RESEARCH LABORATORY STANDARD DATA
AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS
Result of Cooperative Work With U. S. Bureau of Mines Experiment Station, Pittsburgh, Pa.

TABLE 21. HEAT EMITTED BY DIRECT RADIATION—CONVERSION FACTORS

Pressure		Temp. of Steam in deg. fahr.	Temperature of Room in deg. fahr.					
Vacuum In. Hg.	Lb. Absolute		80 deg. fahr.	75 deg. fahr.	70 deg. fahr.	65 deg. fahr.	60 deg. fahr.	50 deg. fahr.
23.4	3.71	150	2.188	2.053	1.934	1.828	1.733	1.572
19.7	4.75	160	1.898	1.795	1.701	1.621	1.546	1.412
15.3	5.99	170	1.669	1.590	1.517	1.451	1.391	1.285
12.3	7.51	180	1.488	1.425	1.364	1.311	1.261	1.175
8.7	9.33	190	1.339	1.287	1.239	1.195	1.155	1.081
6.5	11.52	200	1.215	1.172	1.135	1.095	1.060	0.999
Lb. Gage								
1	15.7	215	1.064	1.029	1.000	0.971	0.943	0.894
2	16.8	219	1.030	1.000	0.970	0.941	0.915	0.870
3	17.8	222	1.004	0.976	0.947	0.921	0.897	0.851
4	18.9	225	0.982	0.954	0.929	0.902	0.878	0.835
5	19.6	227	0.964	0.936	0.909	0.887	0.864	0.822
6	20.8	230	0.943	0.917	0.892	0.869	0.847	0.806
8	22.8	235	0.907	0.883	0.860	0.839	0.818	0.781
10	24.9	240	0.875	0.853	0.831	0.810	0.791	0.756

These conversion factors multiplied by the heat loss from any radiator, operating under the indicated conditions, give the heat loss by the same radiator operating at 215 deg. fahr. in a room at 70 deg. fahr.

RADIATION REQUIRED FOR VARIOUS ROOM TEMPERATURES

The following table from The Establishment of Standard Methods of Proportioning Direct Radiation, by James A. Donnelly (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 210 deg.) for various room temperatures, when the outside temperature is zero:

TABLE 22. EFFECT OF ROOM TEMPERATURE ON HEAT LOSS AND SIZE OF RADIATOR

Room Temperature	Proportionate Loss in B.T.U.	Difference in Temperature Between Radiator and Room	Proportionate Transmission in B.T.U.	Room Temperature	Proportionate Surface Required Sq. Ft.
35	0.50	175	1.34	35	0.37
40	0.57	170	1.29	40	0.44
45	0.64	165	1.24	45	0.52
50	0.71	160	1.19	50	0.60
55	0.79	155	1.14	55	0.69
60	0.86	150	1.09	60	0.78
65	0.93	145	1.05	65	0.89
70†	1.00†	140†	1.00†	70†	1.00†
75	1.07	135	0.95	75	1.12
80	1.14	130	0.91	80	1.26
85	1.21	125	0.87	85	1.40
90	1.29	120	0.82	90	1.56
95	1.36	115	0.78	95	1.74
100	1.43	110	0.74	100	1.93
105	1.50	105	0.70	105	2.15
110	1.57	100	0.66	110	2.39
115	1.64	95	0.62	115	2.66
120	1.71	90	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 140 deg. difference in temperature (steam 210 deg., building 70 deg.) as standard, or 100 per cent transmission, the second column shows the proportionate transmission when the difference in temperature is as given in the first column.

Assuming that under standard conditions of outside temperature zero, building temperature 70 deg., and radiator temperature 210 deg. (or 140 deg. difference between the radiator and room) the amount of radiation necessary is 100 per cent, the proportionate amounts of radiation given in the second column are those necessary to heat a building to the temperatures given in the first 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 porportionate transmission of the radiator, in each case.

The preceding table may be used to find the proportionate amount of radiation necessary to heat a room to any desired inside temperature, other than 70 deg., when the outside minimum temperature is other than zero, and with a radiator temperature other than standard. Find the