# Maintenance Guidelines for HVAC Equipment

Heating, Ventilation, and Air Conditioning (HVAC) equipment plays an essential role in maintaining business operations, whether it supports production processes, storage of perishable goods, or general comfort. A breakdown of this equipment may result in unnecessary downtime, business interruption, spoilage of products, and possibly reduced productivity due to discomfort. The best practice to ensure that equipment is reliable and reduce the risk of equipment breakdowns is to establish a preventative and predictive maintenance program.

It is important to familiarize yourself with the type of equipment and how it is used at your location. Important system characteristics to note include equipment type and manufacturer, system rating, refrigerant type, total system charge, physical layout, etc.

## Preventive Maintenance Guidelines

The following guidelines can be useful for developing a comprehensive maintenance program specific to your operation. Maintenance activities should be well-documented to maintain a record of machine history. Thorough documentation can help provide data for establishing trends, identifying abnormal conditions and tracking work performed by vendors.

Preventative maintenance, inspections and testing should be scheduled in accordance with the manufacturer's recommendations for the specific equipment and should only be completed by qualified technicians following manufacturer recommended procedures and all applicable safety precautions.

The following recommended maintenance practices should be included in your program

**Motors and compressors:**

- Inspect housing for physical integrity, damage, dust/debris build-up, and tightness of bolted connections.
- Ensure moving parts are properly lubricated.
- Check for abnormal noise, temperature, vibration, etc.

**Condensers and evaporators:**

- Check unit for damaged or plugged coil fins that could limit the amount of air exchange needed for unit efficiency and proper operation.
- Check the fan blades and shafting for damage and excessive wear. Verify fans are balanced and centered in their housing.
- Listen for audible indications of abnormal operations, such as grinding, high pitch noises, or excessive vibrations.
- Check for corrosion, damage, excessive buildup of debris, etc.

**Heat exchanger/furnace:**

- Check return air filters for cleanliness and replace on a regularly scheduled basis as determined by operating history.
- Check supply and return air vents for obstructions to ensure adequate air flow to and from the furnace/air handler.
- Check the combustion air inlet for debris or blockage to ensure adequate air is supplied for combustion.
- Visually inspect the flue for signs of carbon buildup (wasted fuel), proper connection, and corrosion. A poorly connected or corroded flue pipe can result carbon monoxide entering the occupied space.
- Perform a flue gas analysis, which may help identify if burners need to be adjusted.

**Ducting, air handlers, air distribution:**

- Visually inspect for leaking fluids, physical damage, corrosion, debris blockage, etc. This can help identify and correct issues that may result in failure.

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- Check for proper lubrication of moving parts.
- Check supply/return ducts for poor connections between duct work sections. Loose fitting, gaps, or holes will allow air to escape or enter the system reducing efficiency.
- Filters, screens, and other replacement parts should be checked regularly and replaced as needed.

**Refrigerant and lubrication oil testing:**

- Perform superheat and subcooling pressure testing to determine if the system requires charging.
- Conduct compressor oil analysis in accordance with manufacturer guidelines. Tests include acid content, viscosity, and wear metal content.
- Test refrigerant for contamination and any indication of oil absorption.
- Test system integrity prior to initial startup and periodically to help identify refrigerant leaks that may occur over the life of the equipment.

**Electrical testing:**

- Take amp draw readings annually: Measurements of the power consumption may identify an issue when readings are outside of expected nameplate data.
- Calibrate and test safety devices in accordance with manufacturer recommendations or at least annually. This includes pressure/flow switches, leak detection, sensors, pilot/combustion sensing control for furnaces, etc.
- Test local and remote alarms at least annually, including high and low temperature, low oil pressure, and low section pressure to ensure they will function as designed to alert the appropriate personnel for needed intervention.

## Predictive Maintenance Guidelines

- Insulation testing: Motor and electrical insulation is subject to degradation over time. Insulation testing will reveal degrading conditions and assist in establishing life expectancy of equipment. Refer to the manufacturer's documentation for insulation life expectancy and recommended testing frequency.
- Vibrational analysis: Annual vibration monitoring of rotational equipment can reveal degrading conditions before a breakdown occurs.

## Contingency Planning

In the event of HVAC equipment failure, it is important to have a written contingency plan established to minimize the interruption to business operations. Factors such as component lead time, access, rental equipment options, installation of rental equipment, excess/spare refrigerant, and contractor availability can affect outage times. Business interruption may be reduced and applicable expenses forecasted by having a formal contingency plan in place. Contingency plans should be reviewed and updated annually to keep key components of the plan accurate and up to date.