TABLE 6. FACTORS TO CONVERT $I=B=R$ FINNED-TUBE STEAM RATINGS TO HOT WATER RATINGS AT TEMPERATURES INDICATED

AVERAGE RADIATOR TEMPERATURE	FACTOR	AVERAGE RADIATOR TEMPERATURE	FACTOR	AVERAGE RADIATOR TEMPERATURE	FACTOR
150	0.45	175	0.65	200	0.86
155	0.49	180	0.69	205	0.91
160	0.53	185	0.73	210	0.95
165	0.57	190	0.78	215	1.00
170	0.61	195	0.82	220	1.05

Btuh per linear foot at specified water flow rates and average water temperatures.

The rating of a finned tube unit in an enclosure having a top outlet is established at a value not in excess of the test capacity (which is the heat extracted from the steam or water in the unit under standard test conditions). For finned-tube with other types of enclosures or covers a percentage is added for heating effect which varies up to a maximum of 15 percent depending on the height and type of enclosure or cover. The additions made for heating effect must be shown in the manufacturer's literature.

Corrections for Non-Standard Conditions

The heat output of a radiator, convector, baseboard or finned-tube heat-distributing unit is an exponential function of the temperature difference between the air in the room and the heating medium in the room-heating unit, or, expressed as an equation

$$H = c(t_s - t_a)^n \qquad (1)$$

where

H = heat output, Btu per hour (Btuh).

TABLE 7. CORRECTION FACTORS FOR DIRECT CAST-IRON RADIATORS AND CONVECTORS[a]

STEAM PRESS. (APPROX.)		HEATING MEDIUM TEMP F STEAM OR WATER	FACTORS FOR DIRECT CAST-IRON RADIATORS							FACTORS FOR CONVECTORS						
			ROOM TEMPERATURE F							INLET AIR TEMPERATURE F						
Gage Vacuum In. Hg.	Abs Lb per Sq In.		80	75	70	65	60	55	50	80	75	70	65	60	55	50
22.4	3.7	150	2.58	2.36	2.17	2.00	1.86	1.73	1.62	3.14	2.83	2.57	2.35	2.15	1.98	1.84
20.3	4.7	160	2.17	2.00	1.86	1.73	1.62	1.52	1.44	2.57	2.35	2.15	1.98	1.84	1.71	1.59
17.7	6.0	170	1.86	1.73	1.62	1.52	1.44	1.35	1.28	2.15	1.98	1.84	1.71	1.59	1.49	1.40
14.6	7.5	180	1.62	1.52	1.44	1.35	1.28	1.21	1.15	1.84	1.71	1.59	1.49	1.40	1.32	1.24
10.9	9.3	190	1.44	1.35	1.28	1.21	1.15	1.10	1.05	1.59	1.49	1.40	1.32	1.24	1.17	1.11
6.5	11.5	200	1.28	1.21	1.15	1.10	1.05	1.00	0.96	1.40	1.32	1.24	1.17	1.11	1.05	1.00
Lb per Sq In.																
1	15.6	215	1.10	1.05	1.00	0.96	0.92	0.88	0.85	1.17	1.11	1.05	1.00	0.95	0.91	0.87
6	21	230	0.96	0.92	0.88	0.85	0.81	0.78	0.76	1.00	0.95	0.91	0.87	0.83	0.79	0.76
15	30	250	0.81	0.78	0.76	0.73	0.70	0.68	0.66	0.83	0.79	0.76	0.73	0.70	0.68	0.65
27	42	270	0.70	0.68	0.66	0.64	0.62	0.60	0.58	0.70	0.68	0.65	0.63	0.60	0.58	0.56
52	67	300	0.58	0.57	0.55	0.53	0.52	0.51	0.49	0.56	0.54	0.53	0.51	0.49	0.48	0.47

[a] To determine the size of a radiator or a convector for a given space, multiply the heat loss of the space in Btu per hour by the proper factor from the above table and select radiator or convector having an equivalent Btu per hour rating.

An alternate method is to divide the heat loss in Btu per hour by 240 and multiply the result by the proper factor from the above table and select radiator or convector having an equivalent square foot rating.

To determine the heating capacity of a radiator or a convector under conditions other than the basic ones with the heating medium at a temperature of 215 F, and the room temperature at 70 F in the case of a radiator, and the inlet air temperature at 65 F in the case of a convector, divide the heating capacity at the basic rating conditions by the proper factor from the above table.

c = a constant determined by test from Equation 1.

t_s = average temperature of heating medium, Fahrenheit. For hot water the arithmetical average of the entering and leaving water temperatures is used.

t_a = room air temperature, Fahrenheit. Air temperature 60 in. above the floor is generally used for radiators while the entering air temperature is used for all other types of heating units.

n = an exponent which equals 1.3 for cast-iron radiators, 1.4 for baseboard radiation, and 1.5 for convectors. For finned-tube units n varies with both air and heating medium temperatures. Correction factors to convert outputs at standard rating conditions to outputs at other conditions are given in Tables 6, 7, and 8.

TABLE 8. CORRECTION FACTORS FOR FINNED-TUBE AND BASEBOARD RADIATION[a]

STEAM PRESSURE APPROX		HEATING MEDIUM TEMP. F STEAM OR WATER	FACTORS FOR FINNED-TUBE							FACTORS FOR BASEBOARD						
			Inlet Air Temperature, F							Inlet Air Temperature, F						
Gage Vacuum In. Hg	Abs Lb per Sq In.		80	75	70	65	60	55	50	80	75	70	65	60	55	50
22.4	3.7	150	2.80	2.50	2.20	1.95	1.81	1.67	1.54	2.86	2.61	2.38	2.20	2.03	1.89	1.76
20.3	4.7	160	2.34	2.14	1.94	1.75	1.62	1.50	1.37	2.38	2.20	2.03	1.89	1.76	1.64	1.56
17.7	6.0	170	2.01	1.86	1.70	1.56	1.46	1.36	1.26	2.03	1.89	1.76	1.64	1.54	1.44	1.38
14.6	7.5	180	1.76	1.65	1.53	1.42	1.32	1.24	1.15	1.76	1.64	1.55	1.44	1.38	1.29	1.23
10.9	9.3	190	1.53	1.45	1.36	1.28	1.20	1.12	1.03	1.54	1.44	1.37	1.29	1.22	1.16	1.09
6.5	11.5	200	1.38	1.31	1.24	1.16	1.09	1.02	0.95	1.38	1.29	1.23	1.16	1.09	1.05	1.00
Lb per sq in.																
1	15.6	215	1.17	1.12	1.06	1.00	0.95	0.90	0.85	1.16	1.10	1.05	1.00	0.95	0.92	0.88
6	21	230	1.00	0.97	0.93	0.90	0.86	0.82	0.78	1.00	0.96	0.92	0.88	0.84	0.81	0.77
15	30	250	0.88	0.85	0.82	0.78	0.75	0.71	0.67	0.86	0.82	0.79	0.76	0.73	0.70	0.68
27	42	270	0.75	0.73	0.70	0.68	0.65	0.62	0.59	0.73	0.70	0.68	0.66	0.63	0.61	0.59
52	67	300	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.58	0.57	0.55	0.53	0.52	0.51	0.49

[a] To determine the heating capacity under conditions other than the basic ones with the heating medium at a temperature of 215 F, and the inlet air temperature at 65 F, divide the the heating capacity at the basic rating conditions by the proper factor from the above table.

Enclosure, Paint, Humidity Effect

The general effect of an enclosure placed about a direct radiator is to restrict the air flow, and diminish the proportion of output due to radiation. Enclosures of proper design may, however, improve the heat distribution within the room as compared to the heat distribution obtained with an unenclosed radiator.[7, 9]

For a radiator or cast-iron baseboard the finish coat of paint affects the heat output. Oil paints of any color will give about the same results as unpainted black or rusty surfaces, but an aluminum or a bronze paint will reduce the heat emitted by radiation. The net effect may be a reduction of 10 percent or more in the total heat output of the radiator.[10, 11, 12]

Some commercial enclosures and shields for use on direct radiators are equipped with water pans for the purpose of adding moisture to the air in the room. Tests[13] show that an average evaporative rate of about 0.235 lb per (hr) (sq ft of water surface) may be obtained from such pans, when a radiator is steam heated and the relative humidity in the room is between 25 and 40 percent. This source of supply of moisture alone is not adequate to maintain a relative humidity above 25 percent on a zero day.