



Inspection Techniques: Keeping Electrical Motors Clean

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Learning Objective: The student shall be able to explain the potential outcome of a “locked rotor condition.”

The dust- and lint-covered bathroom fan housing suggests a similar unseen condition exists behind the wall and regular housekeeping or preventive maintenance is lacking.

While materials and insulation systems have changed, the basic principles and operation of an electric motor have not changed very much over the last century. An electric motor is made up of four basic components:

1. Stator winding.
2. Rotor assembly.
3. Bearings.
4. Shaft.



The dust accumulation on the face of this fan cover suggests that the electric motor behind it may be dirty as well.

The rapidly spinning rotor assemblies occasionally overheat and catch fire when they are run continuously for a long period of time. This happens if the motor is under unusual stress such as being dirty from accumulations of dust, lint, fibers, flyings, and fines in the atmosphere. This dust accumulation prevents the electric motor from dispersing heat away from the rotor, bearings, and shaft. In severely dusty environments, special enclosed electrical motors are required to prevent dust explosions.

If the dust accumulation becomes so severe that the motor cannot start when energized, a situation known as a “locked rotor condition” can occur that may increase the motor temperature dramatically. Dwelling-style bathroom fan motors generally are rated to operate at a maximum insulation temperature of 266 °F (130 °C). With the rotor locked, the temperature of a bathroom fan motor can reach in excess of 340 °F (171 °C).

In the locked rotor condition, the overheating may be compounded by lint build up and plastic fan blades, which can ignite and add fuel to the fire. To prevent this, new bathroom fans have a thermal fuse that opens at approximately 260 °F (126.7 °C). Older fans may not have this safety feature, and may be even more susceptible to overheating to the point of igniting nearby combustibles.

The fire inspector should pay particular attention to this housekeeping problem and see that it is corrected.

