“Heating, ventilation, and air conditioning” (HVAC), is an umbrella term that encompasses many individual generic types of equipment and systems, usually with subsystems and subcomponents. The components of HVAC systems in general include fans, dampers, coils, filters, humidifiers, and controls. The engineering study of the design and operation of such systems falls largely within the realm of mechanical engineering. It is not the intent in this chapter to provide the engineering theory, design parameters, or specific operating guidelines for such systems. Such information is provided in large volumes of handbooks and texts and is too broad in scope to address here. The purpose of this chapter is to provide a simple overview of these systems that will allow clinical engineers to be familiar with the systems and equipment and their functions. HVAC systems are generally integrated, although they can be separate. For example, a radiant heating system that does not employ heated air supplies as the primary method of heating may be used. Even in that example, it is likely that the minimal heating of supply air will use the same source of heat as the radiant heating system. In the simplest model, the central system to the HVAC operations is the air handler, shown in Figure 108–1 with its various elements. A building requires ventilation for fresh air and to exhaust the products of human ventilation and processes. Simple systems take fresh air from outside the building, using a fan, and they blow the fresh air through ducts to every room in the building, where it enters the rooms through vents. Air is similarly exhausted by being drawn out of the rooms through vents into exhaust ducts that blow it out of the building and into the atmosphere. Associated with the fans and ducts that move air in or out of the building are systems that filter the air, humidify or dehumidify the air, heat the air, cool the air, and control the volume of air supplied to the duct work and, in some cases, to each room. Remembering the basic air supply system, the individual additional systems and elements are described below.