Ensuring Healthy & Energy Efficient Buildings

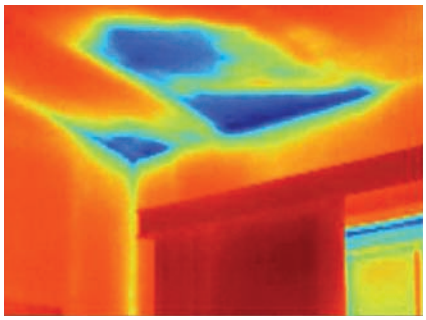
Application Note

Locate Problems Quickly & Easily with Building Diagnostics Tools

Building diagnostics involves identifying & troubleshooting anomalies throughout the building, which can affect overall performance. A number of separate yet inter-related conditions should be checked on a regular basis to identify potential problems in the way the building or its systems are operating.

A wide range of performance issues directly related to the building tightness, the quality of insulation, indoor air quality, and the effectiveness of ventilation systems can be quickly and accurately revealed with the right diagnostics tools. These tools include infrared thermometers and thermal imagers, indoor air quality and airflow meters, as well as equipment troubleshooting tools.

The collected data can be used to quickly locate and accurately diagnose existing or potential problems, which can jeopardize not only building performance and the comfort of its occupants, but also compliance with building, health and safety regulations.



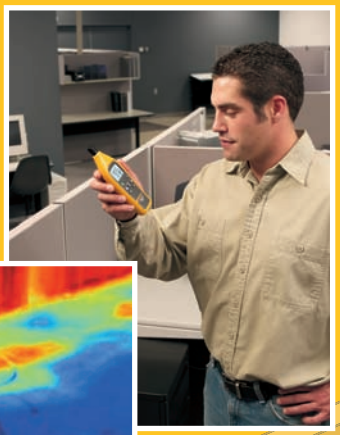
A diagnostic site visit can reveal the hidden dynamics and interactions between the building shell, heating system, and other building features. Here, a **Fluke TiR thermal imager** reveals missing insulation, which is a major contributor to heat loss.

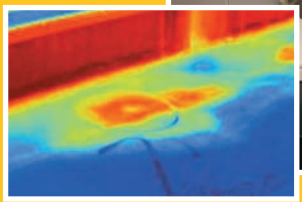
What should you inspect? Consider the following:

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 inspections with a **thermal imager**, inside and outside of structures, quickly locate 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.

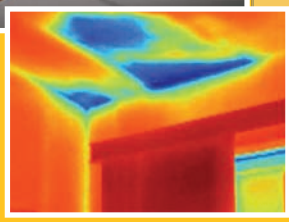




2. Monitor Heat Loss

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 imager** to quickly locate sources of heat loss, such as insufficient insulation or broken seals.



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_2 or carbon monoxide gases. For example, CO_2, which is a bi-product 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.

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Building Diagnostics Checklist

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.

4. Examine Furnaces & 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_2 and harmful carbon monoxide in the area around boilers and furnaces. Harmful levels of CO indicate problems with the ventilation/exhaust system, or the presence of leaks.
- Perform a scan of the furnace or boiler exterior with a **thermal imager** to check the inside insulation – hot spots indicate a need for repair.

5. Verify HVAC System Performance

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

- Use a **thermal imager** 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 to Use for Complete Building Diagnostics

Increase the efficiency, comfort and structural integrity of industrial, commercial and residential buildings by regularly monitoring heat loss, moisture invasion, indoor air quality, as well as the performance of heating & ventilation systems.

Fluke offers you the following set of rugged and reliable tools for complete building diagnostics, including thermal imagers & infrared thermometers as well as indoor air quality meters, air flow meters & equipment troubleshooting tools. Visit the Fluke web for detailed product specifications.

Fluke TiR Series Thermal Imagers

Professional thermal imaging for detecting hidden anomalies

- Detailed, ultra-high quality images
- Displays visual & thermal images
- Professional report writing software

Fluke 561 Multipurpose Thermometer

Two thermometers combined for complete surface temperature checks

- Non-contact infrared thermometer for quick scans
- Adjustable emissivity for highest accuracy
- Velcro pipe probe for easy contact measurements

Fluke 975 AirMeter

Complete monitoring tool for optimizing building comfort

- Measures temperature, humidity, CO_2 & CO levels
- Air flow & velocity measurements (with available probe)
- Easy data logging & reporting

Fluke 971 Temperature Humidity Meter

Pocket-sized solution for temperature & humidity checks

- Measures dew point & wet bulb temperatures
- Quick-response capacitance sensor
- Displays & logs MIN/MAV/AVG values

Fluke 983 Particle Counter

Portable solution for measuring airborne particle concentrations

- Measures particle sizes down to 0.3 µm
- User-selectable measurement parameters for greater flexibility
- Stores up to 5000 data records, which can be uploaded easily to a PC

Fluke 922 AirFlow Meter

All-in-one tool for complete ventilation/ exhaust system checks

- Measures differential/static air pressure, air flow & velocity
- Color-coded hoses enable easy set-up & use
- User-definable parameters

Fluke 902 True-rms Clamp Meter

Versatile service tool for HVAC system diagnosis

- Measures capacitance, DC current (µA) & temperature
- Easy one-hand operation
- CAT III 600V rating for optimal safety

Fluke. *Keeping your world up and running.™*

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Pub_ID 11233-eng