Many prime surface coils utilize flooded expansion as obtained with a float valve to improve the heat transfer coefficient. Where dry expansion is used, many coil manufacturers recommend the use of a liquid-vapor heat exchanger to increase the coil efficiency by obtaining the control of superheat in the heat exchanger rather than in the evaporator coil. Liquid subcooling thus obtained contributes to an increase in the overall efficiency of the refrigeration system.

Where two or more evaporator coils are to be attached to a single condensing unit, and different evaporator temperatures are desired, a back pressure valve may be installed to limit the minimum evaporating temperature of the warmer coils. This valve also finds application where fluctuation in the evaporator temperature prevents accurate control of air temperature and humidity.

The importance of securing uniform air distribution to every part of the product zone, and the use of a permissible velocity of air over the product, must be recognized when selecting the unit coolers and their outlets. For each product there are certain maximum and minimum permissible velocities. If the average velocity falls below the maximum allowable velocity, it is of no consequence so long as the air distribution throughout the storage space is uniform and every portion of the room is reached by cooled air. It is important to note that the quantity of air in motion in the refrigerated space is not only that passing through the coils. A quantity of air many times in excess of the air handled by the units is always set in motion by the induction effect of the moving cooled air. Therefore, in evaluating the velocity for any given area, the total air set in motion must be considered. It is a function of the type of outlet, the discharge air velocity, and the location of the unit relative to restrictive walls and product.

Unit location is also important from the standpoint of occupant comfort, low velocity outlets being preferred for floor type units. High velocity outlets are acceptable in fur storage vaults, ice cream hardening rooms and other spaces where air motion is not an important factor.

In general, unit air coolers should not be suspended in front of door openings, or close to them where moist warm air will be drawn directly into the unit each time the door is opened, thereby causing excessive frosting and loss of capacity. Better performance will be obtained by placing the unit air cooler in a location such that the air will be discharged toward the door. If the shape of the space is such that this location would result in excessive air velocity over the product, then the location of the unit air cooler should be changed so that the air is discharged parallel to the wall in which the door is located.

REFERENCES

[1] Prepared by a Joint Committee of the *American Society of Refrigerating Engineers*, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, *Refrigerating Machinery Association, National Electrical Manufacturers' Association*, and *Air Conditioning Manufacturers' Association* (A.S.R.E. *Circular* No. 13–42).*

[2] Standard Method of Rating and Testing Self-Contained Air Conditioning Units for Comfort Cooling prepared by a Joint Committee of the *American Society of Refrigerating Engineers*, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, *Refrigerating Machinery Association, National Electrical Manufacturers' Association*, and *Air Conditioning Manufacturers' Association* (A.S.R.E. *Circular* No. 16).*

[3] Proposed A.S.R.E. Standard Methods of Rating and Testing Forced-Circulation and Natural Convection Air Coolers for Refrigeration (A.S.R.E. *Circular* No. 25–44).

* *ASRE* has combined *Circulars* No. 13–42 and No. 16 in *ASRE Standard* No. 16-R, Methods Rating and Testing Air Conditioners.

CHAPTER 27

PIPE, FITTINGS, WELDING

Pipe Materials, Types of Pipe, Commercial Pipe Dimensions, Expansion and Flexibility of Pipe, Hangers and Supports, Threading Practice, Types of Fittings, Flange Facings and Gaskets, Welding in Erection of Piping, Valves

IMPORTANT considerations in the selection and installation of pipe and fittings for heating, ventilating, and air conditioning are dealt with in this chapter.

PIPE MATERIALS

Use of corrosion-resistant materials for pipe, including special alloy steels, copper, and brass, has increased considerably during the past few years. The development of copper, brass, and bronze fittings which can be assembled by soldering or sweating, permits the use of thin-wall pipe and thereby has reduced the initial cost of such installations. The following brief discussion indicates the variety of pipe materials and the types of pipe available.

Wrought-Steel Pipe. Because of its lower cost, the great bulk of wrought pipe used for heating and ventilating work at the present time is of wrought steel. The material used for steel pipe is a mild steel made by the acid-bessemer, the open-hearth, or the electric-furnace process. Ordinary wrought-steel pipe is made either by shaping sheets of metal into cylindrical form and welding the edges together, or by forming or drawing from a solid billet. The former is known as *welded pipe*, the latter as *seamless pipe*.

Many types of welded pipe are available, although the smaller sizes most frequently used in heating and ventilating work are made by the lap-weld, resistance-weld, or butt-weld process. While the lap-weld and resistance-weld processes produce a better weld than the butt type, lap-weld and resistance-weld pipe are seldom manufactured in nominal pipe sizes less than 2 in. Seamless pipe can be obtained in the small sizes at a somewhat higher cost, and is listed as pressure tubing below 2 in.

Seamless steel pipe is frequently used for high pressure work or where pipe is desired for close coiling, cold bending, or other severe forming operations. Its advantages are its greater strength which permits use of a thinner wall and, in the small sizes, its freedom from the occasional tendency of welded pipe to split at the weld when bent.

Wrought-Iron Pipe. Wrought-iron pipe may be identified by the spiral line marked into each length, either knurled into the metal or painted on it in red or other bright color. Otherwise, there is little difference in the appearance of wrought iron and steel pipe, although microscopic examination of polished and etched specimens will readily disclose different grain structures.

Cast-Ferrous Pipe. There are now available several types of cast-ferrous