startup date and the Bag filter Change No. Actual date. Subtract two days from this number. Add the this number of days to the last actual bag filter change and enter this new bag filter schedule date in the schedule under Filter Change No. 2/Schedule. Change the

bag filters on this new date. If the Filter light activates before this new date reduce the number of days to the next scheduled change by one day.

BOX FILTERS

1. Run the unit until the Box Filter Clogged lights turns on. When the light comes on the unit will shut down. Immediately turn the Override switch clockwise and put the unit into override. The unit will come back on. Change the Box filters at the end of the shift or the next day before cooking. Write the date that the Box filters were changed on the FILTER REQUENCY CHART under Filter Change No. 1/Actual.
2. Determine the number of days between the Startup date and the Box filter Change No. Actual date. Subtract two days from this number. Add this number of days to the last actual box filter change and enter this new box filter schedule date in the schedule under Filter Change No. 2/Schedule. Change the box filters on this new date. If the Filter light activates before this new date reduce the number of days to the next scheduled change by one day

By following the above procedure, you will maximize your filter life. Changing the prefilter prior to clogging improves the bag filter life and changing the bag filter prior to clogging improves the box filter life.

Table of max pressure filter operation

Filter	Flow %	Max. Value	Flow %	Max. Value	Flow %	Max. Value
Prefilter	100	960	90	864	80	768
Bag Filter	100	1440	90	1300	80	1150
Box Filter	100	1920	90	1730	80	1540

Max Value = Maximum pressure drop in inch of water for filter type. (960 = 0.96'' h2o)
Flow % = The % of use of the unit. (EX : 3200 CFM on a unit of 4000 CFM give 80% Flow %)

The Flow % is a value that need to be set at the start-up in the CC50 controller. To have your exact Max. Value, you need to multiply the Max Value when the Flow % = 100, with the real Flow % of the operational system.

EX : Flow % = 3200 CFM/ 4000 CFM = 80 %.
Max Value Bag filter = 144 x 80% = 115 = 1.15'' h2o.

FILTER FREQUENCY CHART

Startup date/First Prefilter change						
Change No.	Prefilter		Bag Filter		Box Filter	
	Schedule	Actual	Schedule	Actual	Schedule	Actual
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
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18						
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20						
21						
22						
23						
24						

KES MAINTENANCE SCHEDULE

Every two weeks:

1. Consult the CC50 screen to check the pressure reading for each type of filter and check the difference with the maximum pressure differential for each filter (see table of max pressure filter operation). It is very important to maintain clean prefilter(s). Replacing the inexpensive prefilter(s) often extends the life of the bag and box filters and reduces unnecessary down time due to clogged filter shutdowns. The CC50 control screen will indicate separately when the “prefilter”, “bag” and “box” filters are clogged. When this occurs, the unit shuts down. Press the override button to energize the system for another 4 hours. This provides time to change the filters after the day of cooking is complete. This is a final dirty filter alarm after the red dirty filter warning. The filter life of all the filters is constant for each operation. Once the approximate filter life for your application is determined we recommend that a regular filter change schedule be set up before the filter clog activates.

NOTE: An option of a dry contact is available to send a pre-alarm to the building management system to alert that one of the filters is almost clogged

Every Month:

1. Complete the two-week list.
2. Inspect the exhaust fan belt for correct tension and wear. All belts usually require adjustment at this time. Failure to tighten may result in the belt falling off and no airflow.
3. Check the bag filter (2nd stage filtration) pressure reading. If the bag filter bar graph is red replace the bag filter. The life of the bag filter depends on the type of cooking equipment and exhaust hood system. For heavy cooking applications the bag filters may require replacement every month.
4. (Odor Spray Option) Inspect the odor spray bottle. Refill if necessary. At start-up he odor spray is adjusted to the desired level. The amount of odor spray used varies with this initial setting. It is important to inspect the level in the bottle every two weeks until the normal rate of use is determined.

Every Three Months:

1. Complete the two-week and monthly checklist.
2. Inspect the exhaust fan belt for correct tension and wear. Adjust if necessary.
3. Check the box filter (3rd stage filtration) pressure reading. . If the box filter bar graph is red replace the box filter. Once again the life of the box filter depends. on the type of cooking equipment and exhaust hood system. The box filter may provide one year of service on most applications with high efficiency water wash ventilators.
4. Inspect all electrical connections. Tighten if necessary.
5. Test the filter-removed circuit. Open the prefilter access door while the KES unit is in operation. The unit should shut down and indicate a filter-removed condition.

Every Six Months:
1. Complete the two-week, monthly and three month check list.
2. Open the fan wheel access door or hatch on the KES fan section. Inspect the fan wheel for grease build up. Clean as required.
3. Inspect the exhaust inlet fire damper and fusible link. Replace link annually.
4. Check the motor and fan bearings for noise or overheating. STY and FYC bearings are factory pre-lubricated lifetime sealed and require no further lubrication. SY and FY bearings are pre-lubricated and equipped with pressure grease fittings for re-greasing. Under normal service conditions grease after six months of operation.
5. (Odor Pellet Option) Inspect the condition of odor media.
6. The odor media pellets can be checked for remaining life by sending a sample to an accredited test laboratory. Most major filter suppliers have access to such service. Replace media if required. To replace the media remove the cells from the KES unit. Open the side panel on each odor cell and pour out the used media. Refill the cells with new media. Shake cells while filling to allow pellets to settle evenly in the cell. Note: Do not allow odor media to come in contact with water, as this will immediately render the pellets useless.

Every Year:
1. Complete the two-week, monthly, three month and six month check list.
2. Check if KESF fan motor is running hotter then normal. If the motor running hot check the operating AMPS of the motor.
3. Make sure the KESF fan wheel rotates freely before startup. Inspect and clean the wheel periodically. If dirt is allowed to build up the wheel could become out of balance and cause premature bearing wear.

Fan Bearings
1. STY and FYC bearings are factory pre-lubricated lifetime sealed and require no further lubrication.
2. SY and FY bearings are pre-lubricated and equipped with pressure grease fittings for re-greasing.
3. Under normal service conditions grease after six months of operation.

Motor Bearings:
1. All motors leave the factory with bearings custom greased for many years of service under most conditions.
2. Re-greasing of motors depends on the application and is best left to trained service technicians.
3. Periodically check if motor is running hotter then normal.

Centrifugal Exhaust Fan:
1. Make sure the wheel rotates freely before startup.
2. Inspect and clean the wheel periodically.
3. If dirt is allowed to build up the wheel could become out of balance and cause premature bearing wear.

4. A noisy fan is a typical sign of a fan out of balance.

V-Belt Drives:

1. ALWAYS KEEP SPARE SET OF BELTS. Periodically check the belt tension and adjust if necessary.
2. Some slack should be left in the belt, typically 1/4” per foot of belt from the fan to the motor sheave.
3. Always replace the complete set of belts to ensure even tension and wear. When replacing belts loosen the motor mounts.
4. Do not force belts over sheaves.

RECOMMENDATION TO ENSURE TROUBLE FREE OPERATION FOR YOUR KITCHEN EXHAUST SYSTEM A PROPER PREVENTATIVE MAINTENANCE PROGRAM IS NECESSARY. SPRING AIR RECOMMENDS THAT A YEARLY SERVICE CONTRACT BE SET UP WITH A REPUTABLE SERVICE ORGANIZATION. THIS WILL REDUCE UNEXPECTED DOWN TIME TO A MINIMUM.