

(6) Duct resistance:

The longest run is = 150 ft

Two, 58 x 30 in. elbows (150% ratio) $\frac{2 \times 13 \times 58}{12}$ = 126 ft

Two, 30 x 15 in. elbows (150% ratio) $\frac{2 \times 13 \times 30}{12}$ = 65 ft

Three, 15 x 30 in. elbows (75% ratio) $\frac{3 \times 35 \times 15}{12}$ = 131 ft

Total equivalent run 472 ft

472 ft at 0.028 in. per 100 ft 0.132 in.

(7) Allowance for damper adjustment, 25% of 0.132 0.033 in.

(8) Supply grille resistance (from manufacturer's tables) 0.036 in.

Total static pressure loss of system 0.952 in.

The fan is selected from the manufacturer's ratings to deliver 22,935 cfm at a static pressure of 0.952 in. as outlined in Chapter 29.

Example 3. If the rooms and offices of the hotel building of Example 2 are to be

TABLE 4. PIPE SIZES FOR EXAMPLE 2^a

VOLUME OF AIR (CFM)	DIAMETER OF PIPE (INCHES)	EQUIVALENT SIZE OF REC- TANGULAR DUCT (INCHES)
22,935	56	60 x 44
12,510	45	58 x 30
10,425	42	50 x 30
8,340	39	42 x 30
6,255	35	42 x 24
4,170	29.5	30 x 24
2,085	23	30 x 15

^aVelocity through grilles (not shown) to be approximately 300 fpm.

served from a manufactured unit with a capacity of 22,935 cfm against an external resistance of 0.35 in., the known resistances are calculated as:

(1) Outdoor air inlet 0.094 in.

(2) Allowance for damper adjustment 0.033 in.

(3) Supply grille resistance (from manufacturer's tables) 0.036 in.

Total known resistance 0.163 in.

Subtracting this from the total available resistance: 0.35 in. - 0.163 in. = 0.187 in. available for duct resistance.

Known length of run 150 ft

The duct width is then estimated for the following elbow calculations:

Four 150% ratio elbows, 4 x 13 x 3.5 ft 182 ft

Three 75% ratio elbows, 3 x 35 x 1.5 ft 158 ft

Total estimated length 490 ft

The duct friction per 100 ft is then $0.187 \div 4.90 = 0.0382$ in. and the mains and branches are sized from the 0.038 in. friction line in Fig. 2.

If it is desired to size each branch for equal resistance, the total resistance back to the point of juncture is calculated and the branch is then sized in a manner similar to that outlined in Example 3.

DUCT CONSTRUCTION DETAILS

Straight sections of round duct are usually formed by rolling the sheets to the proper radius and grooving the longitudinal seam. Rectangular ducts are generally constructed by breaking the corners and grooving the longitudinal seam, although some fabricators still use the standing seam due to lack of equipment. Elbows and transformation sections are generally formed with *Pittsburgh* corner seams because this seam is easier to

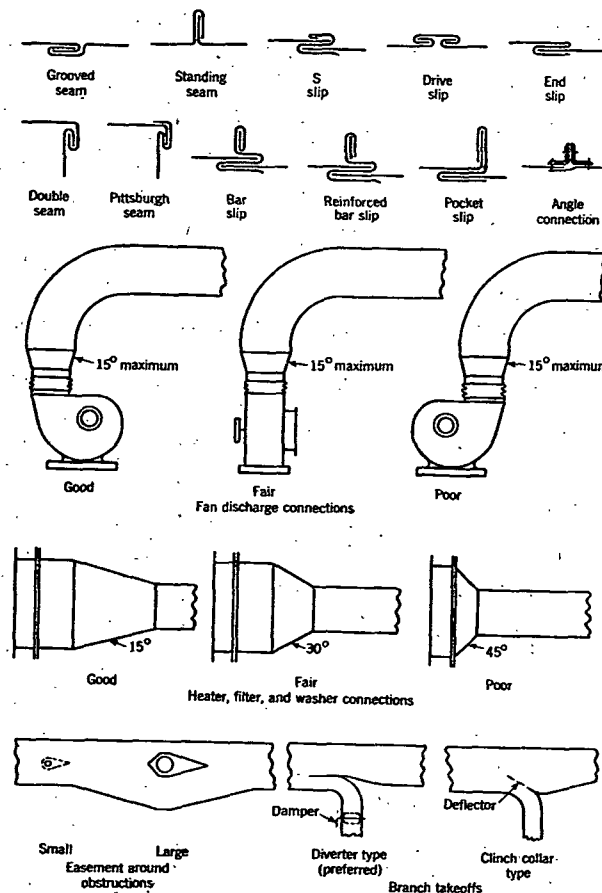


FIG. 7. SHEET METAL DUCT AND ARRANGEMENT DETAILS

lock in place than the double seam, but complicated fittings such as double compounded elbows are usually constructed with double seam corners. The construction of these various seams as well as the types of girth connections are shown in Fig. 7. The application of the various slips and connections is outlined in Table 5. The end slip may be used wherever S slips are recommended. Where drive slips are used the end slip may be applied on the narrow side of the duct and only the drive slips on the