

# MAINTENANCE CHECKLIST

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## ◆ *The Role of Maintenance*

Maintenance provides the capacity of facilities equipment and systems to operate as specified. All equipment and systems are purchased and installed with an expectation that they will perform as per specifications. Maintenance **sustains the capacity** of the equipment and systems to perform to specifications. If maintenance is deferred for prolonged periods, equipment performance will worsen, and in time, the performance potential will decrease.

For operations and maintenance groups, it is important to understand the roles of each. *Maintenance sustains the capacity of the facilities while Operations delivers the performance.* If maintenance is sacrificed, then the operating potential of the facility is reduced. Likewise, if operations are not optimized, the performance expectation of equipment is lost.

## ◆ *Maintenance Review – The Crucial First Step*

**Operating conditions** – What were the intended operating conditions?  
(i.e. occupant loads, temperature, humidity, hours of operation)

**Maintenance schedule per “conditions”** – What are the recommended daily, weekly, monthly, quarterly and annual maintenance items and assumed operating conditions?

## Building Envelope

Protect structural and insulation integrity and prevent excess air infiltration.

### ➤ **Roof and Exterior Wall Systems**

#### Quarterly

- Check roof drainage system for blocking, debris build-up and damming.
- Adjust outside door closers.

#### Annually

- Check roof membrane and penetrations for “checking” and cracking of membrane material and sealants.
- Replace worn or damaged weatherstripping and caulking.
- Check door and window alignment.

## Heating Systems

### ➤ **Boilers**

#### Monthly

- Flue gas analysis
- Check all steam traps for proper operation.
- Monitor water treatment program.
- Repair leaky steam or hot water valves.

#### Quarterly

- Check air intake to boiler room.
- Check radiator units for obstructions and cleaning.

### ➤ **Furnaces**

#### Monthly

- Check fan belts for wear and alignment.
- Change filters or as per specification.

#### Quarterly

- Clean heating and cooling coils.
- Clean grilles and diffusers.

#### Semiannually

- Check pulleys for wear and alignment.
- Clean fan blades.
- Clean and adjust dampers and linkage.
- Lubricate pumps, motors, and bearings as per specifications.

## Cooling Systems

For ducts, motors, fans and terminals treat as per "Furnace" section.

### Quarterly

- Clean exterior coil and fan units.
- Check refrigerant levels and pressures.  
Semiannually

### > **Chillers**

- Check refrigerant levels and pressures semiannually.
- Lubricate pumps, motors and bearings as per specifications.
- Check with manufacturer for compressor oil change or inspection cycle.

### > **Cooling Towers**

#### Monthly

- Lubricate pumps, motors and bearings as per specifications.
- Check belt tension and adjust.
- Clean sump strainer.
- Check fans and inlet screens and remove any dirt or debris.

#### Annually

- Clean and inspect protective finish inside and out. Look for signs of spot corrosion and refinish any damaged protective coating.

## Ventilation Equipment

### Monthly

- Check fan belts for wear and alignment.
- Change filters or as per specification.

### Quarterly

- Clean heating and cooling coils.
- Clean grilles and diffusers.

### Semiannually

- Check pulleys for wear and alignment.
- Clean fan blades
- Clean and adjust dampers and linkage.
- Lubricate pumps, motors and bearings as per specifications.

## Lighting Systems

Lighting output decreases over time but is recoverable with regular maintenance.

### Semiannually

- Survey room occupancy and lighting levels.
- Group relamp fluorescent and HID systems to reduce lumen depreciation and labor costs (if applicable).
- Clean luminaires at the same time as relamping. This item is crucial to maintaining adequate lighting levels.
- Replace badly discolored lenses and diffusers.

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### ◆ **Operations Review**

- Occupancy* – What are the design occupant density and patterns for the facility?
- Use* – What is the intended use (by defined area) within the building?
- Perform “real-time” comparisons – measure and inspect operations in “real time”. For instance, if the controller indicates a control damper is half-open, inspect the damper to confirm its position.

### ◆ **Energy Management Principles**

- Improve efficiencies – purchase efficient equipment and maintain for optimum performance
- Reduce “on-time” hours – what is happening when the space is unoccupied
- Reduce the need to use energy – energy conservation measures and occupant behavior
- Just meet loads and no more – calibrate heating and cooling to address actual conditions

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## **Building Envelope**

Protect structural and insulation integrity and prevent excess air infiltration.

### ➤ **Roof and Exterior Wall Systems**

- Prevent excess surface point loading for flat roofs to avoid wear penetrations. Curb, flash, and seal all base support rails for rooftop equipment.
- Use sealants compatible (chemically and physically) with exterior membrane for sealing all roof penetrations.
- Seal all penetrations and transitions of materials to prevent water migration and air leakage.

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## **Heating Systems**

### ➤ **Heating Equipment General Systems**

- Shut off (or turn down to minimum settings) heating units from vestibules, lobbies, and corridors that are not work areas.
- Do not heat storerooms or garages unless heat is for protection of stored contents.
- Change the spring, fall and winter day-night time clock setting to operate heating equipment fewer hours of the day cycle.
- Turn off heating or cooling 30 minutes before the end of the occupied period.

### ➤ **Boilers**

- Reduce the hot water boiler temperature for space heating to that, which will just satisfy heating needs.
- Monitor boiler logs for annual and seasonal operational characteristics.
- Monitor boiler water usage and blowdown frequency.
- Lower steam pressure to the minimum pressure that will satisfy needs.
- Adjust spring and fall boiler settings to come on line at low fire and stay on low fire until the heating requirement is satisfied. The boiler will cycle less often and maintain a higher overall annual efficiency with this procedure.
- Turn off the boiler natural gas standing pilot during the summer months when the boiler is off.
- Inspect zone shut-off valves. All should be operable so steam going into unoccupied spaces can be shut off.

### ➤ **Furnaces**

- Check flame color and fuel/air mixture.
- Monitor pressures across filter banks.
- Check heat exchangers for cracks and build-up.
- Check thermostats and controls for calibration.

➤ **Heat Pumps (Heating and Cooling)**

- Lower hot deck temperatures to the point that will just satisfy the system.
- Raise cold deck temperatures to highest that will still give acceptable humidity control

**Cooling Systems**

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- Raise room temperatures seasonally by steps to match increase in outside temperatures.
- Consult with manufacturer to determine if cooling equipment can be shut down when outside temperatures are below certain levels.
- Do not cool building when it is unoccupied except to the degree needed to prevent damage to internal contents.
- Schedule pre-cooling startup in the morning in accordance with outdoor temperatures so that the building interior will be at 78°F when occupants arrive.

➤ **Chillers**

- Operate only those water pumps needed to maintain flow volume where multiple pumps are installed in parallel. This would apply to chilled water pumps and condenser water pumps.
- Set demand limiter on chiller at a setting that will maintain the building temperature at or around 78°F.
- Operate one of multiple compressors and chillers at full load, rather than two or more at partial loads.
- Operate condenser water system at lower temperatures.
- Elevate chilled water temperatures when humidity conditions permit.

➤ **Cooling Towers**

- Check operating water level in pan and adjust float valve if necessary
- Check wet deck and sump for any signs of biological growth. Remove and clean if any present.
- Monitor water treatment program for effectiveness.
- Check bleed-off rate and adjust if necessary.
- Check nozzles and distribution pattern on wet deck quarterly.

**Ventilation Equipment**

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General

- Set or confirm that CFM/occupant outside air (OSA) requirements are as per code capacity.
- Adjust outside air equal to or slightly above minimum OSA requirement to provide a slight positive pressure.
- Place a small sign next to each exterior door advising occupants to keep door closed.
- Set exhaust ventilation operation controls to operate "as needed".

During Heating Season

- Adjust time clock or "on" hour settings to operate fewer hours during unoccupied or lower occupied times.
- Set outside air dampers to open only when the building is occupied.

During Cooling Season

- When the outside air temperature is cooler than indoor temperature, use 100% OSA to cool.
- Pre-cool structure with OSA at night.

**Lighting Systems**

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General

- Review area/room occupancy profiles annually to assess lighting levels and controls.
- Shut off lights in unoccupied rooms. In rooms with manual lighting controls, place signs to advise occupants to turn off lights when leaving.
- Turn off lighting during the day in areas that have adequate lighting from daylighting sources.
- Check lighting controls for proper performance and compatibility with current operation.