

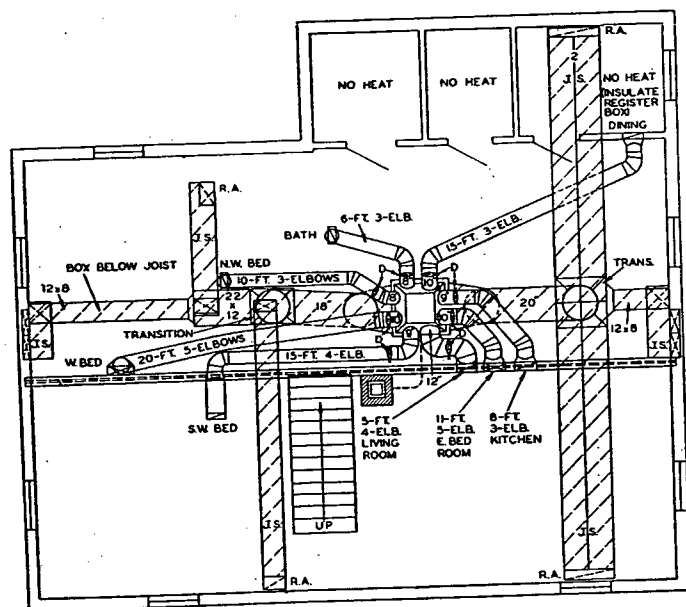


FIG. 6. TYPICAL BASEMENT LINE DRAWING

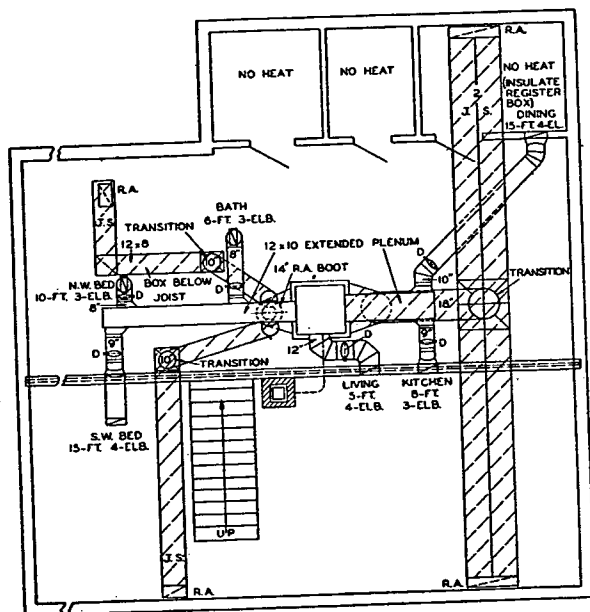


FIG. 7. TYPICAL BASEMENT LINE DRAWING FOR EXTENDED PLENUM

Design of Extended Plenum Systems

The extended plenum system of gravity warm air heating employs horizontal ducts in the basement leading from an enlargement or extension of the customary plenum to the risers which distribute the conditioned air to the various rooms. A typical basement plan for a system using an extended plenum is shown in Fig. 7.

Extended plenum gravity systems have been satisfactorily designed and installed in small compact single-story houses where the heat losses do not exceed 65,000 Btuh. The dimension from the floor to the bottom of the joists should in every case be at least 7 ft. To design such a system the procedure is the same as for the conventional system already described in this chapter.

It is understood that the length of leader pipe is the horizontal distance measured from the register to the furnace. For takeoffs, use standard fittings designed for extended plenum connection and allow the equivalent length of one 90-degree elbow.

Sizing an Extended Plenum

To size an extended plenum, proceed as follows:

1. Make a layout of the furnace, extended plenum, branches and registers, similar to Fig. 7.
2. Follow methods given in paragraphs 1, 2, 3 and 5, under Design Procedure for a conventional system, to determine the diameters or equivalent rectangular sizes of the branches from the extended plenum to registers.
3. Starting with the most remote branch connected to an extended plenum, write its equivalent size as if it were 8 in. in depth. For example: an 8-in. diameter branch is equivalent to a 6-in. wide x 8-in. deep duct (see Table 9). As each additional branch is reached, determine its rectangular equivalent size as if it were 8 in. deep. In the last column of Table 9 find the additional width of plenum required to supply the added branch. When all branches have been included, the sum of the widths added for each branch plus the width of the most remote branch will give the equivalent width for a plenum of 8-in. depth.

The depth of plenum to be selected should be that of the largest branch. The width selected can be determined from the lower section of Table 9 where a plenum of desired depth can be found equivalent to the size computed for an 8-in. deep plenum. For example: if the size based on an 8-in. plenum is found to be 22 x 8 in. the plenum may be 17 x 10 in. or 14 x 12 in. The extended plenum is not changed in size from furnace to end of the plenum.

Return air intakes are to be sized by the same method as for conventional gravity systems.

Design Examples

Examples 1 and 2 will illustrate the use of the tables in selecting warm air and return air system sizes.

Example 1: For a room which has a heat loss of 22,500 Btu per hr, select the size of first story warm-air system. There are three elbows, and the leader is approximately 10 ft long.

Solution: Since 22,500 Btu is beyond the capacities shown in Table 6, it is necessary to select two units of 11,250 each. From Table 6 in 10 ft leader column, and in section for three elbows, find 11,400 as nearest capacity which corresponds to Combination Number 4 in first column. Refer to Combination Number 4 in Table 1 and find that the leader should be 12 in. in diameter, and should be used with a 12 x 14 in. floor register or a 13 x 11 in. baseboard register with a 5 1/4 in. extension.

Example 2: What is the size of a return air system of Type D which is to service 35,000 Btu per hr?