By-pass: A pipe or duct, usually controlled by valve or damper, for short-circuiting fluid flow.

Calorie: (large calorie or kilogram calorie) is equal to 1000 international steam-table calories = 1/860 international kilowatthour. For practical purposes it may be considered as 1/100 of the heat required to raise the temperature of 1 kilogram of water from 0 to 100 C.

Central Fan System: A mechanical indirect system of heating, ventilating, or air conditioning, in which the air is treated or handled by equipment located outside the rooms served, usually at a central location, and is conveyed to and from the rooms by means of a fan and a system of distributing ducts. (See Chapter 20.)

Chimney Effect: The tendency in a duct or other vertical air passage for air to rise when heated, owing to its decrease in density.

Coefficient of Transmission: The amount of heat (Btu) transmitted *from air to air* in one hour per square foot of the wall, floor, roof or ceiling for a difference in temperature of 1 F *between the air on the inside and that on the outside of the wall, floor, roof or ceiling.*

Comfort Air Conditioning: The process by which simultaneously the temperature, moisture content, movement and quality of the air in enclosed spaces intended for human occupancy may be maintained within required limits. (See *Air Conditioning.*)

Comfort Line: The effective temperature at which the largest percentage of adults feel comfortable.

Comfort Zone (*Average*): The range of effective temperatures over which the majority (50 per cent or more) of adults feel comfortable. *Comfort Zone* (*Extreme*): The range of effective temperatures over which one or more adults feel comfortable. (See Chapter 2.)

Concealed Radiator: A heating device located within, adjacent to, or exterior to the room being heated but so covered or enclosed or concealed that the heat transfer surface of the device, which may be either a radiator or a convector, does not *see* the room. Such a device transfers its heat to the room largely by convection air currents.

Conductance: The amount of heat (Btu) transmitted from surface to surface in one hour through one square foot of a material or construction, whatever its thickness, when the temperature difference is 1 F between the two surfaces.

Conduction: The transmission of heat through and by means of matter unaccompanied by any obvious motion of the matter.

Conductivity: The amount of heat (Btu) transmitted in one hour through one square foot of a homogeneous material *1 in. thick* for a difference in temperature of 1 F between the two surfaces of the material.

Conductor (*Heat*): A material capable of readily conducting heat. The opposite of an insulator or insulation.

Constant Relative Humidity Line: Any line on the psychrometric chart representing a series of conditions which may be evaluated by one percentage of relative humidity; there are also *constant* dry-bulb lines, wet-bulb lines, effective temperature lines, vapor pressure lines, and lines showing other physical properties of air mixed with water vapor.

Convection: The transmission of heat by the circulation of a liquid or a gas such as air. Convection may be *natural* or *forced.*

Convector: A heat transfer surface designed to transfer its heat to surrounding air largely or wholly by convection. Such a surface may or may not be enclosed or concealed. When concealed and enclosed the resulting device is sometimes referred to as a concealed radiator. (See also definition of *Radiator.*) (See also Chapter 12.)

Decibel: A unit commonly used for expressing sound or noise intensities referred to an arbitrary reference level. It is defined by the relation $\text{db} = 10 \log_{10} \frac{P_1}{P_0}$, where P_1 is the unknown intensity, and P_0 is the reference level which is commonly taken as 10^{-16} watts per square centimeter.

Degree-Day: A unit, based upon temperature difference and time, used in specifying the nominal heating load in winter. For any one day there exists as many degree-days as there are degrees Fahrenheit difference in temperature between the mean temperature for the day and 65 F.

Degree of Saturation or Per Cent Saturation: The ratio of actual humidity ratio W to the saturation humidity ratio W_s corresponding to the actual temperature and the observed pressure. $\mu = \frac{W}{W_s}$ (Approximately the same as but not identical with *relative humidity.* See Chapter 1).

Dehumidification: The condensation of water vapor from air by cooling below the dew-point.

Dehydration: The removal of water vapor from air by the use of adsorbing or absorbing materials.

Density: The weight of a unit volume, expressed in pounds per cubic foot. $d = W \div V$.

Dew-Point Temperature: The temperature corresponding to saturation (100 per cent relative humidity) for a given moisture content.

Direct-Indirect Heating Unit: A heating unit located in the room or space to be heated and partially enclosed, the enclosed portion being used to heat air which enters from outside the room.

Direct Radiator: Same as *Radiator.*

Direct-Return System (*Hot Water*): A hot water system in which the water, after it has passed through a heating unit, is returned to the boiler along a direct path so that the total distance traveled by the water is the shortest feasible, and so that there are considerable differences in the lengths of the several circuits composing the system.

Down-Feed One-Pipe Riser (*Steam*): A pipe which carries steam downward to the heating units and into which the condensation from the heating units drain.

Down-Feed System (*Steam*): A steam heating system in which the supply mains are above the level of the heating units which they serve.

Draft Head (*Side Outlet Enclosure*): The height of a gravity convector between the bottom of the heating unit and the bottom of the air outlet opening. (*Top Outlet Enclosure*): The height of a gravity convector between the bottom of the heating unit and the top of the enclosure.

Drip: A pipe, or a steam trap and a pipe, considered as a unit, which conducts condensation from the steam side of a piping system to the water or return side of the system.

Dry Air: In psychrometric work, *dry air* is defined as air without water vapor. This state, though not obtained practically, is used as the basis of calculations.

Dry-Bulb Temperature: The temperature indicated by a standardized thermometer after correction for radiation, etc.

Dry Return: A return pipe in a steam heating system which carries both water of condensation and air. The dry return is above the level of the water line in the boiler in a gravity system. (See *Wet Return.*)

Dust: Solid material in a finely divided state, the particles of which are large and heavy enough to fall with increasing velocity, due to gravity in still air. For instance, particles of fine sand or grit, the average diameter of which is approximately 0.01 centimeter, such as are blown on a windy day, may be called dust.

Dynamic Head or Pressure: Same as *Total Pressure.*

Effective Temperature: An arbitrary index which combines into a single value the effect of temperature, humidity, and movement of air on the degree of warmth or cold felt by the human body. The numerical value is that of the temperature of still, saturated air which would induce an identical sensation of warmth.

Enthalpy: A thermodynamic property which serves as a measure of the quantity of thermal energy *convected* by a fluid in steady flow. In a non-flow process the increase of enthalpy equals the quantity of heat absorbed *provided pressure is constant.* Enthalpy was formerly called *heat content,* sometimes *total heat.* Specific enthalpy is the ratio of total enthalpy to total weight, that is, enthalpy per unit weight of substance, Btu per pound.

Entropy: A thermodynamic property which, for practical purposes, is best defined by stating its principal functions: (1) during a reversible *adiabatic* change of state, entropy is constant; (2) during a reversible *isothermal* change of state, the heat absorbed is equal to absolute temperature times change of entropy. *Specific entropy* is the ratio of total entropy to total weight, that is, entropy per unit weight, Btu per degree Fahrenheit per pound.

Equivalent Evaporation: The amount of water a boiler would evaporate, in pounds per hour, if it received feed water at 212 F and vaporized it at the same temperature and atmospheric pressure.

Estimated Design Load: The sum of the heat emission of the equivalent direct radiation to be installed plus the allowance for heat loss of the connecting piping plus the heat requirements of any auxiliary apparatus connected with the system.

Estimated Maximum Load: The load stated in Btu per hour or equivalent direct radiation that has been estimated to be the greatest or maximum load that the boiler will be called upon to carry.

Extended Heating Surface: See *Heating Surface.*

Extended Surface Heating Unit: A heating unit having a relatively large amount of extended surface which may be integral with the core containing the heating medium or assembled over such a core, making good thermal contact by pressure or by being