

APPLICATION NOTE



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Indoor Environmental Quality Audit Check HVAC Application

Office buildings, hotels and educational facilities are generally considered to be safe and healthful environments. However, newer building construction and energy conservation measures have minimized the infiltration of outside air and contributed to the buildup of indoor air contaminants which in turn gave rise to a new health diagnosis called “Sick Building Syndrome.”



Sick Building Syndrome is a term used to describe a set of symptoms related to chemical, particulate or biological exposure that cannot be related to a specific cause but are alleviated when the occupant leaves the building. Individuals report symptoms such as headaches, nausea, fatigue, drowsiness or eye, nose and throat irritation.

Indoor Environmental Quality (IEQ) and Indoor Air Quality (IAQ) are common terms used for the physical, chemical, and biological characteristics of indoor air. The characteristics of the environment are unique to the building, the climate, the HVAC system, the potential contaminant sources (i.e.: furnishings, moisture sources, work processes and activities, and outdoor pollutants) and the building occupants.



Investigations of indoor air quality are often triggered by complaints of smells, headaches, respiratory problems or other irritations that affect the inhabitants of the facility. The range of investigations of indoor air quality problems spans from complaints from one or two employees to episodes where entire facilities are shut down and evacuated until the events are investigated and problems corrected.

IEQ audits to check the safety, comfort or the health of the indoor environment typically are conducted either via a walk-through with an instrument in

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hand and pump running, or with an instrument set up to log data on a daily basis in the working environment. The walk-through inspection should cover all the affected areas. Factors to be evaluated include inside and outside contamination sources; the HVAC system, e.g., location of air source, contamination, and proper operation; and occupational contributors.

The National Institute of Occupational Safety and Health (NIOSH) has determined that inadequate ventilation is the main problem in 52% of their IAQ investigations. Therefore, ventilation surveys should be initially conducted. A good indicator of proper ventilation is the level of CO₂ present in a space. Also, high temperature and humidity levels can increase the concentrations of some pollutants. In the most basic configurations, IEQ instruments measure air quality on these three parameters; Temperature, Relative Humidity (RH) and Carbon Dioxide (CO₂).

Measuring and monitoring for other airborne contaminants can include sampling for formaldehyde, carbon monoxide, nitrogen dioxide, and VOC's which are common potential sources of contamination.

Much of today's new furniture, carpeting, and other building materials are chemically treated before being shipped or stored to prevent insect or pest invasion. Sources of formaldehyde fumes include off-gassing from urea formaldehyde foam insulation, plywood, particle board, and paneling; carpet and drapes; glues and adhesives. The IEQ Chek™ monitors equipped with a formaldehyde sensor can detect levels down to 0.1 part per million.



Measurements of carbon monoxide should be taken periodically throughout many areas in a building to be sure that air is being distributed evenly and no dangerous levels of CO are detected, especially in areas where any form of combustion takes place. Typical examples of outdoor CO sources in a building include exhaust emissions from traffic or parking areas and building exhaust stacks. Many buildings have adjacent or underground parking areas and controlling the introduction of vehicle emissions into the building is imperative. Indoor sources include furnaces, boilers, stoves and smoking areas. Instruments that measure carbon monoxide in real time include the IEQ Chek™ and combustion analyzers, such as the Fyrite® INSIGHT® or PCA®3. High nitrogen dioxide levels can also be generated from diesel or gas exhaust or incomplete combustion.

To confirm air quality and possible contaminants, the inspector should monitor and record area samples to identify potential causes of the problem(s). An indoor environmental quality monitor samples the air continuously and records the data points until downloaded to a PC. Accompanying datalogging software provides an analysis of the air quality based on the measurements from sensors installed in the monitor. Once the source has been determined then proper actions can be taken to improve the air quality.