EFFECT OF AIR VELOCITY ON LOSSES FROM INSULATED SURFACES

In the case of well-insulated surfaces the increases in losses due to air velocity are very small as compared with increases shown above for bare surfaces, because of the fact that air flowing over the surface of the insulation can increase only the rate of heat transfer from surface to air, and cannot change the internal resistance to heat flow inherent in the insulation itself. The maximum increase in heat loss due to air velocity ranges from about 30 per cent in the case of 1 in. thick insulation, to about 10 per cent in the case of 3 in. thick insulation, provided that the insulation is thoroughly sealed so that air can flow only over the surface. If the conditions are such that the air may circulate through cracks and crevasses in the insulation, the increases may be far greater than those given above. Therefore, it is essential that insulation be sealed as tightly as possible. Pipe insulation out of doors should be provided with a weatherproof jacket, and other outdoor insulation should be thoroughly weatherproofed.

HEATING CONDUITS

When steam pipes are run between buildings they should be placed in some form of waterproof conduit which will withstand earth loads and take care of the expansion and contraction of the piping without strain or stress on the couplings, and without affecting the insulation or conduit. Expansion of the piping must be carefully controlled by means of anchors and expansion joints or bends so that the pipes can never come in contact with the conduit. The anchors used are usually U-shaped steel straps which partially encircle the pipes and are firmly bolted to a short length of structural steel set in concrete.

TEN IMPORTANT POINTS ABOUT INSTALLATION

In laying out conduits of this type the following points should be borne in mind:

1. The conduit should be laid out in successive straight runs between manholes or anchor pits.

2. An anchor should be placed wherever the line changes direction.

3. An expansion joint or bend must be placed between each two anchors.

4. Manholes should be provided at each expansion joint. Where slip joints are used manholes should be vented.

5. Branches should be taken off at or near an anchor.

6. If the distance between buildings is less than 150 ft. and the steam line contains high pressure steam, it may be anchored in the basement of one building and allowed to expand into the basement of the second building. If the steam line contains low pressure steam (up

to 4-lb. pressure), this method may be used if buildings are less than 250 ft. apart.

7. If the distance between buildings is between 150 ft. and 300 ft. and the steam line contains high-pressure steam, the lines should be anchored midway between the buildings and allowed to expand into the basements of both buildings. If the steam line contains low-pressure steam this method may be used if buildings are between 250 ft. and 500 ft. apart. No manhole is required at the anchor, and a blind pit is all that is necessary.

8. For longer lines manholes must be located according to judgment and depending upon the expansion value of the type of expansion joint or bend that is used. The minimum number of manholes will be required when an expansion bend or an anchor with double expansion joint is placed in each manhole, and the pipes are anchored midway between manholes.

9. Stabilizers to maintain alignment of pipes should be placed on each side of each expansion bend.

10. A proper hydrostatic test should be applied to the piping before top of conduit is applied and before application of insulation. The pressure used in this test should be greater than the pressure used in service, and should be not less than 100 lb. per square inch in any case.

STYLES AND CONSTRUCTION OF CONDUITS COMMONLY USED

Filler Type.—The pipes are supported on rollers placed on a steel rod which rests on an iron frame. The frame is set on a concrete or mortar base. The pipes are protected by a split tile conduit, and the entire space between the pipes and the tile is filled with an insulating filler. Thus the pipes are nested and the insulation between them and the tile effectively prevents circulation of air. The conduit is placed on a bed of gravel or crushed rock from 4 to 6 in. thick, which is extended upward so as to come about 2 in. above the parting lines of the tile. A tile underdrain is placed beneath the conduit throughout the entire length and is connected to existing sewers led to some other point of free discharge.

Insulated Tile Type.—The insulating material, which is diatomaceous earth, is molded to the inside of a split tile conduit. The pipes are supported on rollers, which in turn are supported by an iron frame which extends through the conduit and rests on a tile base which also serves as an underdrain. The space between the pipes and the insulating conduit lining may also be filled with an insulating filler. The conduit, insulation, piping and earth load are supported by the base drain. A few inches of gravel or crushed rock are placed about the conduit and the base drain.

Sectional Insulation Type (Tile Conduit).—Each pipe is insulated in the usual way with any desired type of sectional pipe insulation over which is placed a jacket of standard asphalt waterproof roofing with cemented joints. The pipes are enclosed in a split tile conduit which is placed on a bed of crushed rock or gravel from 4 to 6 in. thick. This