

## Four Basic Categories of Air Handling Systems

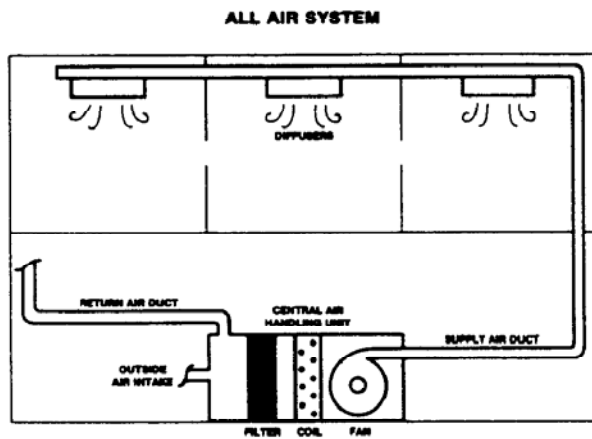


FIG. 1

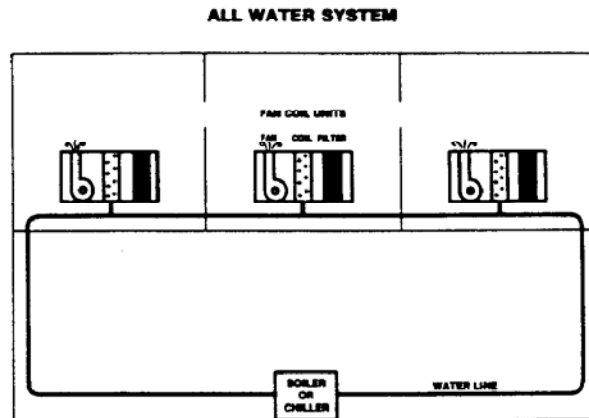


FIG. 3

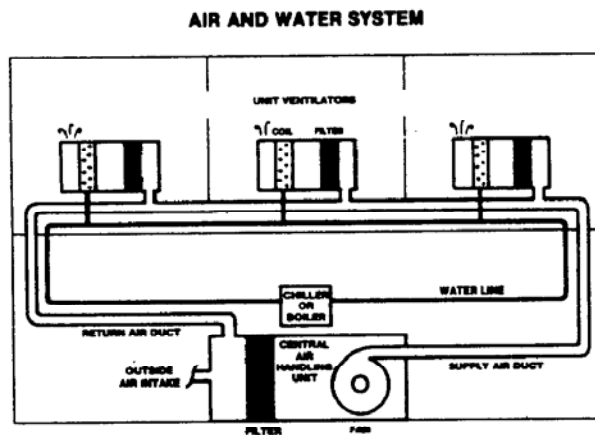


FIG. 2

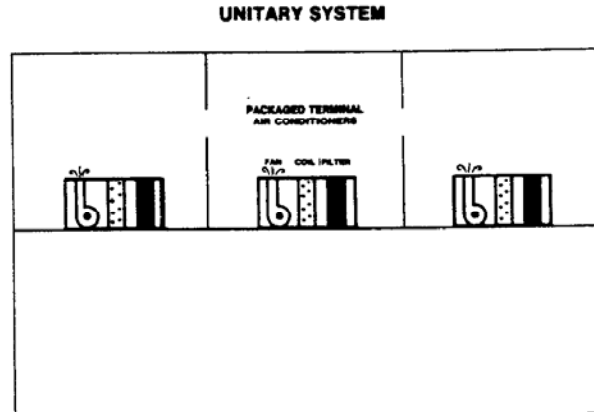


FIG. 4

The industry has divided HVAC systems into four main categories with the classification of a particular system based upon how the air supplied to the occupied areas is cooled. (How the air is heated is not considered.)

### ALL AIR SYSTEM

In an All Air System (See Fig. 1), the air is drawn by a large central fan through cooling coils located in a large central air handling unit. This pre-cooled air is then delivered through ductwork to terminal outlets (diffusers) in each room.

### AIR & WATER SYSTEM

An Air and Water System (See Fig. 2) is very similar to the All Air System, except the cooling coils are relocated to small housings called "unit ventilators" in each room. In this type of system, there are water pipes running next to the air ducts to carry cold water to the coils. Room air is induced or drawn through these coils and mixed with primary air from the central air handler. Unit ventilators typically have panel filters or media pads in front of the coils to prevent them from accumulating a layer of

dirt and lint. There is also typically a bank of filters in front of the fan.

### ALL WATER SYSTEM

In an All Water System (See Fig. 3), there is no Central Air Handling Unit or air ductwork. Only water pipes are needed. The coils again are in small housings or cabinets located in each room, but the cabinets also contain a small fan which draws air over the coils to cool the room. These units, called "fan coil" units, have a panel filter or media pad to protect the coils.

### UNITARY SYSTEM

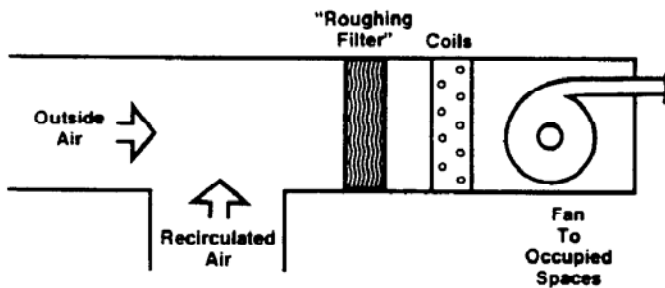
In Unitary Systems (See Fig. 4), all components, including the refrigerant, are contained in a unit in the room being cooled. Each unit operates totally independent of the others. There is no piping or ductwork. Room air conditioners and "through the wall" packaged terminal air conditioners fit into this category. As with unit ventilators and fan coil units, these units have a panel filter or media pad to protect the coils.

## Air Filtration Systems Used In All Air Central Air Handling Systems

Air filters are used in all types of HVAC systems to prevent the coils from becoming coated with dirt, dust, and lint. A build up of contamination on the coils decreases their heat transfer efficiency, in-

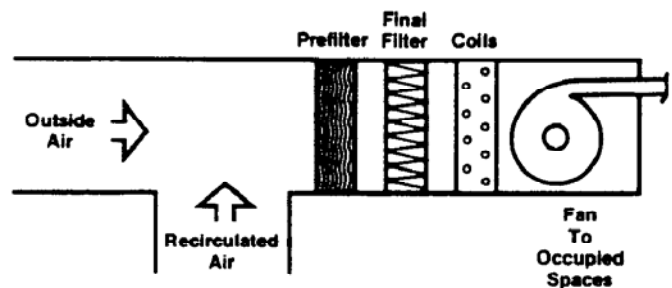
creasing energy costs for heating and cooling. A heavy accumulation will also increase the pressure drop across the coils, thereby affecting air volume.

### SINGLE STAGE FILTRATION



When the primary purpose of the filters is simply to protect the coils from accumulating a layer of dirt, a single stage system is normally used. "Roughing" filters, such as disposable panel filters, permanent filters, disposable media pads in permanent frames, automatic roll filters, or pleated filters are adequate for this purpose.

### TWO STAGE FILTRATION



When the application requires a higher level of air cleaning, such as prevention of staining, two stages of filtration are typically used. A bank of "roughing" filters, called "pre-filters," is followed by a bank of extended surface filters, often called, "final filters." The efficiency of the final filters ranges from 25% to 90% (ASHRAE 52.1-1992), depending on the filter design and type of media. Pre-filters are used to extend the life of the final filters. In those applications where extremely high filtration is necessary, a third stage of filters, such as HEPA filters, is installed at the inlet to the critical area.