

Facility Safety

# Tips and Tools for Indoor Air Quality and Efficiency in Building Envelopes

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Whether at an industrial plant, in a commercial office, or residential home, frequent inspections of the building envelope and the environmental conditions inside are important for maintaining healthy and efficient buildings. Here are tips on how to monitor heat loss, moisture detection, indoor air quality, as well as the performance of heating and ventilation systems.

## 1. Locate moisture intrusion

Moisture intrudes through joints and cracks in roofs, ceilings and walls, and is trapped, resulting in structural rot and mold.

Regular moisture detection inspections with a thermal camera, inside and outside of structures, quickly locates areas of accumulated moisture. If mold is suspected, take temperature and humidity readings using a temperature humidity meter to determine whether suspected areas have fallen below dew point levels.

The Tools:

- *Fluke Ti480 PRO Thermal Camera*
- *Fluke 971 Temperature Humidity Meter*

## 2. Monitor heat loss

Inspect the quality of insulation inside the building, as well as numerous other areas where heat loss can occur, such as cracks or breaks in building seals. Temperature scans inside and outside of structures—along ceilings, floors, walls, windows, doors, vents and pipes—immediately show you problem areas.

Use an infrared thermometer to scan walls, floors and ceilings and quickly determine whether room temperatures are equally balanced. If differences are found, use a thermal camera to quickly locate sources of heat loss, such as insufficient insulation or broken seals.

The Tools:

- *Fluke 561 HVAC Infrared and Contact Thermometer*
- *Fluke Ti480 PRO Thermal Camera*

## 3. Measure indoor air quality

Actively monitor conditions that promote a healthy, productive environment and greatly reduce the number of occupant complaints. Measurements include air temperature, relative humidity, airborne

particle concentrations, and levels of CO<sup>2</sup> or carbon monoxide gases. For example, CO<sup>2</sup>, which is a byproduct of respiration, can indicate the rate of fresh air exchange into an indoor space.

Use an indoor air quality meter to check that temperature, humidity and ventilation are within comfortable levels. Verify filter effectiveness using a particle counter. Check that indoor air particulate levels are less than outdoor levels. Use an air flow meter to measure the pressure and movement of air within the building to locate leaks in ducts as well as malfunctioning ventilation and exhaust systems.

The Tools:

- *Fluke 975 AirMeter*
- *Fluke 922 Airflow Meter/Micromanometer*
- *Fluke 985 Particle Counter*

#### **4. Examine furnaces and boilers**

A variety of measurements can be made to inspect the performance of the heating system and identify repairs that need to be made.

Compare DC micro amps with manufacturer specifications and verify that flue gas temperatures are within acceptable limits using a true-rms clamp meter (with temperature measurement function). Use an indoor air quality meter to check for excess levels of CO<sup>2</sup> and harmful carbon monoxide in the area around boilers and furnaces. Harmful levels of CO<sup>2</sup> indicate problems with the ventilation/exhaust system, or the presence of leaks. Perform a scan of the furnace or boiler exterior with a thermal camera to check the inside insulation—hot spots indicate a need for repair.

The Tools:

- *Fluke 902 FC True-rms HVAC Clamp Meter*
- *Fluke 975 AirMeter*
- *Fluke Ti480 PRO Thermal Camera*

#### **5. Verify HVAC system performance**

For greater efficiency and extended equipment life, verify the proper operation of building HVAC systems.

Use a thermal camera or infrared thermometer to locate hot spots on operational components, which indicate pending mechanical or electrical system failure. Check electrical connections with a true-rms clamp meter. Over/under voltage causes reliability problems and failures.

The Tools:

- *Fluke Ti480 PRO Thermal Camera* or *Fluke 561 HVAC Infrared and Contact Thermometer*
- *Fluke 902 FC True-rms HVAC Clamp Meter*

*Previously Featured on Fluke's blog.*

*To help you locate moisture intrusion, monitor heat loss, measure indoor air quality and more, browse Fluke's line of electronic test tools on [MSCDirect.com](https://www.mscdirect.com).*