PIPE SIZING FOR INDIRECT HEATING UNITS

Pipe connections and mains for indirect heating units are sized in a manner similar to radiators, but the equivalent direct radiation must be ascertained for each row of heating unit stacks and then must be divided into the number of stacks constituting that row and into the number of connections to each stack.

$$EDR = \frac{Q \times 60 \times (t_1 - t_e)}{55.2 \times 240} = \frac{Q \times (t_1 - t_e)}{220.8} \qquad (3)$$

where

EDR = equivalent direct radiation, square feet.
Q = volume of air, cubic feet per minute.
t_e = the temperature of the air entering the row of heating units under consideration, degrees Fahrenheit.
t_1 = the temperature of the air leaving the row of heating units under consideration, degrees Fahrenheit.
60 = the number of minutes in one hour.
55.2 = the number of cubic feet of air heated 1 F by 1 Btu.
240 = the number of Btu in 1 sq ft of EDR.

Example 5. Assume that the heating units shown in Fig. 25 are handling 50,000 cfm of air and that the rise in the first row is from 0 to 40 F, in the second row from 40 to 65 F, and in the third row from 65 to 80 F. What is the load in EDR on each supply and return connection?

Solution. For row 1,

$$R = \frac{50{,}000 \times (40 - 0)}{220.8} = 9058 \text{ sq ft.}$$

For row 2,

$$R = \frac{50{,}000 \times (65 - 40)}{220.8} = 5661 \text{ sq ft.}$$

For row 3,

$$R = \frac{50{,}000 \times (80 - 65)}{220.8} = 3397 \text{ sq ft.}$$

Each row of heating units consists of four stacks and each stack has two connections so that the load on each stack and each connection of the stack is as follows:

Row	Total Load (EDR)	Stack Load[a] (EDR)	Connection Load[b] (EDR)
1	9058	2265	2265 or 1132
2	5661	1415	1415 or 708
3	3397	849	849 or 425

[a] One quarter of total row load.
[b] One half of stack load if two steam connections are made; otherwise, same as stack load.

DRIPPING

Any steam main in any type of steam heating system may be dropped to a lower level without dripping if the pitch is downward with the steam flow. Any steam main in any heating system can be elevated if dripped (Fig. 27). Steam mains also may be run over obstructions without a change in level if a small pipe is carried below the obstruction to care for the condensation (Fig. 28). Return mains may be carried past doorways or other obstructions by using the scheme illustrated in Fig. 29; in vacuum systems it is well to have a gate valve in the air line.

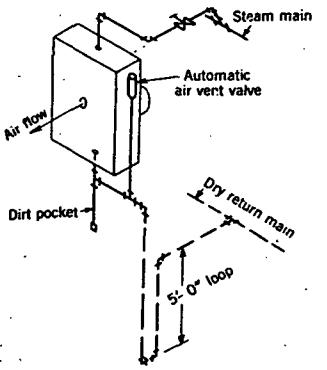


FIG. 26. UNIT HEATER CONNECTED TO ONE PIPE AIR VENT SYSTEM WITH DRY RETURN

Note.—If connection can be made to a wet return, no 5 ft loop is required.

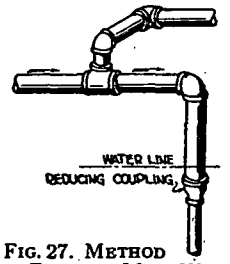


FIG. 27. METHOD OF DRIPPING MAIN WHERE IT RISES TO HIGHER LEVEL

Note.—Suitable for vapor and atmospheric systems.

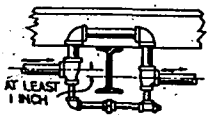


FIG. 28. LOOPING MAIN AROUND BEAM

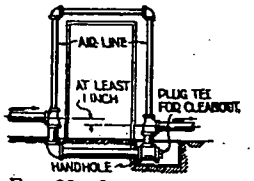
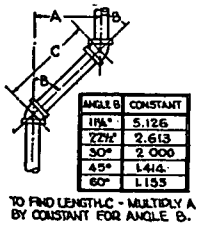


FIG. 29. LOOPING DRY RETURN MAIN AROUND OPENING

Note.—Suitable for any dry return line and any return line carrying air.



ANGLE B	CONSTANT
11½°	5.126
22½°	2.613
30°	2.000
45°	1.414
60°	1.155

FIG. 30. CONSTANTS FOR DETERMINING PROPER LENGTH OF OFFSET PIPE

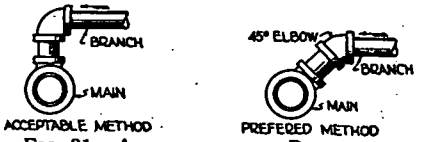


FIG. 31. ACCEPTABLE AND PREFERRED METHODS OF TAKING BRANCH FROM MAIN

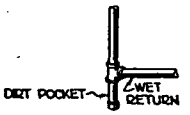


FIG. 32. DIRT POCKET CONNECTION

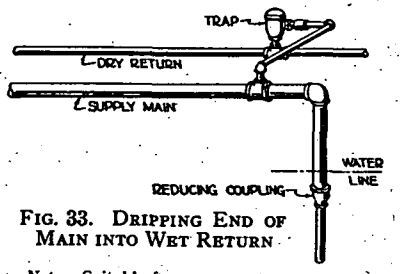


FIG. 33. DRIPPING END OF MAIN INTO WET RETURN

Note.—Suitable for vapor systems.