rating-test conditions to output under other operating conditions. Such factors are given in Table 3.

When it is desired to change the output under any test conditions to the corresponding output under standard Code test conditions, the reciprocal form of correction factor may be derived. The equations for steam units are:

For radiators: $C_s = \left(\frac{215 - 70}{t_s - t_r}\right)^{1.3}$ For convectors: $C_s = \left(\frac{215 - 65}{t_s - t_i}\right)^{1.5}$ (3)

The output under standard conditions will be:

$$H_s = C_s H_t \quad (4)$$

where

C_s = correction factor.
t_s = steam temperature during test, degrees Fahrenheit.
t_r = room temperature during test, degrees Fahrenheit.
t_i = inlet air temperature during test, degrees Fahrenheit.
H_s = heat emission rating under standard conditions, Btu per hour.
H_t = heat output under test conditions, Btu per hour.

The relation between the size of the radiator or convector and the size of the test room will affect the results obtained in a capacity-rating test[4]. The height and location of the radiator and the insulation of the test room are other important factors that are not specifically regulated by the Code.

For a radiator, 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 per cent or more in the total heat output of the radiator[5,6,7].

Radiator enclosures and convector casings affect the heat distribution within the room as well as the total amount of heat supplied by the steam or hot water[8].

Heating Effect

For several years the term *heating effect* has been used to designate the relation between the *useful output* of a radiator, in the comfort zone of a room, and the total input as measured by steam condensation or water temperatures[9]. The application of such a heating effect factor is a recognition that some radiators and convectors use less steam than others for producing equal comfort heating results in the room.

No standard method for evaluating the heating effect of radiators and convectors and correlating it with comfort has yet been accepted. One

[4]Factors Influencing the Heat Output of Radiators, by A. C. Davis, W. M. Sawdon and David Dropkin (A.S.H.V.E. TRANSACTIONS, Vol. 42, 1942, p. 185) and Cornell University, *Engineering Experiment Station Bulletin* No. 29, April, 1942.

[5]Heat Emission from Radiators, by K. F. Rubert (Cornell University, *Engineering Experiment Station Bulletin* No. 24, 1937).

[6]Comparative Tests of Radiator Finishes, by W. H. Severns (A.S.H.V.E. TRANSACTIONS, Vol. 33, 1927, p. 41).

[7]Heat Loss from Direct Radiation, by J. R. Allen (A.S.H.V.E. TRANSACTIONS, Vol. 26, 1920, p. 11)

[8]Heat Output of Concealed Radiators, by E. A. Allcut (University of Toronto, *School of Engineering Research, Bulletin* No. 140, 1933).

[9]The Heating Effect of Radiators, by Dr. Charles Brabbeé (A.S.H.V.E. TRANSACTIONS, Vol. 33, 1927, p. 33).

method, with test data[10] on radiators and convectors, and making use of the eupatheoscope for evaluating the environment produced, has been suggested by the University of Illinois. The principle underlying the

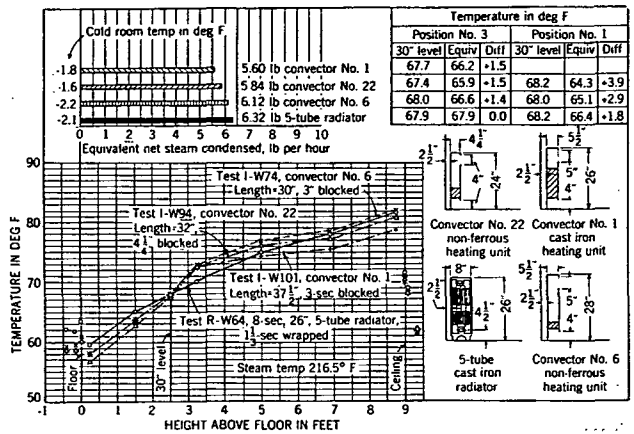


FIG. 2. TEMPERATURE GRADIENTS AND EQUIVALENT TEMPERATURES FOR RADIATOR AND CONVECTORS WITH COMMON 30 IN. LEVEL TEMPERATURE

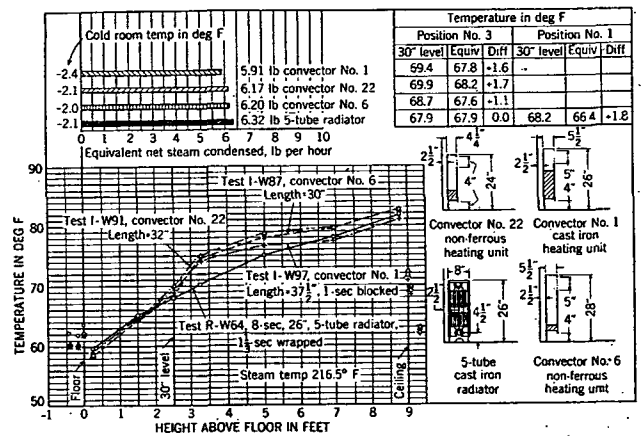


FIG. 3. TEMPERATURE GRADIENTS AND EQUIVALENT TEMPERATURES FOR RADIATOR AND CONVECTORS WITH COMMON EQUIVALENT TEMPERATURE

eupatheoscope involves the measurement of the heat loss from a sizable body by radiation and convection, when the surface is maintained at some constant temperature. Through the use of this instrument and its calibration curve, non-uniform environments may be referred to uniform

[10]A.S.H.V.E. Research Report No. 962—The Application of the Eupatheoscope for Measuring the Performance of Direct Radiators and Convectors in Terms of Equivalent Temperature, by A. C. Willard, A. P. Kratz and M. K. Fahnestock (A.S.H.V.E. TRANSACTIONS, Vol. 39, 1933, p. 303).