

Excerpt from

**Introduction
to
Comfort Control**

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Preview

The following is a sample excerpt from a study unit converted into the Adobe Acrobat format. A sample online exam is available for this excerpt.

The sample text, which is from the Air Conditioning and Refrigeration program, introduces you to the various types of work, components, and systems in the indoor comfort-control industry. In this excerpt, you'll look at the four components of comfort control and see where comfort-control systems are used. You'll also learn about the types of jobs and the pay scales for comfort-control employees.

After reading through the following material, feel free to take the [sample exam](#) based on this excerpt.

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Introduction to Comfort Control

THE FOUR COMPONENTS OF CLIMATE CONTROL

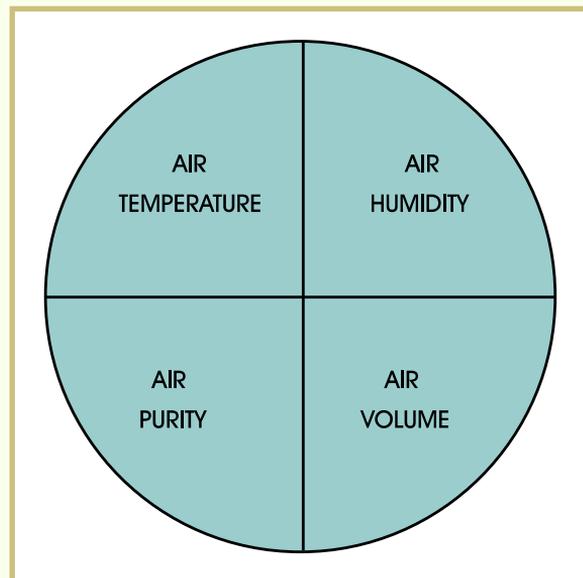
When most people hear the term *climate control*, they immediately think of air conditioning. However, there's much more to climate control than simply controlling the temperature of a room or area. You can easily control the temperature in any size area with thermostatically controlled heaters and air conditioners.

True climate control will provide

1. Temperature control
2. Humidity control
3. Air filtering (purity)
4. Air-volume management

Of these four components, which is the most important in climate control? All four of these components of climate control are equally important ([Figure 1](#)).

FIGURE 1—A true indoor comfort-control system will control these four components of the indoor air or climate.



What good would 70 degree air be if the humidity level was so low that wood furniture cracked and people complained of static shocks and dry noses and throats. Or, how about such a very high moisture content that mold and mildew form near the air outlets? Do we then control the temperature and humidity but let dirt, mold, pollen, and other pollutants circulate through the building? No, let's control the temperature and humidity and filter the air. We have to deliver the good air at an even rate so that stagnant pockets of air don't form around the building and so that papers don't blow off desks. So, climate control, commonly termed indoor comfort control, requires the control of air temperature, air humidity, air purity, and air volume to assure the comfort of the occupants.

Where We Use Comfort Control

The simplest form of comfort control is present in our homes. We have a wall-mounted thermostat that will turn on the furnace or electric heaters to increase the temperature of our homes. We may have window-mounted air conditioners that cool our homes when the temperature is too great. As we mentioned previously, these are simple systems that are proper for single-unit dwellings, but are very improper and inefficient for larger buildings.

Let's discuss some types of buildings that will normally have large, centrally located, climate-control systems. Suppose you were to climb the tallest building in a typical city and look around. You would see a lot of buildings that have roof-mounted air-conditioning and air-handling equipment, such as

- A college or an elementary school
- A hospital
- Hotels and motels
- Retail stores and a mall
- High-rise offices or smaller office buildings
- Apartment buildings
- Manufacturing plants and warehouses

As you can see, a typical city has a large number of climate-control systems from small systems to large systems housed in separate buildings called *powerhouses*.

With all of these systems in operation, you can see how work in the field of comfort control can be a profitable and stable form of employment. Heating, air conditioning, and refrigeration technicians held about 256,000 jobs in America in 1996. Heating contractors have about half of those employed in the field on their payroll. The remaining technicians work for hospitals, supermarkets, large industry, hotels, and so forth. About one in seven people employed in this field are self-employed. [Table 1](#) displays the wage range distribution for heating, ventilation, and air-conditioning technicians, or HVAC technicians as posted by the Occupational Employment Statistics, Bureau of Labor Statistics, United States Government.

Table 1

WAGE RANGE DISTRIBUTION FOR HEATING, VENTILATION, AND AIR-CONDITIONING TECHNICIANS (HVAC)

Wage Range	Hourly	Annual	Percent of Employment
A	under \$5.75	under \$11,960	*
B	\$5.75–8.49	\$11,960–17,659	9%
C	\$8.50–9.99	\$17,660–20,779	10%
D	\$10.00–11.24	\$20,780–23,399	13%
E	\$11.25–13.24	\$23,400–27,559	18%
F	\$13.25–15.74	\$27,560–32,759	19%
G	\$15.75–19.24	\$32,760–40,039	16%
H	\$19.25–24.24	\$40,040–50,439	10%
I	\$24.25–43.24	\$50,440–89,959	4%
J	\$43.25–60.00	\$89,960–124,820	*
K	\$60.01 and over	\$124,821 and over	*

As you can see from the table, the vast majority of the technicians are in the E, F, and G categories, a total of 53 percent. These technicians will earn between \$11.25 an hour or \$23,400 per year to \$19.24 per hour or \$40,039 per year. Of course, the rates are dependent upon the average pay and cost of living in the area where you live and the demand for climate-control technicians.

Types of Heating, Ventilating, and Air Conditioning (HVAC) Work

Note: Since most HVAC systems contain refrigerants and refrigeration systems, an HVAC technician must now be certified by an Environmental Protection Agency, or EPA, testing agency. Once certified in the proper handling and recycling of refrigerants, a technician may legally repair, install, and maintain these systems for their customers. *Everyone* who works on the refrigerant charging or discharging must obtain certification. There are no exceptions. There are stiff fines and imprisonment for violations.

In this section, we'll list some of the major job descriptions for HVAC work.

HVAC Maintenance Technician. A maintenance technician monitors, troubleshoots, and repairs HVAC systems. This technician may work for a contractor or may be a steady employee of a company using HVAC systems. This person will normally take readings and measurements, change filters, or check belts and fan blades. If certified, the maintenance technician may replace refrigeration system components and recharge the system.

HVAC Service Technician. A service technician is normally more highly trained in the service and repair of HVAC than the maintenance technician. The service technician's jobs will include the maintenance technician's tasks along with the troubleshooting of the pneumatic, electric, or electronic controls.

HVAC Field-service Technician. A large contractor or an equipment manufacturer employs the field-service technician. This technician travels from site to site helping with the installation, troubleshooting, and repair of large HVAC systems. This technician has had factory training on specific systems manufactured by one or more companies.

Modern advances in electronic controls have also created specialized jobs at higher employment levels for designers, system programmers, and specialized field-service technicians.

HVAC Installation Technician. An installation technician will typically work for a contractor. This technician is responsible for working with electricians, sheet metal mechanics, and other such contractors to install, test, and troubleshoot new HVAC systems.

Employment and Career

Sources of Information

If you want more information on career opportunities or on refrigeration system certification, you can contact any of the following sources of information.

Air Conditioning & Refrigeration Institute (ARI)

<http://www.ari.org/>
4301 North Fairfax Drive
Suite 425
Arlington, VA 22203

Air Conditioning Contractors of America (ACCA)

<http://www.acca.org/>
1712 New Hampshire Avenue, NW
Washington, DC 20005

Associated Builders and Contractors (ABC)

<http://www.abc.org/>
1300 North 17th Street
Roselyn, VA 22209

Home Builders Institute (HBI)

<http://www.hbi.org/>
National Association of Home Builders
1201 15th Street, NW
Washington, DC 20005

Mechanical Contractors Association of America (MCAA)

<http://www.mcaa.org/>
1385 Peccard Drive
Rockville, MD 20850-4329

North American Technician Excellence, Inc. (NATE)

<http://www.natex.org/>
PO Box 8127
Reston, VA 20195-2025

Plumbing-Heating-Cooling Contractors Association (PHCC)

<http://www.phccweb.org/>
180 S. Washington Street
PO Box 6808
Falls Church, VA 22046

Refrigeration Service Engineers Society (RSES)

<http://www.rses.org/>
1666 Rand Road
Des Plains, IL 60016-3552

A Positive Job Experience

A job in the HVAC industry at any level or position can be very rewarding, both personally and financially. In today's highly unstable markets, we can consider HVAC employment stable employment as there's a base of a larger number of installed HVAC systems that will need servicing. Many such systems are older systems that workers will gradually convert to the newer refrigerants, and workers are installing a large number of new HVAC systems daily. In addition, you can find other employment in such areas as the maintenance, repair, or service of refrigeration systems such as those used in supermarkets, food storage warehouses, and ice rinks.

Air-Conditioning Terms

Listed below are a few of the many new terms you'll need to be familiar with as you progress through the program.

BTU: British Thermal Unit, which is the amount of heat that will raise or lower one pound of water one degree Fahrenheit.

BTUH: A BTU hour relates to how many BTU's are used in one hour.

COP: Coefficient of Performance is a term used to rate a heat pump at 47°F and 17°F on its heating capacity.

HSPF: Heating Seasonal Performance Factor, which rates a heat pump on its efficiency in its heating mode.

SEER: Seasonal Energy Efficiency Ratio—This term relates how much cooling your equipment delivers per dollar spent on electricity.

Ton: A ton of air conditioning or refrigeration is equal to 12,000 BTU. A small home air conditioner can be as small as 5,000 BTU, and a large commercial system can be in the thousands of tons.