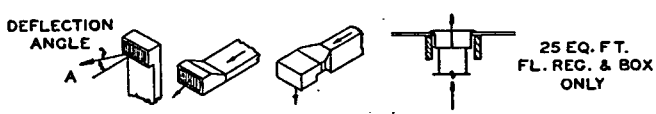


FIG. 3. EQUIVALENT LENGTH OF FITTINGS (Concluded)

GROUP 7. REGISTERS (INCLUDING LOSSES IN STACKHEAD AND VELOCITY PRESSURE).



DEFLECTION ANGLE A

25 EQ. FT. FL. REC. & BOX ONLY

TABLE 4A. EQUIVALENT LENGTH FOR REGISTERS

Deflection Angle A	0°	15°	22°	30°	45°
Baseboard, High or Low Sidewall Registers	Eq. Ft. 35	40	45	60	115
Floor Registers with Box only	25				

For 2-way deflection registers, add the vertical and horizontal deflection angles together and multiply by 0.7. Select closest angle A in Table 4A.

5 for buildings having a heat loss between 120,000 and 350,000 Btu per hr or Table 6 for buildings having a heat loss greater than 350,000 Btu per hr. Select *shortest actual length* and read downward in nearest column in Tables 5 or 6 until lower heavy diagonal line is reached, but do not cross line. Run horizontally to first column of table and note *bonnet temperature*. Also select *longest actual length* and read downward in nearest column in Tables 5 or 6, until upper heavy diagonal line is just crossed. Run horizontally to left to obtain value for *bonnet temperature* in first column. Select as the design bonnet temperature any value between these two limits.

5. Determination of air volume to be delivered through each register and the respective register air temperatures.

Using Tables 5 or 6 and the design bonnet temperature selected, find the values of cfm per 1000 Btu for each duct length.

6. Selection of register sizes and pressure losses to produce necessary throw, for the air volumes handled.

Use Tables 7 or 8 to obtain required free area and pressure loss of register.

7. Design of duct system.

A. Warm air branches.

a. Use Table 9 to select maximum bonnet pressure *usually* required for the trunk carrying the maximum volume of air (cfm). If the maximum bonnet pressure is not high enough to accommodate the pressure loss through the registers, use a higher bonnet pressure. If the register pressure is critically large, it may be necessary to reduce it by either using two registers in place of one, or using smaller deflection angles.

b. Obtain actual duct loss by subtracting register pressure loss from maximum bonnet pressure.

c. Obtain the pressure drop in each duct per 100 ft by use of Table 10.

d. Determine duct size by means of air friction chart (such as Fig. 1, Chapter 31), volume (cfm), and pressure drop per 100 ft of duct.

B. Return air branches.

a. Select a low value of actual duct loss obtained from step b under item A for the suction loss of return duct system.

b. Proceed in sizing return air branches by the same method described for the warm air branches.

C. Trunk ducts for warm air and return air sides of system.

a. Add air volumes of branches to be handled by each trunk duct.

b. The friction loss per 100 ft of trunk duct is determined by taking the smaller of the two values for friction loss for the two ducts meeting at the junction.

c. Determine trunk duct size by using an air friction chart, volume (cfm), and pressure drop per 100 ft of trunk duct.

TABLE 5. SELECTION OF BONNET TEMPERATURE, REGISTER TEMPERATURE AND REGISTER DELIVERY (CFM)^a
(For Buildings Having a Heat Loss between 120,000 and 350,000 Btu/Hr.)
Register Delivery Volume in CFM per 1000 Btu per Hr.

TEMP. OF BOU- NET ^b	LINEAR DISTANCE FROM BONNET TO REGISTER, IN FEET																			
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
108*	108	107	106	104	103	102	101	100	99	98	97	96	95	94	93	92	91	90	89	88
110	23.1 ^b	23.6	24.2	25.4	26.0	26.6	27.3	28.0	28.8	29.6	30.5	31.5	32.3	33.3	34.6	35.9	37.3	38.6	39.9	41.3
120	118	116	114	112	111	109	108	106	105	103	102	101	100	99	98	97	96	95	94	93
130	128	126	123	121	119	117	115	113	111	108	107	105	103	101	99	97	95	93	91	89
140	137	134	131	129	126	124	122	120	118	114	112	110	108	106	104	102	100	98	96	94
150	147	143	140	137	134	131	129	127	124	122	120	118	116	114	112	110	108	106	104	102
160	156	152	149	145	142	139	136	133	130	128	126	123	121	119	117	115	113	111	109	107
170	166	161	157	153	150	146	143	140	137	134	131	128	126	124	122	120	118	116	114	112
180	175	170	166	161	157	153	150	146	143	140	137	135	131	128	126	124	122	120	118	116
190	184	179	174	169	165	160	156	153	149	145	142	139	136	133	130	128	126	124	121	119
200	193	187	182	176	171	167	163	158	154	151	147	144	140	138	135	132	129	127	125	122

* Register temperature, Fahrenheit. (Use upper value in each group).
b Register delivery volume in cubic feet per minute per 1000 Btu (Use lower value in each group).