

Glossary of Technical Terms

To fully understand steam systems, you must first be familiar with some basic steam-related terms.

Absolute Pressure: pressure exerted by vapor or liquid. The theoretical pressure less state of a perfect vacuum is “absolute zero.” Absolute pressure is the pressure above absolute zero. The pressure exerted by the atmosphere is 14.7 psi abs. at sea level.

Air Vent: device to release quantities of air from remote points or stagnant corners of steam condensing equipment.

Atmospheric Pressure: pressure exerted by the atmosphere; equals 14.7 psi at sea level.

BTU (British Thermal Unit): the measure of heat energy defined as the amount of heat required to raise one pound of water at atmospheric pressure 1°F.

Back Pressure: pressure at the steam trap discharge.

Bernoulli’s Theorem: the principle of conservation of energy applying to a constricted fluid. Fluid going from a high pressure to a lower pressure through an orifice will increase in velocity. High velocity flow across a surface creates a lower pressure area.

Blast Discharge Trap: steam trap that operates in an intermediate fashion – wide open discharging condensate alternating with periods of being completely closed.

Centigrade: temperature measuring scale based on the freezing point of water at 0°C and the boiling point of water at 100°C. Also called Celsius.

Condensate: condensed steam; water.

Conduction: heat transfer by direct contact.

Continuous Discharge Trap: steam trap discharging condensate in a continuous flow.

Convection: heat transfer by direct contact.

Cyclic Trap: see *Blast Discharge Trap*.

Dalton’s Law of Partial Pressures: “in a mixture of gases in a given volume, each gas exerts the same pressure that it would if it occupied the same volume alone.

The total pressure exerted by the mixture of gases is equal to the sum of the pressures each would exert if it occupied the volume alone.”

De-aerator: device used to remove entrained air from water.

Degrees of Superheat: temperature difference between the superheated steam and dry saturated steam.

Differential Pressure: difference between the operating pressure and back pressure *iii Appendix*

Dry Saturated Steam: steam at the boiling temperature and pressure containing no water droplets.

Enthalpy: total heat equal to the sum of the sensible heat, latent heat, and the superheat. The total energy, due to both pressure and temperature, of a fluid or vapor at any given time and condition. The basic unit of measurement for all types of energy is the BTU, or British Thermal Unit.

Fahrenheit: temperature measuring scale based on the freezing point of water at 32°F and the boiling point of water at 212°F.

Flash Steam: steam formed when hot condensate is discharged from a high pressure to some lower pressure.

Gauge Pressure: pressure above atmospheric. The pressure shown on a standard pressure gauge in a steam system. Gauge pressure is the pressure above atmospheric pressure, so the zero on the gauge is equivalent to 14.7 psi abs. Pressures below zero gauge are expressed as inches of mercury.

Heat: A form of energy. As such, heat is a part of the enthalpy of a liquid or gas.

Heat Exchanger: device in which heat transfer takes place.

Heat Transfer: exchange of enthalpy from hotter to cooler, when they are brought together.

Heat Transfer Coefficient: rate of conductance or rate of heat flow.

Horsepower: equal to 2545 BTU/hr.

Insulation: material used to reduce or eliminate heat loss.

Kilowatt: equal to 3415 BTU/hr.

Kinetic Energy: energy of motion.

Lagging: see *Insulation*.

Latent Heat of Vaporization (Latent Heat): heat required to convert a unit mass of water at a saturated temperature to dry steam at the same temperature. Also known as *Enthalpy of Evaporation*.

Modulating Discharge Trap: steam trap discharging condensate at a rate varying with the load.

Natural Process Undercooling: the reduction in condensate temperature below saturation due to the temperature differential between the condensate and the process. The longer the condensate remains in contact with the heat transfer surfaces, the cooler it will be when it reaches the trap.

One Pipe Heating System: radiator heating system where steam and condensate flow within the same piping, the pitch of the piping allowing gravity drainage of the heavier condensate.

Operating Pressure: pressure at the steam trap inlet.

Orifice: an opening through which fluid passes.

PSI: pounds per square inch.

PSIG: pounds per square inch gauge.

Radiation: heat transfer by absorption of electromagnetic waves.

Running Load: rate at which condensate forms when temperature difference is constant.

Saturated Steam: see *Dry Saturated Steam*.

Saturated Water: At the point of boiling, the water is known as *Saturated Water*. Water at the boiling point containing only sensible heat.

Second Law of Thermodynamics: "heat cannot of itself pass from a colder to a hotter body."

Sensible Heat: heat required to raise the temperature of a unit mass of water from the freezing point to the boiling point. Also known as the *Enthalpy of Saturated Water*.

Specific Enthalpy: The enthalpy, or total energy, of a unit mass (1 lb). The units generally used are BTU/lb.

Specific Heat: ratio between the heat added and the temperature rise; the amount of heat a substance can hold relative to water. The heat energy which has been added and which has had the effect of raising the water temperature is known as the *Sensible Heat*, and utilizes the symbol "hf."

Specific Heat Capacity: rate at which heat is absorbed; the amount of energy (BTU's) required to raise 1lb. by 1°F. Thus, specific heat capacity is expressed as BTU/lb °F. The specific heat capacity of water is 1 BTU/lb °F, meaning that an increase in enthalpy of 1 BTU will raise the temperature of 1lb of water by 1°F.

Specific Gravity: ratio of the density of any substance compared to the density of the water.

Specific Volume: volume that a pound of steam occupies at a corresponding pressure.

Start-up Load: rate at which condensate forms when temperature difference is greatest.

Steam Curve: curve showing the relationship between the pressure, boiling temperature, sensible heat, latent heat, and total heat.

Steam Locking: condition where steam is preventing condensate from reaching the steam trap.

Steam Table: table giving the relationship between the pressure, boiling temperature, sensible heat, latent heat, and total heat.

Steam Trap: a device that automatically opens to permit the discharge of air and non-condensable gases and condensate at, or below saturated steam temperature and closes to prevent or limit the passage of steam.

Strainer: device used to filter dirt and other particles from condensate system.

Sub-cooling: reducing the temperature of the condensate before it is discharged to allow for the use of sensible heat or the reduction of flash steam vapor. Also called "undercooling."

Superheated Steam: dry saturated steam at a temperature above the boiling temperature and pressure. As long as water is present, the temperature of saturated steam will match the figure in the Steam Tables. If heat transfer continues after all the water has evaporated, the steam temperature will again rise, resulting in superheated steam with a temperature above that for saturated steam at the corresponding pressure.

Suppression: the temperature at which a steam trap operates relative to the saturated steam temperature.

Temperature: degrees of hotness or coldness.

Thermal Efficiency: heat energy converted to work as a percentage of the total heat energy put into the steam.

Thermostatic Dead Band: the differential between the temperature at which thermostatic steam Trap closes and the saturated steam temperature through the traps' operating pressure Range.

Total Heat: see *Enthalpy*.

Total Heat of Steam: the sum of latent heat and sensible heat.

Under-Cooling: see *Sub-Cooling*.

Vacuum Breaker: device to prevent damage to equipment due to vacuum formed when hot process equipment cools.

Warming Load: see *Start-up Load*.

Water Hammer: damaging effect of "slug" or mass of water traveling in steam lines at high velocity reaching obstructions; or change of direction delivering its' inertial force to the obstruction.

Waterlogged: condensate back-up.

Wet Steam: steam which carries water droplets in suspension.