

The Locomotive

How Will Your Air Conditioning Perform This Summer? Here Are Nine Maintenance Tips to Help Keep Your Equipment Trouble Free

By Ron Behrens, P.E., The Hartford Steam Boiler Inspection and Insurance Company

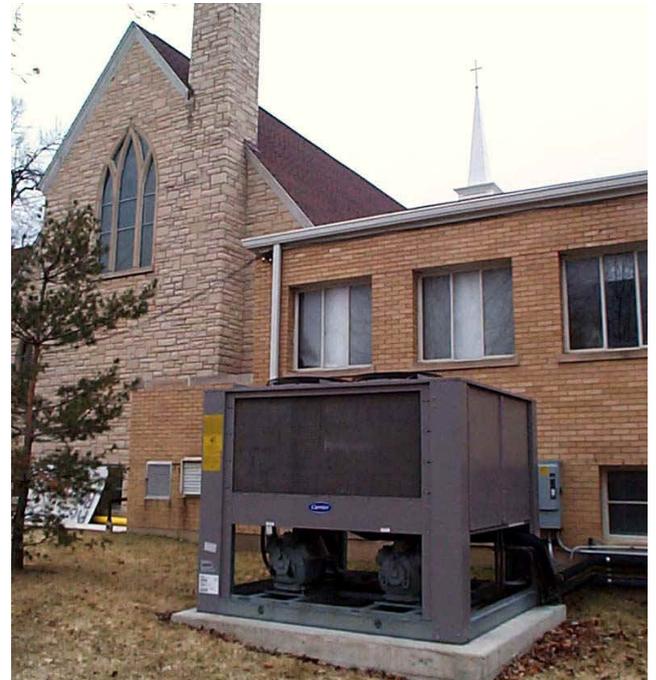
Introduction

Every year The Hartford Steam Boiler Inspection and Insurance Company (HSB) investigates numerous air conditioning unit breakdowns. Many of these are smaller hermetically sealed air conditioning units. One of the primary reasons for these breakdowns is poor preventive maintenance prior to start-up, as many failures take place at start-up or early in the cooling season.

Here are nine (9) maintenance tips to help you keep cool — and get ready for this summer's heat. These suggestions are intended to complement the equipment manufacturers' recommendations, not replace them.

Not Sure? Ask for Help

When in doubt, contact a service technician. Since most refrigerants are now regulated, and technicians must be certified if they're going to add a refrigerant charge (or even take pressure readings), we recommend that service work of this kind be handled by a reputable service company rather than performing it with in-house personnel. Many service contractors offer discounted rates for preseason checks, and



additional rate reductions for subscribing to their checks on a year-to-year basis. The time to take action is now, on a preventive basis. Don't wait until it's 96 degrees F in the shade.



Hartford Steam Boiler

© 1996-2013 The Hartford Steam Boiler Inspection and Insurance Company
All rights reserved. <http://www.hsb.com/TheLocomotive>

All recommendations are general guidelines and are not intended to be exhaustive or complete, nor are they designed to replace information or instructions from the manufacturer of our equipment. Contact your equipment service representative or manufacturer with questions.

Maintenance Tips

1. Crankcase Heater

For most rooftop and pad-mounted units, the outside unit consists of the condenser coils, a hermetic motor-compressor unit, and the compressor controls. A very critical control is the crankcase heater. This device is usually a strap-on heater strip that's attached to the lower circumference of the hermetic compressor.

At the beginning of the cooling season, before starting a unit, the crankcase heater must be energized. There may be a switch or the replacement of the disconnect may reenergize this circuit. Either a clamp-on ammeter or the back of hand (to detect heat) can be used to verify that the crankcase circuit is energized. The energized heater will minimize refrigerant migration to the compressor oil, and dilution of the crankcase oil (undesirable).

The crankcase heater should be energized for at least eight (8) hours before running the compressor. Crankcase heaters should be left energized for the rest of the season so that whenever the compressor is idle, the heater will prevent refrigerant "migration" to the crankcase.

2. Condenser Coils

These are the outside fins or coils, and they should be cleaned at least twice per year; once before start-up, and once before peak cooling demand (typically in July). Here's why. Dirty condensers are a key cause of pressure and temperature problems. A dirty condenser results in higher compressor discharge pressures, which may shorten the life of compressor valves within the reciprocating unit. A dirty condenser also is very inefficient in transferring heat, which means equipment will have to work harder and longer to achieve the same cooling effect inside.

If cottonwood trees are close-by, owners will need to check the outside unit frequently (daily) during the time when they're shedding their cotton-like seeds. The same goes for other dirt and debris that could block the coils. If

using a cleaning solution, make sure it's compatible with the condenser metals, and marketed for this specific use.

3. Electrical

The motor-compressor starter should be inspected prior to start-up. The contacts can be removed while de-energized for visual inspection. They should be replaced if pitted or deteriorated as the result of compressor cycling, arcing, or corrosion. Contacts are a common maintenance item, and service companies know they are a very common cause for "no cooling" service calls. They should be replaced on a scheduled preventive basis, not at the peak of the cooling season when service companies are busiest. At the same time, terminal connections should be checked and tightened.

Speaking of the peak of the cooling season, the bar graph below illustrates when most air conditioning losses occur. Besides start-up failures, we are also seeing a peak of "hot weather" breakdowns. Insurance coverage may pay for the financial loss. But that is of little immediate comfort when your air conditioning unit is down, the temperature is in the high nineties or worse, and the inside of your facility is sweltering.

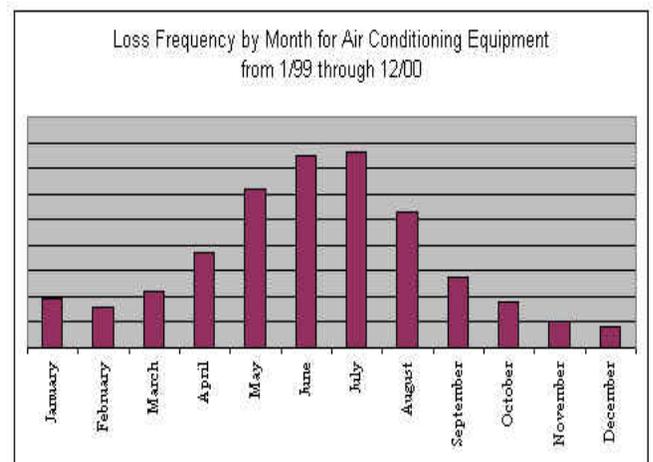


Table 1: Loss Frequency by Month for Air Conditioning Equipment

4. Moisture

Moisture within the refrigeration system is very undesirable. For this reason, most systems are equipped with moisture filters and moisture indicators, usually on the high pressure (liquid) line, but sometimes filters are also located on the low pressure suction line as well. Once the compressor is up and running, check the color indicator to see if moisture is present. If moisture is present, make sure the service technician deep vacuum cleans and dries the system, and installs new line filters and dryers. Also the source of the moisture must be determined and corrected, e.g. check for leaks at fittings.

5. Low Charge

If your system has ever needed a refrigerant charge because it was low on refrigerant, it is very likely you'll need a recharge sometime again, unless all leaks were identified and repaired. The moisture indicator also serves as an indicator of refrigerant charge. While the compressor is running, there should be no bubbles in the sight glass. Normally you'll see a pattern of clear liquid flow. Bubbles in the liquid refrigerant indicate a low charge or related problem. Another indicator of improper charge is ice buildup on the compressor suction line. Cold sweat is normal during operation, but an ice build up at the compressor suction line is abnormal.

6. Check for Leaks

A check for leaks should be conducted if conditions warrant, not only for operational reasons, but also to protect the environment. Additives to the refrigerant are available that will become fluorescent and highly visible under black light. Sniffers are also available that will detect very minute leaks. There should be no oily appearance at fittings or seals.

7. Evaporators

These are the inside coils/fins. These heat transfer surfaces need to be clean and air flow unobstructed. Therefore, make sure air filters are in place and are changed on a regular basis. A log should be placed near the filter area to record and document the cleaning schedule.

8. Electrical Protection

Line disturbances" and "lightning" are often cited as loss causes for air conditioning equipment. Here are some recommendations that will improve your level of protection:

Install service-entrance surge protection. Since these devices are installed where the power comes into your facility, everything downstream benefits, including telephone systems, computers, photo-copiers, microwaves, VCRs, public address and broadcast equipment, and the list goes on. Compressor "hard start" kits (basically capacitors) may also provide an additional level of surge protection for the air conditioning unit.

Install a programmable thermostat. These devices have built-in time delay that will prevent a compressor from restarting immediately after it just shut off, perhaps because of a temporary low voltage condition in the area. Starting currents are six times (or more) the normal running amperage, and cycling should be minimized because of the detrimental stress and heating effects. Also, an immediate restart would be hard on motor-compressor because the system discharge pressures would still be very high. By waiting until the system pressures equalize, the unit will likely have a longer life.

Most smaller units use single-phase power. Larger 480-volt units may be three-phase. In these cases, phase protection is very desirable. The protection would keep the unit from continuing to run or trying to start when there was not power from all three power lines connected to the unit. When this happens, a compressor motor will often "burn out" before conventional over-current and short circuit protection devices can protect the motor from damage.

9. Operating Characteristics

Not enough can be said about the common sense aspects of a routine preventive maintenance program that includes regular visual checks of equipment. Each system has its own pattern of noise, vibration, speed, temperature and pressure. They vary depending on the

season and load your system handles. Once you've familiarized yourself with these normal conditions, you'll be able to identify the trouble spots. Any change in normal operating characteristics is a warning. Call the service technician if you notice:

- Unusual noise or vibration
- A strange odor
- Oil or water spots
- Sudden change in temperature, speed, or pressure.

Correct the problem at once.

Start a preventive maintenance program now, and stay cool this summer. Take the time to check air conditioning equipment prior to start-up and continue regular maintenance to help keep your equipment running longer and more efficiently from season to season.

About the Author

Ron Behrens, a director of Loss Control for The Hartford Steam Boiler Inspection and Insurance Company in Chicago, has more than 23 years of insurance and engineering experience. He is a licensed Professional Engineer (Illinois) and earned an Electrical Engineering degree from Valparaiso University. Ron also received the Associate in Loss Control Management designation from the Insurance Institute of America, is a certified infrared thermographer, a member of the Institute of Electrical and Electronics Engineers (IEEE) and the National Society of Professional Engineers (NSPE).