units, using a sealing compound if necessary to prevent air leakage into the fan section of the unit.

Since the drain connection is usually made on the exit side of the coil, it is important that the drain line be properly sealed. This seal should be at least twice as deep as the suction on the fan in inches of water, to prevent gurgling sounds, and to insure a positive seal against infiltration of odors and moisture laden air. Drain pans should not be used to support the coils, unless they are designed to hold this weight without sagging. As the movement of air draws the condensate or excess humidification water toward the fan, drain connections are usually placed on the exit side of the coil. The advantages of quick drainage are lost if improperly supported coils distort drain pans and cause water to accumulate in the center or back of the pan.

When the fans of vertical units are stopped, condensate that has been held up in the coils by fan suction, drops into the drain pan and splashes against the casing. If water damage is to be avoided, flashings should be provided to prevent this water from running out of the unit at the seams.

When locating unitary equipment, floor and beam loadings should be carefully checked. Suspended horizontal units can add 50 to 100 lb per square foot to the loading on the floor above. Should this floor be already heavily loaded, or be a roof structure designed for a 40 lb per square foot snow load, excess beam deflection may occur and cause cracking of plaster or concrete fire-proofing. A small fire, normally of little consequence, may cause a rupture of a heavily loaded structure and permit the equipment to drop with extensive property damage. Self-contained units should be carefully installed since their weights run as high as 200 lb per square foot. When they are installed in street floor shops, the extra precaution of placing a column beneath them in the basement is an inexpensive method of reducing vibration, as well as providing insurance against overloaded floor beams.

The services required for operation of unitary equipment should conform to the many restrictive, but necessary, local municipal codes. Existing buildings seldom are wired adequately for the electrical load imposed by the starting of an air conditioning compressor on any branch circuit. Even the smallest room cooler can draw enough current to reduce the voltage of a lighting circuit to the point where it is visibly apparent. This voltage drop may even affect the life of the unit due to the relatively slow starting. The cost of a separate electrical circuit of adequate capacity from the main panel is more than justified; it is a necessary expense in the majority of installations.

A water supply of adequate capacity and pressure is necessary to prevent overloading of electrical equipment by high head pressures. The average city water supply pressure is adequate for installations up to the third floor. Since most water cooled units require about 20 lb pressure, including control valve losses, it is important that any units served by gravity from roof tanks be checked carefully if located less than 40 ft below the tank.

Drain connections from condensers should flow to an open and properly trapped sink as required by most city codes. This prevents back pressures on the city water system in the event of condenser failure. A check valve should also be installed in the water supply as a further precaution against contamination.

When installing small remote or self-contained units with outside air connections in buildings more than 6 stories high, the effect of wintertime

stack action in elevator and stairwells requires special attention. This stack action is the cause of negative pressures on the lower floors, tending to draw cold air through the units, and positive pressures on the upper floors preventing adequate ventilation and disrupting air distribution. It can also cause annoying whistling at door openings and lead to serious complaints in hotels and offices. Wherever the removal of such units is impracticable, it is important that carefully fitted, felt-edged dampers be installed in the outside air intakes with adequate locking devices.

One further consideration when installing self-contained units in conditioned areas is that any maintenance or repairs to be required in future years must be carried on in occupied space.

UNIT AIR COOLERS

Unit air coolers are intended principally for product cooling, but are often used for cooling spaces to low temperatures. They differ from normal air conditioning units only in features required to produce lower temperatures. In using such units, relative humidity and dry-bulb temperatures should be considered as carefully as in comfort air conditioning systems. Where the product being cooled is sealed in containers impermeable to water vapor, relative humidity becomes a secondary consideration.

In recent years the unit cooler has almost entirely supplanted the gravity type prime-surface and finned-tube coil. It provides more positive control of air and better air distribution, is more efficient in performance, requires less space, and is less expensive. In the past, applications of unit coolers were often limited to cold storage warehouses and to retail and wholesale markets for meat, fruit, and vegetables. In such applications, control of relative humidity was considered unimportant because of the low storage temperature or the temporary nature of the storage. In most of these cases, experience had indicated that approximately correct relative humidities would be obtained if the temperature differential between the room and refrigerant were maintained within a desirable range.

Unit coolers, however, can perform satisfactorily in installations requiring accurate control of relative humidity, air motion, and dry-bulb temperature, and thereby prevent excessive weight loss, mold and slime growth, and moisture absorption by hygroscopic materials such as dried fruits.

Unit coolers, especially in the smaller sizes, are very similar in appearance to unit heaters. Copper or steel prime or finned surface tubes are arranged in single or multiple circuits, depending on the loading. Propeller or centrifugal fans either blow or draw room air over the tubes. The fan and coil are generally enclosed in a casing provided with a drip pan. The motor horsepower requirements are a function of the air quantity and coil depth, that is, the number of rows of tubes. Finned coils are generally four to six rows in depth while prime-surface coils range from six to ten rows in depth. Fin spacing is based principally on operating temperature and the ratio between latent and total load. For operation below 32 F, fin spacing may vary from 2 to 6 fins per inch, while above 32 F it may vary from 5 to 8 fins per inch. Both direct expansion refrigerants and brine are used successfully as cooling mediums.

Unit coolers may be arranged for either free or duct delivery. Face velocities vary from 200 to 800 fpm, depending principally upon the intended application of the unit. In the larger sizes particularly, speed adjustment of the fan is generally provided to permit variation of the air delivery, and thus obtain a closer control of the relative humidity. While unit coolers are usually installed in the storage space, remote installation combined with