

importance for heating and ventilating purposes. If great exactness is required it should be remembered that any increase in thickness over 1 in. will reduce the heat loss from that shown by the curves.

HEATING CONDUITS

When steam pipes are run between buildings they should be placed in some form of conduit and suitable insulation provided. The pipes must be supported so as to provide for expansion and contraction. 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.

NINE 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 straight runs.
2. Manholes should be provided at each expansion joint.
3. Branches should be taken off at or near an anchor.
4. An anchor should be placed wherever the line changes direction.
5. An expansion joint or bend must be placed between each two anchors.
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 less than 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 less than 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.

STYLES AND CONSTRUCTION OF CONDUITS COMMONLY USED

Filler Type.—The pipes are supported on rollers placed in a steel frame, and the lower part of this frame is set in concrete, thus supporting the pipes independent of the conduit. The pipes are protected by a split tile conduit and the entire space between the pipes and the tile is filled with an insulation filler. 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 placed in a steel frame. The space between the pipes and the insulating conduit lining may also be filled with an insulating filler. The conduit is placed on a tile base which also acts as an underdrain. A few inches of gravel or crushed rock are placed about the conduit and the tile base.

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 gravel bed is extended upward so as to come about 2 in. above the parting lines of the tile. No underdrain is used with this conduit as any water seeping into the interior will flow down the bottom of the conduit to the nearest manhole. Drains are laid from the floor of each manhole to some point of free discharge. The pipes are supported on roller frames and these, according to the type of conduit used, are either supported by the conduit itself or have their lower parts set in concrete thus supporting the pipes independent of the conduit.

Sectional Insulation Type (Bituminized Fibre Conduit).—Each pipe is individually insulated and encased in a bituminized fibre conduit. The insulating material is 85 per cent carbonate of magnesia sectional pipe covering, applied in the usual manner as on overhead pipes, except that bands are omitted. After every fifth section of magnesia covering there is applied a short, hollow section of very hard asbestos material in the bottom portion of which rests a grooved-iron plate carrying ball-bearings upon which the pipe rides when expanding or contracting. This short expansion section is of the same outside diameter as the adjacent 85 per cent magnesia covering. Over the pipe covering and expansion device there are placed two layers of bituminized fibre conduit with all joints staggered and the surface of each conduit finished with liquid