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, dry-bulb temperatures should be considered first, after which room moisture conditions and air distribution should be considered, depending on the product being cooled or stored.

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, is easier and less expensive to install, and is often less expensive in first cost. Early applications of unit coolers were limited to cold storage warehouses. In recent years they have been widely used in retail and wholesale markets for meat, fruit, and vegetables.

Products to be cooled or stores may be divided into four general classifications based on their sensitiveness to moisture loss.[4] Selection of the proper temperature differential between storage-room air temperature and evaporating refrigerant temperature will produce adequate moisture control for all practical purposes. The differentials required for gravity circulation and for forced air circulation are different, the latter requiring closer differentials. The four classes and differentials which have been successfully used are as follows:

Class 1.—*Products requiring high room-moisture content, which are highly susceptible to moisture loss and are being stored for extended periods, for example, eggs.*

Gravity Circulation	18 F or less.
Forced Air Circulation	6 to 9 F.

Class 2—Products similar to Class 1 but which are being stored only for a limited time as in retail stores where the turn-over is usually 3 days or less, for example, cut meats.

Gravity Circulation	18 to 22 F.
Forced Air Circulation	9 to 12 F.

Class 3—Products requiring moderate room moisture content and which are moderately susceptible to moisture loss, for example, carcass meats and some fruits.

Gravity Circulation	21 to 27 F.
Forced Air Circulation	12 to 20 F.

Class 4—Products from which there is a very low moisture loss or none at all and where room moisture content is not important, for example, canned goods, furs, woolens, bottled goods, dried fruits, foods packaged in good moisture vapor barrier packages.

Gravity Circulation	25 F and up.
Forced Air Circulation	20 F and up.

When using class 4 application, with finned evaporators and automatic defrosting at each cycle of the condensing unit, it is important to avoid using too wide differentials with very low refrigerant temperatures. In many applications, prime-surfaced evaporators prove unsuitable for this type of defrosting and will require some positive method of defrosting.

Unit coolers can perform satisfactorily in installations requiring accurate control of relative humidity, air motion, and dry-bulb temperature, and