EL28 *Controls* (Climate Zones: all)

Use an astronomical time switch for all exterior lighting. Astronomical time switches are capable of retaining programming and time settings during loss of power for a period of at least ten hours. If a building energy management system is being used to control and monitor mechanical and electrical energy use, it can also be used to schedule and manage outdoor lighting energy use. Turn off exterior lighting not designated for security purposes when the building is unoccupied.

Parking lots and ground lighting are often beyond the control of the individual retailer and are not included here or in the Recommendation Tables in Chapter 3. Recommendations for parking lots and grounds are included in "Bonus Savings" sections EX1 through EX4 at the end of this chapter.

References

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USGBC. 2005. LEED NC Sustainable Sites Credit 8, "Light Pollution Reduction." Washington, DC: U.S. Green Building Council.

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HVAC

Good Design Practice

HV1 *General* (Climate Zones: all)

The HVAC equipment for this Guide includes packaged-unit systems and split systems generally referred to as *air-conditioning* or *heat pump* units (see Figure 5-26). These systems are suitable for projects with no central plant. This Guide does not cover water-source or ground-source heat pumps, systems that use liquid water chillers or purchased chilled water for cooling, or oil, hot water, solar, steam, or purchased steam for heating. These systems are alternative means that may be used to achieve the energy savings target of this Guide.

The systems included in this Guide are available in pre-established increments of capacity with a refrigeration cycle and heating source. The components are factory designed and assembled and include fans, motors, filters, heating source, cooling coil, refrigerant compressor, controls, and condenser. The components can be in a single package or a split system that separates the evaporator and condenser sections.

Performance characteristics vary among manufacturers, and the selected equipment should match the calculated heating and cooling loads (sensible and latent), also taking into account the importance of meeting latent cooling loads under part-load conditions. See HV3 for calculating the loads, HV4 for meeting latent cooling loads under part-load conditions, and HV13 for recommendations on zoning the building. See HV21 for a discussion on the location of space thermostats. The equipment should be listed as being in conformance with electrical and safety standards with its performance ratings certified by a nationally recognized certification program.

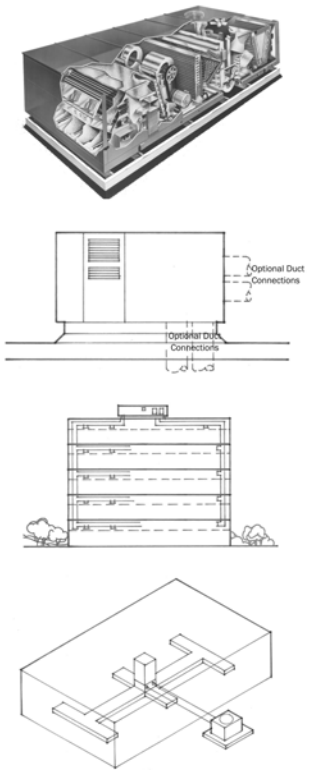

Figure 5-26. (HV1) Typical HVAC equipment and duct system layouts.

Single packaged units can be mounted on the roof, at grade level, or indoors. Split systems generally have the blower unit, including filters and coils, located indoors or in unconditioned space and the condensing unit outdoors on the roof or at grade level. On smaller systems, the blower is commonly incorporated in an indoor furnace section. The blower unit may also be located outdoors; if so, it should be mounted on the roof to avoid ductwork outside the building envelope. See HV9 for further discussion on the ductwork recommendations. The equipment should be located in a position that results in minimizing fan power, ducting, and wiring. See Figure 5-26 for examples of typical HVAC equipment and duct system layouts.

HV2 *HVAC System Types* (Climate Zones: all)

This Guide considers packaged-unit systems and split systems with a refrigerant-based direct expansion system for electric cooling and heating by means of one of the three following options:

Option 1: Indirect gas-fired heater
Option 2: Electric resistance heat
Option 3: Heat pump unit

Indirect gas-fired heaters use a heat exchanger as part of the factory-assembled unit to separate the burner and products of combustion from the circulated air.

Electric resistance heaters can be part of the factory-assembled unit or can be installed in the duct distribution system.

The auxiliary heat source for heat pump units may also be used to supply heating to the space during the defrost cycle and can be either electric or gas.

Where variable air volume systems are used, the refrigeration system requires reduced capacity in response to reduced load. The package unit should be designed to maintain the required apparatus dew point for humidity control. The controls of a variable air volume system should be arranged to reduce the supply air to the minimum setpoint for ventilation before tempering of the air occurs. Variable-speed drives should be considered as an option to reduce airflow and fan/motor energy.