

HEATING VENTILATING AIR CONDITIONING GUIDE 1943

TABLE 6. WEIGHTS OF SHEET METAL USED FOR DUCT CONSTRUCTION

U. S. STD. GAGE	BLACK SHEETS				GALVANIZED SHEETS ^b			
	Approximate Thickness, In.		Weight Per Square Foot		Approximate Thickness, In.		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

^bGalvanized sheets are gaged before galvanizing and are therefore approximately 0.004 in. thicker.

TABLE 7. WEIGHTS AND THICKNESSES OF STANDARD COPPER SHEETS^c
Rolled to Weight

WEIGHT PER SQUARE FOOT		THICKNESS, INCHES		NEAREST GAGE NO.		
Ounces	Pounds	Decimal Equivalent	Nearest Fraction	B. & S.	Stubs	U. S. Std.
10	0.625	0.0135	$\frac{1}{64}$	27	29	29
12	0.750	0.0162	$\frac{1}{64}$	26	27	28
14	0.875	0.0189	$\frac{1}{64}$	25	26	26
16	1.000	0.0216	$\frac{1}{32}$	23	24	25
18	1.125	0.0243	$\frac{1}{32}$	22	23	24
20	1.250	0.0270	$\frac{1}{32}$	21	22	23
24	1.500	0.0324	$\frac{1}{32}$	20	21	22
28	1.750	0.0378	$\frac{1}{32}$	19	20	20
32	2.000	0.0432	$\frac{5}{64}$	17	19	19
36	2.250	0.0486	$\frac{5}{64}$	16	18	18
40	2.500	0.0540	$\frac{5}{64}$	15	17	17
44	2.750	0.0594	$\frac{1}{16}$	15	17	17
48	3.000	0.0648	$\frac{1}{16}$	14	16	16
56	3.500	0.0756	$\frac{3}{16}$	13	15	14
64	4.000	0.0864	$\frac{3}{16}$	11	14	13

^cVariations from these weights must be expected in practice.

is considered good practice to allow 20 per cent additional for weights of joints and bracings. Various weights and thicknesses of standard copper sheets will be found in Table 7.

REFERENCES

- Method of Determining Rectangular Equivalents and Weights of Ducts, by Peter Franck (A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning*, December, 1940).
- The Flow of Liquids, by W. H. McAdams (*Refrigerating Engineering*, February, 1925, p. 279).
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- Air Conditioning and Engineering, American Blower Corp.
- Fan Engineering, Buffalo Forge Co.
- Heat Power Engineering, by Barnard, Ellenwood, and Hirshfeld, Part III.
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Chapter 33

SOUND CONTROL

Unit of Noise Measurement, Apparatus for Measuring Noise, General Problem, Kinds of Noise, Noise Transmitted Through Ducts, Design Room Noise Level, Noise Generated by Fan, Natural Attenuation of Duct System, Duct Sound Absorbers, Air Supply Noises, Grille Selection, Cross Transmission Between Rooms, Controlling Vibration from Machine Mountings

IN ventilating and air conditioning a building or a room, the effect of the mechanical system employed must be considered on the acoustics of the space conditioned. It is important to consider also that the use of air conditioning often permits keeping the windows closed, thus giving relief from certain external noises, but at the same time increasing the necessity of providing adequate sound control.

It is not assumed that the ventilating and air conditioning engineer will attempt to improve the acoustics of the space that is being conditioned, but the designer should have at least enough fundamental knowledge of the acoustical effects of the system which is being designed to be sure that no damaging effects occur to the existing acoustical properties. It is assumed that in a given space the architect and acoustical engineer have produced a room or rooms which are satisfactory for speech, music, or other uses. The ventilating engineer's sole function is to ventilate and air condition these rooms properly so that they will be physically comfortable without adding any acoustical hazards.

UNIT OF NOISE MEASUREMENT

By a recently adopted international standard, two terms are used for noise measurement. The *decibel* (db) is the physical unit for expressing intensity or pressure levels. The *phon* is the unit of loudness level. The loudness level, in phons, of any sound is by definition equal to the intensity level in decibels of a thousand cycle tone which sounds equally loud.

The decibel is defined by the relation $N = 10 \log_{10} \frac{I_1}{I_0}$, where N is the number of decibels by which the intensity flux I_1 exceeds the intensity flux I_0 . The intensity flux is the measure of the energy contained in a sound wave and is defined in terms of micro-watts per square centimeter of wave front in a freely traveling plane wave. It is usually more convenient to select an arbitrary reference intensity for I_0 and express all