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## Building Operators Training Program

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### Univents

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#### Unit Ventilators (e.g., Herman Nelson, AAF Trane):

##### Function:

- ◆ Unit ventilators (a type of HVAC equipment) use a centrifugal blower, a finned-coil heating/cooling exchanger, and an air filter.
- ◆ Unit ventilators are very popular for rooms that require large amounts of ventilation air (such as classrooms) since ductwork is not required, and outside air is provided directly from the outside air grille.

##### The disadvantages of this type of terminal system include:

- ◆ Limited filtration because of the small filter rack width and limited static pressure head generated by the unit's fan system.
- ◆ As a result of infiltration, malfunctioning outside air dampers, and other maintenance and operations problems, the unit's coils may freeze during unoccupied periods when temperature setbacks are used.

##### The control sequences for operation are very flexible and include the following three basic cycles:

- ◆ **Cycle I:** 100 percent outdoor air is admitted for economy cooling during the occupied mode of operation. During warm-up, the outside air damper is closed.
- ◆ **Cycle II:** A minimum amount of outside air (20 to 50%) is admitted during the occupied mode of operation for heating and ventilating. The percentage of outdoor air is gradually increased, in response to a rise in space temperature. As additional space cooling is required, the heating valve is gradually closed and the outside air damper is gradually opened to 100% providing economy cooling. During warm-up the outside air damper is closed.
- ◆ **Cycle III:** Except during the warm-up stage, a variable amount of outdoor air is admitted (as needed) to maintain a fixed inlet air temperature for air entering the building. This control, typically set at 55°F to 60°F, provides ventilation during the cooling mode of operation.

##### Degradation of univent function:

The cause of degradation of the univent function can be attributed to lack of maintenance in the room or of the univent itself. The following are signs that the univent system is not operating as designed.

- ◆ **Accumulation of dust on the return intake vent.**
- ◆ **Heavy deposits of dust on the univent filter.** This can be a sign that the univent filter is not changed on a routine basis.

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**“In Wildness is the preservation of the World”. - Henry David Thoreau**

- ◆ **Accumulation of debris inside the univent above the fan units.** Accumulation of crayons, paper, food, and other debris can be a sign that univents are not routinely cleaned.
  - Storage of books, boxes, paper or other materials on top of the univent.
  - Storage of materials that block airflow prevents the univent from functioning.
- ◆ **Production of air from the univent at or near outdoor air temperature** can be a sign that the fresh air damper may be frozen open, allowing outdoor air to be preferentially drawn into the univent. This condition may result in pipes bursting due to heating coils freezing.
- ◆ **Production of excessive heated air from the univent** can be a sign the fresh air damper is closed, preventing fresh air from mixing and tempering return air temperature.
- ◆ **Controls within the univent fail to activate univent motors** can indicate that univent motors are disabled or univent controls are disconnected.
- ◆ **The room temperature does not match temperature setting on the thermostat.** This can indicate that thermostats are disabled and are not controlling the activation of the classroom univent.
- ◆ **Missing vanes or substitute covers over the univent air diffuser.** Failing to fix vanes in univent air diffusers can allow for materials to fall into the univent and damage the motors.
- ◆ **Leaves and other plant debris in the space above the filter rack** can indicate filters have not been installed.
- ◆ **The presence of plant debris above the filter rack** also indicates that the interior of the univents was not routinely cleaned.
- ◆ **Activated univent motors without spinning fans** can be a sign of broken or slipping fan belts.

**Each of these conditions can lead to the degradation of univent function, which can lead to a decrease in the provision of filtered fresh air into classrooms. Each of these conditions should be examined and repaired or remediated where found.**

### Custodial Maintenance Schedule

#### **Equipment Required:**

1. Wet/dry vacuum.
2. Grease gun and oil can.
3. Replacement filter media.
4. Allan keys.

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#### Procedures and Frequency:

At the beginning of each heating season and every three months thereafter:

1. Turn off power supply and lock out and tag out at the source.
2. Remove front cover with Allan wrenches.
3. Remove the old filter and vacuum the coil and interior cabinet. Care must be taken so that the fins on the coil are not damaged.
4. Inspect filters; wash or replace as necessary (monthly).
5. Dampers should be checked to see that they close completely when the unit is off. Lubricate as necessary.
6. Fan and motor bearings should be lubricated as required.
7. Belts should be checked for wear, cracks, alignment and tension.
8. If possible replace cover before turning the power on and testing the unit. If the cover must be left off to observe the operation, wear safety goggles and ensure that all tools and personnel are clear of any moving parts. When finished replace the cover and adjust the thermostat to the desired setting.

**Units must be vacuumed and pressure washed yearly.**

#### Force Flow Heaters

Air is forced by means of a fan over a coil heated by steam or hot water to supply heat to a room or area.

#### Equipment Required:

1. Extension light.
2. Various wrenches and screwdrivers.
3. Grease gun and oil can.
4. Wet/dry vacuum.

#### Procedures and Frequency:

##### Monthly:

- ♦ Inspect all operating parts for vibration and/or leaks; also listen for unusual noise.

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**“God has cared for these trees, saved them from drought, disease, avalanches, and a thousand tempests and floods. But he cannot save them from fools”. - John Muir**

#### Ceiling Mounted Units:

1. Turn off power supply and lock out and tag out at the source.
2. Inspect coil for dirt and leaks. Vacuum as required being careful not to damage fan blades or the fins on the coil.
3. Lubricate bearings, where applicable, on motors and fan. Remove excess lubricant and dust from the housing.
4. Turn power supply on and check operation.
5. Adjust thermostat to start the motor to verify proper operation and then set to desired temperature.
6. Check and replace filters if installed.

#### Entrance Heaters:

1. Turn off the power supply and lock out and tag out at the source.
2. Remove the front of the entrance heater being careful to cause as little damage as possible to the paint.
3. Vacuum the coil and the inside of the cabinet being careful not to damage the fins on the coil. Inspect the coil for leaks.
4. Lubricate bearings where applicable.
5. Inspect belts for wear, cracks, alignment and tension.
6. If possible replace the cover before turning the power on and testing the unit. If the cover must be left off to observe the operation, wear safety goggles and ensure that all tools and personnel are clear of any moving parts. When complete, replace cover.
7. Adjust the thermostat to start the motor to verify proper operation and then set to desired temperature.
8. Check and replace filters if installed.

#### Note:

- ♦ Turn off during summer.