PROPORTIONATE RADIATION FOR VARIOUS ROOM TEMPERATURES

Table 6, based on one given in the paper, The Establishment of Standard Methods of Proportioning Direct Radiation, by James A. Donnelly (AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS TRANSACTIONS, Vol. 21, p. 535), gives the proportionate heat losses from buildings, the proportionate transmission from direct radiators, and the proportionate radiation required (with steam at 215 deg. fahr.) for various room temperatures when the outside temperature is 0 deg.

TABLE 6. EFFECT OF ROOM TEMPERATURE ON HEAT LOSS AND SIZE OF RADIATOR

Room Temperature Deg. Fahr.	Proportionate Loss in B.T.U.	Difference in Temperature Between Radiator and Room	Proportionate Transmission in B.T.U.	Room Temperature Deg. Fahr.	Proportionate Surface Required Sq. Ft.
35	0.50	180	1.33	35	0.38
40	0.57	175	1.28	40	0.45
45	0.64	170	1.23	45	0.52
50	0.71	165	1.18	50	0.60
55	0.79	160	1.14	55	0.69
60	0.86	155	1.09	60	0.79
65	0.93	150	1.05	65	0.89
70*	1.00*	145*	1.00*	70*	1.00*
75	1.07	140	0.96	75	1.11
80	1.14	135	0.91	80	1.25
85	1.21	130	0.87	85	1.39
90	1.29	125	0.83	90	1.55
95	1.36	120	0.78	95	1.74
100	1.43	115	0.74	100	1.93
105	1.50	110	0.70	105	2.14
110	1.57	105	0.66	110	2.38
115	1.64	100	0.62	115	2.65
120	1.71	95	0.58	120	2.95

* Standard Conditions.

Assuming that the rate of heat loss from a building varies directly with the difference between the outside temperature and the building temperature, and considering the heat loss for zero outside, 70 deg. inside as the standard, or 100 per cent; the second column shows the proportionate loss of heat from a building when the outside temperature is zero, and the inside temperature is as given in the first column.

Assuming that the rate of transmission from a direct radiator to the air of a building is in proportion to their difference in temperature, with a variation in the rate of transmission of 2 per cent. greater or less, for each 10 deg. increase or decrease in their temperature difference, and considering 145 deg. difference in temperature (steam 215 deg., building 70 deg.) as standard, or 100 per cent transmission, the fourth column shows the proportionate transmission when the difference in temperature is as given in the third column.

Assuming that under standard conditions of outside temperature zero, building temperature 70 deg., and radiator temperature 215 deg. (or 145 deg. difference between the radiator and room) the amount of radiation necessary is 100 per cent, the proportionate amounts of radiation given in the sixth column are those necessary to heat a building to the temperatures given in the fifth column, when the outside temperature is zero.

Note.—The amount of surface required for heating is always obtained by dividing the heat loss from the building by the amount of heat transmitted per square foot of radiation. Therefore, as may be seen from the above tables, the proportionate amount of surface required for heating is obtained by dividing the proportionate heat loss from the building by the proportionate transmission of the radiator, in each case.

Table 6 may be used to find the proportionate amount of radiation necessary to heat a room to any desired inside temperature, other than 70 deg. fahr., when the outside minimum temperature is other than zero, and with a radiator temperature other than standard. Find the difference between the outside temperature and the room temperature in

the *first column;* divide the proportionate heat loss opposite this amount, in the *second column*, by the proportionate transmission opposite the difference in temperature between the radiator and the room, as given in the *fourth column*, and the result will be the proportionate amount of radiation required.

Example.—What is the proportionate amount of radiation required to heat a room to 90 deg. fahr. with a temperature of −20 deg. fahr. outside and a steam temperature of 240 deg. fahr.?

Solution.—The difference in temperature between −20 deg. fahr. outside, and 90 deg. fahr. inside, is 110 deg. fahr. Opposite 110, the proportionate heat loss, or 1.57, is found in the second column. The difference in temperature between the radiator and the room (steam 240 deg. fahr., room 90 deg. fahr.) is 150 deg. fahr. Opposite this, the proportionate transmission 1.05 is found in the fourth column. Divide 1.57 by 1.05 and the quotient, 1.50, is the proportionate amount of radiation required.

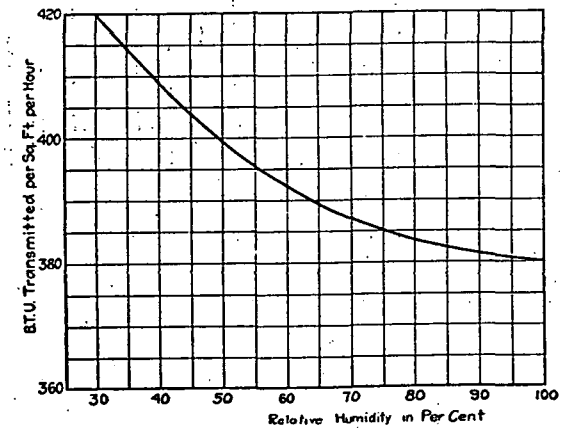

FIG. 1. EFFECT OF HUMIDITY ON HEAT TRANSMISSION

EFFECT OF HUMIDITY

The late John R. Allen, while Director of the Society's Research Laboratory, submitted a paper as a report (A. S. H. V. E. TRANSACTIONS, Vol. 26, p. 11), which in addition to the treatise on the heat emitted by various types of radiation, from which the preceding tables were calculated gives other data from which the following is taken.

Fig. 1 shows the effect of increasing the humidity upon the heat transmission. It will be noted that with extreme change of humidity there is a slight change in the heat transmission, the heat transmission reducing slightly as the humidity increases. Humidity can have very little, if any effect upon radiation, and the effect of humidity must therefore change the convected heat lost by the radiator. This change of convected heat is probably due to the change in the density of the air passing over the radiator.

WARMING THE RADIATOR

It is often very important to know the maximum condensation that occurs in a radiator when steam is turned on. Fig. 2 shows the condensation rate in pounds per hour for the time elapsing after steam is turned into the radiator. It will be noticed that the maximum condensation in the radiator occurs 10 min. after steam is turned on,