TABLE 9. WEIGHTS OF BLACK AND GALVANIZED SHEETS

U. S. Std. Gage	Black Sheets: Approximate Thickness, In.		Black Sheets: Weight Per Square Foot		Galvanized Sheets[a]: Approximate Thickness, In.		Galvanized Sheets[a]: Weight Per Square Foot	
	Steel	Iron	Ounces	Pounds	Steel	Iron	Ounces	Pounds
30	0.0123	0.0125	8	0.500	0.0163	0.0165	10.5	0.656
28	0.0153	0.0156	10	0.625	0.0193	0.0196	12.5	0.781
26	0.0184	0.0188	12	0.750	0.0224	0.0228	14.5	0.906
24	0.0245	0.0250	16	1.000	0.0285	0.0290	18.5	1.156
22	0.0306	0.0313	20	1.250	0.0346	0.0353	22.5	1.406
20	0.0368	0.0375	24	1.500	0.0408	0.0415	26.5	1.656
18	0.0490	0.0500	32	2.000	0.0530	0.0540	34.5	2.156
16	0.0613	0.0625	40	2.500	0.0653	0.0665	42.5	2.656
14	0.0766	0.0781	50	3.125	0.0806	0.0821	52.5	3.281
12	0.1072	0.1094	70	4.375	0.1112	0.1134	72.5	4.531
11	0.1225	0.1250	80	5.000	0.1265	0.1290	82.5	5.156
10	0.1379	0.1406	90	5.625	0.1419	0.1446	92.5	5.781

[a]Galvanized sheets are gaged before galvanizing and are therefore approximately 0.004 in. thicker.

should be avoided, as aluminum has a tendency to crack under such treatment. Aluminum of 16 B. & S. gage or heavier can readily be welded by the metallic arc or acetylene process. Soldering is difficult and is not generally recommended. Riveting is done in the same manner as in iron or steel sheet. Self-tapping screws tend to loosen because of the softness of aluminum.

HEAT LOSSES FROM DUCTS

In designing duct systems, the heat gains or losses of ducts should not be neglected. Heat gains in large duct systems can be quite considerable, not only if the duct passes through unconditioned space, but also on long duct runs within conditioned space. Proper insulation will remedy this situation considerably, but sometimes a redistribution of the supply air to the various supply outlets is necessary in order to compensate for the heating effect of the duct surface.

The thermal transmittance U for ducts can be found as follows:

For uninsulated metal duct, $$U = \frac{1}{\frac{1}{f_i} + \frac{1}{f_o}} \quad (20)$$

For uninsulated non-metallic ducts, $$U = \frac{1}{\frac{1}{f_i} + \frac{x}{k} + \frac{1}{f_o}} \quad (21)$$

TABLE 10. WEIGHTS AND THICKNESSES OF 2S ALUMINUM (DENSITY 0.098 LB/CU IN.)

B. & S. Gage	Thickness, Inches: Decimal	Thickness, Inches: Nearest Fraction	Weight per Square Foot: Ounces	Weight per Square Foot: Pounds
28	0.012	1/64	2.7	0.169
26	0.016	1/64	3.6	0.226
24	0.020	1/64	4.5	0.282
22	0.025	1/32	5.4	0.353
20	0.032	1/32	7.2	0.452
18	0.040	3/64	9.0	0.563
16	0.051	3/64	11.5	0.720
14	0.064	1/16	14.4	0.903

where

U = overall coefficient of heat transfer, Btu per (hour) (square foot) (degree Fahrenheit).

f_i = surface conductance (inside) Btu per (hour) (square foot) (degree Fahrenheit).

f_o = surface conductance (outside) Btu per (hour) (square foot) (degree Fahrenheit).

x = thickness, inches.

k = unit conductivity of material, Btu per (hour) (square foot) (degree Fahrenheit per inch thickness).

Where x is small and k is large, however, the factor $\frac{x}{k}$ is of little importance and may be neglected.

Film conductance f_i for air flowing in ducts apparently depends only on the velocity of the air and the diameter of the duct. A fairly reliable inside coefficient can be calculated from Schultz's modified equation:

TABLE 11. WEIGHTS AND THICKNESSES OF STANDARD COPPER SHEETS[a]
Rolled to Weight

Weight per Square Foot: Ounces	Weight per Square Foot: Pounds	Thickness, Inches: Decimal Equivalent	Thickness, Inches: Nearest Fraction	Nearest Gage No.: B. & S.	Nearest Gage No.: Stubs	Nearest Gage No.: U. S. Std.
10	0.625	0.0135	1/64	27	29	29
12	0.750	0.0162	1/64	26	27	28
14	0.875	0.0189	1/64	25	26	26
16	1.000	0.0216	1/32	23	24	25
18	1.125	0.0243	1/32	22	23	24
20	1.250	0.0270	1/32	21	22	23
24	1.500	0.0324	1/32	20	21	22
28	1.750	0.0378	1/32	19	20	20
32	2.000	0.0432	3/64	17	19	19
36	2.250	0.0486	3/64	16	18	18
40	2.500	0.0540	3/64	15	17	17
44	2.750	0.0594	1/16	15	17	17
48	3.000	0.0648	1/16	14	16	16
56	3.500	0.0756	5/64	13	15	14
64	4.000	0.0864	5/64	11	14	13

[a]Variations from these weights must be expected in practice.

$$f_i = \frac{0.32v^{0.8}}{D^{0.25}} \quad (22)$$

where

v = velocity of air in duct, feet per second.

D = inside diameter of duct, feet.

Film conductance f_o depends on a number of variables including temperature, diameter, and emissivity of the outer surface, and can be calculated from data in Chapter 5. From this explanation, it is seen that it is unwise to recommend a given value of U for all uninsulated metal ducts.

The heat loss from a given length of duct can be expressed by:

$$Q_v = UPL\left[\left(\frac{t_1 + t_2}{2}\right) - t_3\right] \quad (23)$$