Indoor Air Quality Fundamentals Part I

An Online Continuing Education Course for Engineers

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Indoor Air Quality Fundamentals- Part I

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Factors Affecting Indoor Air Quality

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Introduction

A healthy indoor environment is one in which the surroundings contribute to productivity, comfort, and a sense of health and well being. The indoor air is free from significant levels of odors, dust and contaminants and circulates to prevent stuffiness without creating drafts. In a well designed facility, temperature and humidity are appropriate to the season and to the clothing and activity of the building occupants. There is enough light to illuminate work surfaces without creating glare and noise levels do not interfere with activities. Sanitation, drinking water, fire protection, and other factors affecting health and safety are well planned and properly managed.

Unfortunately, many commercial buildings do not meet the above mentioned standard for air quality even though good air quality is an important component of a healthy indoor environment. For the purposes of this document, the definition of good indoor air quality includes:

- Introduction and distribution of adequate ventilation air,
- Control of airborne contaminants, and
- Maintenance of acceptable temperature and relative humidity.

A practical guide to indoor air quality (IAQ) cannot overlook temperature and humidity, because thermal comfort concerns underlie many complaints about “poor air quality.” Furthermore, temperature and humidity are among the many factors that affect indoor contaminant levels.

It is important to remember that while occupant complaints may be related to time at work, they may not necessarily be due to the quality of the air. Other factors such as noise, lighting, ergonomic stressors (work station and task design), and job related psychosocial stressors can - individually and in combination - contribute to the complaints.

Good indoor air quality enhances occupant health, comfort, and workplace productivity.

Failure to respond promptly and effectively to building environmental problems can have consequences such as:

- Increasing health problems such as cough, eye irritation, headache, and allergic reactions, and, in some rare cases, resulting in life-threatening conditions (e.g., Legionnaire's disease, carbon monoxide poisoning)
- Reducing productivity due to discomfort or increased absenteeism
- Accelerating deterioration of furnishings and equipment
- Straining relations between landlords and tenants, employers and employees
- Creating negative publicity that could put rental properties at a competitive disadvantage
- Opening potential liability problems

This course is the first in a two-part series. In this course, we will look at factors affecting indoor air quality and how to measure and evaluate indoor air quality. An explanation of how HVAC systems work is covered in chapter three and mold, mildew, asbestos and radon are covered in subsequent chapters.

The second course in this series discusses methods to mitigate indoor air quality problems and covers several common indoor air quality problems and potential solutions. But first, let's look at some of the factors that impact a building's air quality.

Chapter 1
Factors Affecting Indoor Air Quality

The indoor environment in any building is a result of the interaction between the site, climate, building system, construction techniques, contaminant sources (building materials and furnishings, moisture, processes and activities within the building, and outdoor sources), and building occupants.

The following four elements are in… …lity problems: