

cases, the demand charge is based upon the rated connected load, in other cases, upon the maximum demand as indicated by a demand meter.

Homes are almost universally supplied with lighting current of 115 volts, which can only be used economically for small heaters. Usually the service lines will not permit more than plug-in devices. The Underwriters permit approved heaters of 1320 watts or less to be plugged into approved baseboard receptacles, but such heaters cannot be served on a circuit supplying much other load without overloading the fuses. There is an increasing trend toward supplying homes with three wire 115/230 volt service. Where homes have such service, larger heaters can be installed. For industrial purposes, heaters should be designed to use polyphase power, which is usually supplied at 220, 440 or 550 volts. All polyphase heaters should be balanced between phases.

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Chapter 45

RADIANT HEATING

Physical and Physiological Factors, Control of Heat Losses, Rate of Heat Production, British Equivalent Temperature, Application Methods, Calculation Principles, Mean Radiant Temperature, Measurement and Control of Radiant Heating

FOR health and comfort, it is necessary for the rate of heat loss from the human body to be controlled by the aggregate effect of the conditions surrounding the body, so that the physiological reactions result in a feeling of comfort. No heating system serves the purpose of adding heat to the individual, but only reduces the net rate at which the body loses heat in cold weather by radiation, convection and evaporation. In convection methods of heating, the medium serves to maintain such an air temperature as will give comfort under existing conditions of humidity and of surrounding surface temperatures. The object of radiant heating, on the other hand, is to maintain an average temperature of the surrounding surfaces which will prevent too much heat loss from the human body by radiation, and thereby give comfort without needlessly heating the air. The difference between convection heating and radiant heating is therefore partly physical and partly physiological.

On a cool spring day while standing in the sunshine, one may feel perfectly comfortable but, when a cloud passes over the sun, one will instantly feel much cooler. A shielded thermometer will show no immediate reduction in air temperature, so that one actually feels a cooling effect which an ordinary thermometer cannot register. This is because light and heat waves travel at the same speed and are both interrupted by the cloud, or other shield. This proves that heat rays affect the comfort of the body more quickly and more definitely than does air temperature.

It also proves that an ordinary thermometer registering the temperature of the air is not a criterion of comfort conditions. Healthful comfort requires that heat shall escape from the body at the same rate as it is generated by the oxidation of food in the body, and in a manner suitable to physiological requirements.

Furthermore, the ambient conditions will often cause changes both in the rate of heat generation in the body, and in the operation of the several methods by which the body loses heat. The feeling of heat or cold results not only from the rate at which the body loses heat, but also from the manner in which the heat is abstracted from the body, and the ease with which the body's heat regulating mechanisms can operate. If the con-