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., with a temperature of 20 deg. below zero outside, and a steam temperature of 240 deg.

Solution.—The difference in temperature between 20 deg. below outside, and 90 deg. inside, is 110 deg. 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., room 90 deg.) is 150 deg. Opposite this, the proportionate transmission 1.09 is found in the fourth column. Divide 1.57 by 1.09 and the quotient, 1.44 is the proportionate amount of radiation required.

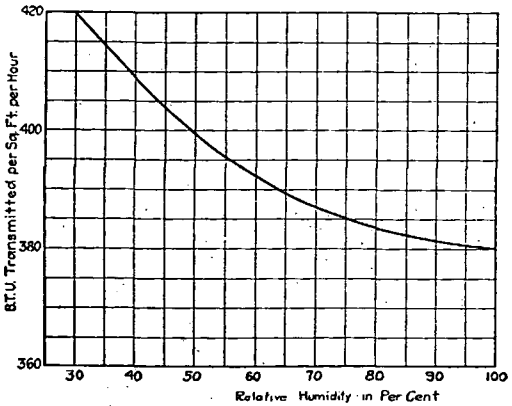

FIG. 8. EFFECT OF HUMIDITY ON HEAT TRANSMISSION

The late John R. Allen, while Director of the Society's Research Laboratory, submitted a paper as a report (A. S. H. V. E. JOURNAL, January, 1920), 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.

EFFECT OF HUMIDITY

Fig. 8 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.

EFFECT OF AIR CIRCULATION

The amount of heat given off by a radiator may also be increased by increasing the velocity of the air over the surface of the radiator. This increase in velocity will increase the amount of heat carried off by convection. No exact data are available on the effects that may be introduced by increasing these velocities over radiator surfaces, but in rooms with moving machinery the heat transmission is increased approximately 10 per cent.

WARMING THE RADIATOR

It is often very important to know the maximum condensation that occurs in a radiator when steam is turned on. Fig. 9 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 occurs 10 min. after steam is turned on, and in that

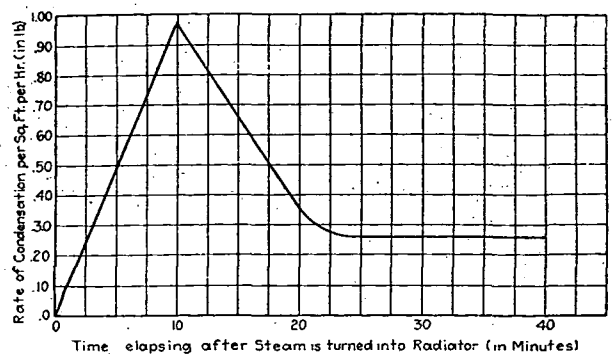

FIG. 9. CHART SHOWS DEMAND UPON BOILER FOR HEATING-UP PLANT

case it amounts to about three and one-half times normal condensation. After the end of 25 min., the radiator had reached a normal rate of condensation. This curve was made from observations at intervals of 10 min. so that the intermediate points between the 10 min. points are not known, and the form of the curve is not exact. It shows, however, that in starting a plant, the demand made upon the boiler may be very much higher than the normal demand.

EFFECT OF PAINTING

The effect of painting was originally determined by experiments made with a cast iron rectangle; and in applying these to radiators of standard type, corrections must be made to allow for the difference between the area of the radiating and convecting surfaces. The effect of painting is to change the radiation constant of the radiating surface and has practically no effect upon the heat lost by convection. It is, therefore, a surface effect and it makes no difference what paints are placed on the radiator as a priming coat, the results are always dependent upon the last coat of paint put upon the radiator. In radiators having a large proportion of radiating surface such as pipe coils or wall coils, the effect of painting will be more marked than in four-column radiators having a comparatively small radiating surface in proportion to convecting surface. All finely ground materials have about the same radiation constant. Therefore all paints having finely ground pigments will give about the same effect. Metals have a poor radiating effect so that any paint involving flake metal, such as the bronze, will have a low radiating constant. The following Table 32 shows the heat loss from a two-column 38-in. radiator, 10 sections long, when painted with different kinds of paints: