Cooling Tower Terms Glossary

Water Chemistry and Biological Terms

Acid	any substance that donates a proton (H+) when dissolved in a solution. In water treatment, it usually means circulating water with a pH of less than 7.0. Sulfuric acid is the most common acid used to control cooling water pH.
Adsorption	assimilation of molecules or other substances onto the physical structure of a liquid or solid without chemical reaction.
Aeration	blowing or mixing of air through water to sweep out other dissolved gases and to equilibrate the water with primarily nitrogen, oxygen and carbon dioxide.
Aerobe	an organism that grows only in the presence of free (molecular) oxygen.
Algae	a low form of plant life containing chlorophyll that generally requires sunlight and air for existence. Many are microscopic but under favorable conditions can grow sufficiently dense to plug cooling tower distributors on the decks and to interfere with water splashing in the fill. Large masses often slough off the tower and plug heat exchangers or deposit in piping.
Algaecide	a toxic material that will kill algae. Some of the more commonly used algaecides are chlorine, copper sulfate and phenolic compounds.
Alkalinity	an expression of the total basic anions (hydroxyl groups) that is present in a solution. It also represents, particularly in water analysis, the bicarbonate, carbonate, hydroxyl and occasionally the borate, silicate, and phosphate salts which will react with water to produce acid neutralizable anions.
Ammonia	a water-soluble, colorless, pungent gas with the formula NH3.
Ammonium	positive ion with the formula NH4+ that forms when ammonia dissolves in water. It adds non-natural alkalinity to the water.
Anaerobe (strict)	an organism that grows only in the absence of free oxygen (e.g., sulfate reducing bacteria).
Anaerobe (facultative)	an organism that can grow under either aerobic or anaerobic conditions.
Anion	a negatively charged ion.
Anode	a positively charged electrode that, during electrolysis, attracts anions.

Anodic area	area on a metal surface where electrons are given up and metal dissolves (corrosion).
Antifoam	an agent that prevents foam from forming or reduces its presence.
Atomic number	a number given to each element representing the number of protons in one atom of that element.
Atomic weight	weight (in grams) of 6.02x1024 atoms of a particular element. The weight of an atom of any element compared with that of oxygen that is considered to be 16.
Autotrophic	an organism that is capable of producing its own food through the use of chlorophyll and light.
Bacteria	Unicellular microorganisms which reproduce by fission or spores, identified by their shapes: coccus, round; bacillus, rod shaped; and spirillum, curved.
Bicarbonate alkalinity	in a water solution, the presence of ions resulting from the hydrolysis of carbonates when these salts react with water. A strong base and a weak acid are produced and the solution is alkaline. Its formula is HCO3-, but its concentration is usually denoted as ppm as CaCO3.
Biocide	a chemical that is designed to control the population of troublesome microbes by killing them.
Biological deposit	water-formed deposits of organisms or their waste products (example: slimes, barnacles, etc.).
Biostat	a chemical that is designed to control the population of troublesome microbes by inhibiting their reproduction and subsequent increase in population.
Blowdown	water discharged from the system to control concentration of salts or other impurities in the circulating water.
Carbonate hardness	hardness in water caused by bicarbonates of calcium and magnesium. If alkalinity exceeds total hardness, all hardness is carbonate hardness; if hardness exceeds alkalinity, the carbonate hardness equals the alkalinity.
Cathode	a negatively charged electrode (which attracts cations in electrolysis).
Cation	a positively charged ion resulting from dissociation of molecules in solution.
Chemical dosage	the amount of chemical added to a system, usually expressed as ppm, or pounds of chemical per million pounds of water.
Chloramine	a compound formed when chlorine reacts with ammonia or a chemical containing the ammonium ion. The result is mono-, di-, tri-, and organochloramines. The resulting chloramines are weak oxidants or nonoxidants. They are a component of total chlorine. These are very weak biocides.
Chlorination	adding chlorine or a chlorine derivative to water to prevent the growth of various organisms that cause biofouling.

Chlorination, dechlorination	the act of removing chlorine from water, usually via a reducing agent or strong aeration.
Chlorine	a poisonous yellow gas with chemical symbol Cl2 used for water treatment. It is soluble in water but can be removed by reducing aeration and reaction with sunlight.
Chlorine demand	the relation of the amount of chlorine to be added to a system to react with chlorine-oxidizable material until a free residual in a given system is achieved.
Chlorine dioxide	a compound with the symbol ClO2, used mainly for bleaching wood pulp for paper. It is also used for the taste and odor control of phenolic compounds in water and can be used as a disinfectant in cooling towers.
Chlorine, free	the total amount of hypochlorous ion and hypochlorous acid in the system.
Chlorine, residual	the amount of available chlorine present in water at any given time subsequent to the addition of chlorine.
Circulating water rate	quantity of water pumped from the tower basin to the equipment to be cooled, usually expressed as gallons per minute (gpm).
Combined Chlorine (new)	the amount of chloramine or chloro-organic compounds present in water.
Compounds	substances formed from the chemical bonding of two or more atoms.
Concentration	the process of increasing solids per unit volume of solution, usually by evaporation of the liquid; also, the amount of material dissolved in a unit volume of solution. This occurs in a cooling tower due to evaporation that cools the water. It is normally expressed directly as ppm or indirectly as mhos conductivity.
Conductivity	the ability of water to conduct electricity. When measured with a standard apparatus, it is called specific conductivity and is a function of the total ionic dissolved solids. As a rule of thumb, TDS = 2/3 specific conductance measured as micromhos.
Cooling water	water circulated through a cooling system to remove heat from certain areas.
Copper alloys	metals made from a mixture of copper and another metal (Example brass = copper + zinc).
Corrosion	to be dissolved away, usually by oxidation or acidification. This usually refers to metal loss in cooling systems, often recognized by the local reaction of the dissolved metal with oxygen, carbon dioxide, acids or galvanic action. May result in general (widespread) or pitting loss of the metal.
Corrosion coupon	a small piece of metal that is inserted into a circulating system that can be analyzed to find the corrosive nature of the system's water.
Corrosion fatigue	the weakening of a pipe or similar piece of metal due to corrosion acting on it.
Corrosion inhibitor	chemical used in a system to prevent corrosion.

Cycles of Concentration	compares dissolved solids in makeup water with solids concentrated through evaporation in the circulating water. Since chlorides are soluble in water, for example, the cycles of concentration are equal to the ratio of chlorides in circulating water to chlorides in makeup water.
Deflocculation	the ability of some materials such as polyphosphides to peptize and disperse suspensions of colloidal particles.
Delignification	the dissolving of the lignin portion of cooling water wood usually by strong alkaline and/or oxidizing agents.
Denitrification	the removal of nitrogen from a system. This may be done chemically or biologically.
Disinfecting	to remove microorganisms from a particular surface or liquid.
Dispersant	a chemical that causes particulates in a water system to remain in or be placed into suspension.
Dissolved gases	total gases dissolved in a liquid.
Dissolved solids	total solids that have been dissolved into a liquid. They may be ionic and/or polar in nature.
Drift	water lost from a cooling tower as liquid droplets entrained in the exhaust air. It is independent of water lost by evaporation. Units may be in lbs./hr. or percentage of circulating water flow. Drift eliminators control this loss from the tower.
Electrode	conductor that carries an electrical charge.
Electrolyte	a chemical compound that dissociates or ionizes in water to produce a solution that will conduct an electric current; an acid, base, or salt.
Elements	substances that cannot be divided into smaller units without nuclear destruction.
Equivalent weight	molecular or atomic weight divided by the valence of the substance being considered.
Evaporation loss	water evaporated from the circulating water into the atmosphere by the cooling process.
Evaporation rate	the rate at which a liquid turns into gas and leaves a system.
Fatigue, corrosion	The weakening of a piece of metal or pipe due to corrosion.
Ferrobacillus	a type of iron-reducing bacteria.
Filamentous bacteria	bacteria with a long, threadlike shape.
Float valve	a valve that is actuated by a float, generally used to control makeup water supply to a cooling system.

Flocculation	the process of agglomerating coagulated particles into settleable flocs, usually of a gelatinous nature.
Flow control valve	a manually controlled valve generally located in the hot water supply line used to increase or decrease the flow of a liquid in a system.
Fungi	simple, plant-like life forms that lack true roots, stems, leaves, and chlorophyll. They are filamentous in structure (e.g., mushrooms, mildews, molds, and yeasts).
Galvanic attack	corrosion behavior caused by the current generated when one metal type is in contact with a different metal type.
Galvanic corrosion	corrosion formed from galvanic attack.
Galvanic couple	the contact of one metal type with another as seen with a steel bolt in an aluminum sheet or a copper joint on an iron pipe, which allows a differential current to be generated.
Groundwater	water pumped from underground rivers, wells and lakes.
Half life	in water treatment, the time it takes to lose " of a slug fed product from the system through blowdown, drift and windage when taking into account its continuous concentration by evaporation and dilution by fresh makeup.
Hardness, calcium	the calcium compounds dissolved in water, usually expressed as calcium carbonate.
Hardness, carbonate	the calcium and magnesium carbonate and bicarbonate dissolved in water, expressed as calcium carbonate. Other metallic cations such as ferrous iron, barium, zinc and manganous ions are also included.
Hardness, magnesium	magnesium compounds dissolved in water, expressed as calcium carbonate.
Hardness, noncarbonate	the difference between the total hardness and the total alkalinity of a water.
Hardness, permanent	the hardness that cannot be removed from water by precipitation reactions. Essentially, the same thing as the non-carbonate hardness.
Hardness, temporary	the hardness that can be removed from water by precipitation. Essentially, the same as the carbonate hardness.
Hardness, total	the sum of the calcium and the magnesium hardness. Also the sum of the permanent hardness and temporary hardness. The U.S. Geological Survey hardness criteria for potable water are: soft water 0-60 ppm, moderately hard water 61-120 ppm, hard water 121-180 ppm, very hard water >180 ppm.
Heat exchanger	a device for transferring heat from one substance to another. Heat transfer can be by direct contact, as in a cooling tower, or indirect, as in a shell and tube condenser. Can also be the tube or fin tubed bundles in a wet/dry tower.
Heat load	heat removed from the circulating water within the tower. It may be calculated from the range and the circulating water flow.

Unit: Btu/hr.=gpmx500x(HWT - CWT).	
Impurities	any substance that contaminates another.
Iron bacteria	oxidative bacteria that cause taste, staining, and odor problems in water. The precipitation of iron by the bacteria can build up in piping and heat exchangers to restrict water flow. Although they are not a direct cause of corrosion, differential aeration cells will form under deposits and localized corrosion will appear.
Langelier's Index	a formula for predicting whether water will tend to dissolve or precipitate calcium carbonate.
Makeup	water added to the circulating water system to replace water lost from the system by evaporation, drift, blowdown, and leakage.
Microorganism	an organism that is too small to be studied without the aid of a microscope.
Molluscicide	a material that will kill molluscs.
Nonoxidizing biocide	a biocide whose effectiveness depends on some property other than its ability to oxidize organic material (i.e., systematic poisons and surface activity).
pH	the logarithm of the reciprocal of the hydrogen ion concentration. Water with a pH of 7 is neutral at room temperature. A pH greater than 7 indicates alkaline water. A pH less than 7 indicates acidic water.
Phosphates	inorganic ions comprised of phosphorous and oxygen.
Photosynthesis	the process by which plants use sunlight to produce energy by consuming CO2 and releasing O2.
Residual chlorine	(see chlorine, free) the amount of available chlorine present in water at any specified period, subsequent to the addition of chlorine.
Ryznar Index	an empirical method, often used in combination with the Langelier's Index, to predict the scaling tendencies of water. It is based on a study of operating results with water of various saturation indices.
Scale	the deposition on heat transfer surfaces of material normally in solution, as opposed to fouling, which is deposition of material normally in suspension.
Slime	a deposit build-up directly related to the excessive growth of microorganisms that secrete or form thick, sticky material. These slimes cause tube pluggage, reduce heat transfer, entrap migratory suspended solids and can result in underdeposit corrosion.
Solubility	the ability of one material (the solute) to dissolve in another (the solvent).

Solutions	liquid mixtures that are uniform throughout.
Sulfate-reducing bacteria	group of anaerobic bacteria capable of reducing sulfates to sulfides, especially hydrogen sulfide, a very corrosive gas.
Surfactant	in water, any molecule that modifies the interfacial tension of a liquid and the surface it contacts (surfaces can be air, metal, biomass, etc.).
Suspended solids	insoluble particles suspended in water
Synergism	the condition existing where the effect of two or more materials added to water is greater than the sum of their individual effects
Thermophilic	a type of bacteria that thrives in very high temperatures.
Total Chlorine (new)	the total amount of all types of chlorine compounds present. This includes Cl2, hypochlorous acid, hypochlorite ion, and all the chloramine compounds. Free Chlorine + Combined Chlorine = Total Chlorine.
Total Dissolved Solids	the sum of the organic and inorganic materials dissolved in water.
Tuberculation	localized attack typified by the formation of inverted pliable conical structures. In water systems, tuberculation is more commonly associated with localized corrosion of iron and the conical structures are predominately made up of several oxidation states of iron (Fe2O3, Fe3O4, etc.). Pitting is normal result.
Turbidity	the interference to light transmission caused by suspended solids usually colloidal in nature.
Water-formed deposit	any accumulation of insoluble material derived from water or formed by the reaction of water upon surfaces, including scale, sludge, foulants, sediments, corrosion products or biological deposits.

Definitions

Access tunnel	Opening in natural draft tower used for access to the cold water basin. It can be large enough for a man only, or large enough for mechanical equipment.
Air flow	Total amount of dry air and associated water vapor flowing through the tower, measured in cubic feet per minute at the exhaust from the tower and converted to standard air which has a density of 0.075 lb. per cu. ft.
Air horsepower	The measure of useful power required to move a given air rate against a given resistance. The ratio of air horsepower to fan input horsepower is the measure of fan efficiency.
Air inlet	Opening in cooling tower through which air enters a tower. On induced draft towers, the air inlet is commonly called the louvered face.
Algae	A low form of plant life which generally requires sunlight and air for existence. Causes plugging of heat exchanger tubes and cooling tower distribution systems, and fill.

Algaecide	A toxic material which will retard or prevent the growth of algae and slimes. Some of the more commonly used algaecides are chlorine, copper sulfate and phenolic compounds.
Ambient	The atmosphere which is adjacent to but not affected by the cooling tower. Generally, this means upwind of the tower, and the other areas where other heat producing equipment is located that supplies extraneous sources of heat to the air coming to the tower.
Ambient dew point	The ambient temperature in oF when dew begins to be deposited.
Ambient wet-bulb temperature	The wet-bulb temperature that is measured in accordance with the definition of ambient. Readings are obtained by means of a mechanically aspirated psychrometer.
Anchor bolt	A threaded bolt embedded in a concrete basin or fitted to supported members, to which an anchor casting is attached.
Anchor casting	A device for attaching the tower structure to the foundation; it does not include the anchor bolt. Also known as Column Anchor.
Approach	The difference between the cold water temperature in oF and the ambient or inlet wet-bulb temperature in oF.
Atmospheric tower	One in which air movement through the tower is dependent upon atmospheric conditions, not induced by mechanical fans.
Basin	(see Cold Water Basin and Distribution Basin).
Basin curb	The top level of the retaining wall of the cold water basin; usually the datum point from which tower elevation points are measured.
Basin sump	(see Sump).
Bay	The volume between adjacent columns.
Beam	(see Joist).
Bent	A line of structural framework composed of columns, girts or ties; a bent may incorporate diagonal bracing members.
Bevel washer	A metal fitting used to accommodate through-bolts to angular position of a diagonal member, usually connecting to columns or other framework members.
BHP	(abbr) (see Brake Horsepower).
Blow out	Water that is blown or pulled out of the air inlet by wind.
Blowdown	Water discharged from the system to control concentration of salts or other impurities in the circulating water.

Blower	A squirrel-cage type of air moving device usually applied for operation at higher than normal static pressures or for sound control reasons.
Brace	(see Diagonal).
Brake horsepower (bhp)	The actual power output of an engine or a motor.
British thermal unit (Btu)	The quantity of heat required to raise the temperature of one lb. of water 1oF.
Caissons	(see Foundation).
Canopy (Natural draft tower)	Connects the hyperbolic shell to the cooling section, acting as an air conduit and air seal between the two.
Capacity	(see Thermal Capacity).
Casing	A vertical enclosing sidewall or endwall of a tower, exclusive of the louvers.
Casing panel	A pre-assembled or pre-cut unit of the casing.
Cell	The smallest tower subdivision which can function as an independent unit with regard to air and water flow; it is bounded by exterior walls or partitions. Each cell may have one or more fans or stacks and one or more distribution systems.
Cell dimensions	(a) Width: dimensions perpendicular to tower longitudinal axis and usually at right angles to the louver area; (b) Length: dimension parallel to longitudinal axis and the plane where louvers are usually placed; (c) Height: distance from basin curb to top of fan deck but not including fan stack. Nominal width and length are measured from and to the column center lines.
Circulating water rate	Quantity of hot water entering the tower.
Coil shed	Portion of the tower structure housing atmospheric (tubular) heat exchangers.
Cold water basin	A device underlying the tower to receive the cold water from the tower and direct its flow to the suction line or sump.
Cold water temperature (CWT)	Temperature of the water entering the cold water basin before addition of make-up.
Column	Framework member; a main vertical supporting member in the tower framework.
Column anchor	(see Anchor Casting).
Concentration	(see Water Loading).

Concrete cooling tower	Cooling tower in which the structure is made of concrete.
Cooling range	(see Range).
Counterflow tower	One in which air, drawn in through the louvers (induced draft) or forced in (forced draft) at the base by the fan, flows upward through the fill material and interfaces counter currently with the falling hot water.
Cross struts	Framework that holds up the hyperbolic shell of a natural draft tower. The number of cross struts varies according to shell size.
Crossflow tower	One in which air, drawn or forced in through the air intakes by the fan, flows horizontally across the fill section and interfaces perpendicularly with the falling hot water.
CWT	(abbr.) (see Cold Water Temperature).
Cycles of concentration	Compares dissolved solids in make-up water with solids in the circulating water. Since chlorides are soluble in water, for example, the cycles of concentration are equal to the ratio of chlorides in circulating water to chlorides in the make-up water.
Cylinder	(see Fan Stack).
DBT	(abbr.) (see Dry-Bulb Temperature).
Deck Batt	(see Splash Bar).
Deck Stringer	Holds the splash bars of the fill deck in a fixed position with respect to air and water flow.
Deck support	A horizontal member supporting the fill decks.
Design conditions	Defined as the hot water temperature (HWT) cold-water temperature (CWT), water flow and wet-bulb temperature (WBT) in mechanical draft towers. In natural draft towers; HWT, CWT, GPM, WBT plus either dry bulb temperature (DBT) or relative humidity (RH). Allowable noise level also applies to both.
De-silting sump	The area in the cold water basin, usually at a low point, where silt can be flushed to a drain.
Diagonal	(see also Cross Struts for Natural Draft Tower) A framework member; a load bearing member transmitting forces at other than a right angle with reference to columns or horizontal ties. Also known as Brace.
Diffusion deck	A fill deck that is located directly under the distribution basin or nozzle bank. The purpose of this deck is to receive water from the basin or nozzle and distribute it uniformly over the fill decks.
Discharge stack	(see also Fan stack) A walled enclosure extending upward above the eliminators to direct exhaust air vertically away from fans in a forced draft tower. See Fan Stack for operation in induced draft towers.
Distribution basin	A shallow pan-shape basin used to distribute hot water over the tower fill.

Distribution box	Used in conjunction with the manifold and valve assembly in a crossflow tower to disperse the hot water uniformly in all directions thereby increasing the effectiveness of the distribution nozzles.
Distribution header	Pipe or flume delivering water from inlet connection to lateral headers, troughs, flumes, or distribution basins.
Distribution nozzle	(see Nozzle and next entry).
Distribution system	Those parts of a tower, beginnings with the inlet connection, which distribute the hot circulating, water within the tower to the points where it contacts the air. In a counterflow tower, this includes the header, laterals, and distribution nozzles. In a crossflow tower, the system includes the header or manifold, valves, distribution box, basin pan, and nozzles.
Double-flow water-cooling tower	A crossflow tower with two fill sections and one plenum chamber, which is common to both.
Downspout	A short vertically placed pipe or nozzle used in a gravity distribution system to divert water from a flume or lateral to a splasher.
Drift	Water lost from the tower as liquid droplets entrained in the exhaust air. It is independent of water lost by evaporation. Units may be in lbs./hr. Or percentage of circulating water flow. Drift eliminators control this loss from the tower.
Drift eliminators	An assembly constructed of wood, plastic, cement board, or other material that serves to remove entrained moisture from the discharged air.
Driver	Primary drive for the fan drive assembly. It may be an electric motor, gas engine, steam turbine, hydraulic motor, or other power source.
Drive Shaft	A device including couplings for transmitting torque from the driver to the speed reducer.
Dry-bulb temperature (DBT)	The temperature of the inlet or ambient air adjacent to the cooling tower as measured by a dry-bulb thermometer.
Effective volume	(see Net Effective Volume).
Eliminator	(see Drift Eliminator).
Eliminator baffle	(see Eliminator Board).
Eliminator blade	(see Eliminator Board).
Eliminator board	The smallest component in a wood drift eliminator assembly which is usually installed in a fixed position at an angle to the direction of air flow. Also known as Eliminator Baffle (Blade).
End wall	The wall on the end of the tower structure.

Entering air	Air from the atmosphere surrounding the cooling tower which enters through the louvers on an Induced draft tower or is discharged into the tower by a fan on a Forced Draft Tower.
Entering wet-bulb temperature	Average wet-bulb temperature of the entering air. Includes any effects of recirculation.
Evaporation loss	Water evaporated from the circulating water into the atmosphere by the cooling process.
Exhaust air	The mixture of air and its associated vapor leaving the tower (see Air Flow).
Exhaust wet-bulb temperature	average wet-bulb temperature of the air discharged from the tower.
Exit basin temperature	Temperature of the circulating water leaving the cold water basin if blowdown or make-up is added to the basin, the temperature will be affected accordingly.
Exit diameter	Diameter of the shell at the top in a hyperbolic natural draft tower or at the top of a fan stack.
Fan	A device for moving air in a mechanical draft tower. The fan design may be either an axial flow propeller or centrifugal blower. The fan can be applied as induced draft or forced draft.
Fan deck	The surface enclosing the top of an induced draft tower. In a counterflow tower, the fan deck covers the entire top surface of the tower. In a crossflow tower, the open fan deck covers only the tower plenum area, leaving the distribution system exposed. An extended fan deck encloses the distribution system and covers the entire top surface of the tower.
Fan drive assembly	mechanical components furnishing power to the fan, usually consisting of driver, drive shaft, speed reducer, and supporting members.
Fan driver input	Horsepower input to the driver. For 3-phase alternating current (ac) motors: hp = (amps x volts x 3 x Power Factor x Efficiency) / 746
Fan driver output	Brake horsepower output of the driver to the drive shaft. Fan driver input x motor efficiency.
Fan guard	A protective screen installed either at the inlet of a forced draft fan or at the exit of an induced draft fan.
Fan pitch	The angle that a fan blade makes with the plane of rotation.
Fan ring	(see Fan Stack).
Fan stack	Cylindrical or modified cylindrical structure in which the fan operates. Fan stacks are used on both induced draft and forced draft axial flow propeller fans. Also known as Cylinder.
Fan stack height	Distance from top of fan deck to top of fan stack.
Fan support	(see Mechanical Equipment Support).

Fill bars	The assembly of splash bars comprising the tower filling. Fill bars intercept the downward fall of water at regular intervals, forming splash surfaces which cause water drops to break into smaller droplets, and provide wetted surfaces for air-water contact.
Fill-deck	The assembly of splash bars comprising the tower filling. (See Fill Bars for description of operation in a crossflow tower.)
Fill hanger	Support system in a crossflow tower for fill bars which hold fill in place.
Fill support	(see Deck Support).
Filling	That part of a crossflow, counterflow, or natural draft tower consisting of splash bars, vertical sheets of various configurations, or honeycomb assemblies, tile or other materials, which are placed within the tower to effect heat and mass transfer between the circulating water and the air flowing through the tower.
Firewall	A double wall between cells used to isolate a fire portion system and designed according to NFPA 214.
Flexible shaft	(see Drive Shaft).
Float valve	A valve that is actuated by a float, generally used to control make-up water supply.
Flow control valve	A manually controlled valve generally located in the hot water supply line.
Flume	A trough, which may be totally enclosed or open at the top. Flumes are used in counterflow cooling towers for the manifold pipe laterals to distribute the hot water over the fill.
Fogging	A fog condition created when the exhaust air or plume from a cooling tower becomes supersaturated so that part of the water vapor condenses into visible liquid droplets.
Forced draft water cooling tower	Type of mechanical draft tower in which one or more fans are located at the air inlet to force air into the tower.
Foundation	Support material beneath the tower.
Framework members	The structural members designed to support all live and dead loads. They consist of columns, horizontal ties, diagonals and joists and beams. Can also include shear walls if designed accordingly as in a concrete tower.
Gear reducer	A reduction gear, commonly used on fan drivers to reduce driver speed to fan speed requirements. Also known as Speed Reducer.
Girt	(see Horizontal Tie).
GPM	(abbr.) Gallons per minute
Handrail	A horizontal or sloping rail placed along an access way or at the edge of a platform. Usually at 3'-6" above the walkway or floor. (See Safety Handrail. See OSHA for design criteria.)

Header	In a counterflow tower, the main pipe carrying hot water to a series of laterals for distribution over the fill material. In a crossflow tower, it is the main pipe carrying hot water to the distribution basin of each cell. (See Manifold.)
Heat exchanger	A device for transferring heat from one substance to another. Heat transfer can be by direct contract, as in a cooling tower, or indirect, as in a shell and tube condenser. Also known as filling. Can also be the tube or fin tubed bundles in a wet/dry tower.
Heat load	Heat removed from the circulating water within the tower. It may be calculated from the range and the circulating water flow. Unit: Btu/hr.= gpm x 500 x (HWT - CWT).
Horizontal tie	A horizontal connection member in the tower framework. Also known as Girt.
Hot water temperature (HWT)	Temperature of circulating water entering the distribution system.
Hydrogen ion concentration (pH)	A scale for expressing acidity or alkalinity of the circulating or make-up water. A pH below 7.0 indicates acidity and above 7.0 indicates alkalinity. A pH of 7.0 is neutral.
Hyperbolic tower	A cooling tower of hyperbolic shape, which depends on natural draft for air movement through the tower. Can be either crossflow or counterflow tower. (See Natural Draft Tower.)
Induced draft water cooling tower	Type of mechanical draft tower in which one or more fans are located in the air outlet to induce air flow through the air inlets.
Inlet air	(see Entering Air).
Inlet connection	Fitting to which the circulating water supply piping is connected to serve the tower distribution system. Also known as Inlet Flange.
Inlet wet-bulb temperature	The average of the wet-bulb temperature obtained from several stations located on both the windward and leeward sides of the tower.
Joist	Supports for fan decking, or for film fill modules.
Ladder	Typical rung-and-rail device providing access on outside or inside of the tower.
Ladder cage	Protective cage parallel with and connecting to a vertical access ladder.
Landing	A horizontal flooring, designed to provide offset clearances for stairways, ladders, or other access arrangements.
Lateral header	A pipe or flume distributing water from the distribution header to nozzles, or from other points of discharge to the filling area.

Longitudinal	Always measured parallel to air intakes and perpendicular to air flow.
Louvers	Members installed horizontally in a tower wall to provide openings through which the air enters the tower while also containing the falling water within the tower. Usually installed at an angle to the direction of air flow to the tower.
Make-up	Water added to the circulating water system to replace water lost from the system by evaporation, drift, blow-down, and leakage.
Manifold	The main header pipe in a crossflow tower. (See Header.)
Mastic	A compound usually made up of asphalt and asbestos fiber with suitable solvents and fillers which can be used to seal joints and cracks against leakage of water.
Mechanical draft water-cooling tower	A tower through which air movement is effected by one or more fans. There are two main types: Forced draft with fans located at the air inlet; Induced draft with fans located at the air exhaust.
Mechanical equipment support	Members, which comprise the primary support for the fan, drive assembly. Normally steel or concrete.
Motor rated horsepower	Horsepower rating inscribed on name-plate of the motor driving the fan. (See Rated Horsepower.) Unit: hp.
Natural draft water-cooling tower	One in which air movement is dependent upon the difference in density between the entering air and internal air. As the heat of the water is transferred to the air passing through the tower, the warmed air tends to rise and draw in fresh air at the base of the tower. (See Hyperbolic Tower.)
Net effective volume	That portion of the total structural volume with in which the circulating water is in intimate contact with the air flow through the tower. Unit: ft.3.
Nominal tower dimensions	Width and length measured from and to column centerline or walls; height measured from basin curb to top of fan deck (counterflow design) or to top of distribution basin (crossflow design). Unit: ft.
Nozzle	A device for controlled distribution of water in a cooling tower. Nozzles are designed to deliver water in a spray pattern by pressure or by gravity flow.
Obstruction lights or Aviation warning lights	Warning lights required by FAA regulations, placed on the outside of the hyperbolic shell of a natural draft tower.
Overall tower dimensions	(a) width: overall dimensions perpendicular to the tower's longitudinal axis; (b) length: overall dimension parallel to the air inlet louvers and the longitudinal axis; (c) total height: distance from basin curb to top of fan stack. Dimensions measured in feet.
Packing	(see Filling).
Partition	An interior wall subdividing the tower into cells or into separate fan plenum areas.

Pedestals	Used as a transition from the cross struts to the foundation of a natural draft tower or fan mount in force draft towers..
pH	(see Hydrogen Ion Concentration).
Pier	In a wood tower an exterior or interior column support used to elevate column footings above the basic floor or foundation grade. Also known as Internal Pier.
Pilaster	An exterior column support, usually an integral part of the basin wall. Also known as External Pier. Used as a central point to establish the elevation of framework members.
Piles	(see Foundation).
Pitot tube	An instrument that operates on the principal of differential pressures. The primary use on cooling towers is the measurement of circulating water rate.
Plenum	The enclosed space between the eliminators and the fan stack in induced draft towers or the enclosed space between the fan and the filling in forced draft towers.
Plume	Visible exhaust from a cooling tower. (See Fogging.)
Power Factor	The ratio of true power (watts) to the apparent power, as indicated by the product of amps x volts.
Psychrometer	An instrument used primarily to measure the wet-bulb temperatures. Either a sling or a mechanically aspirated type of psychrometer is acceptable provided the instrument is properly shielded from radiation and the air across the wick is limited to approximately 1,000 ft./min.
Range	Difference between the hot water temperature and the cold water temperature. Also known as Cooling Range.
Rated horsepower	Nameplate horsepower of fan drivers. Unit: hp.
Recirculation	This term describes a condition in which a portion of the discharge air enters the tower along with the fresh air. The amount of recirculation is determined by tower design, tower placement, and atmospheric conditions. The effect is generally evaluated on the basis of the increase in the entering wet-bulb temperature compared to the ambient.
Redistribution basin	an elevated basin installed between the hot and cold water basins in a crossflow tower to maintain correct water distribution through out the entire height of the fill.
Relative Humidity	the ratio of the mole fraction of water vapor present in the air to the mole fraction of water vapor present in saturated air at the same temperature and barometric pressure.
Ring Beam	Footing that carries the loads from the shell of a Natural Draft Tower.
Riser	Piping which connects the circulating water supply line from the level of the base of the tower to the supply header of the tower inlet connection.

Safety handrail	Railing around top of tower, platforms, and stairways; usually composed of top handrail, kneerail, and toeboard. (See Handrail.)
Shell diameter	Diameter of the shell in a natural draft tower at the top of the curb, measured from inside of cross struts to inside of cross struts.
Shell height	Dimension from top of curb to top of the hyperbolic shell in a natural draft tower.
Single-flow water-cooling tower	A crossflow tower having a fill section on one side of the plenum chamber only.
Soffitt	The underside of the lintel beam in a natural draft tower forming the bottom part of the hyperbolic shell. Generally it is thick at the base and is the first portion of the shell above the diagonals or columns, which carry the shell.
Speed reducer	(see Gear Reducer).
Splash bar	Horizontal component of a fill deck, which constitutes the principal splash surface.
Splasher or Splash plate	Used in a gravity distribution system to receive water from a down spout and effect uniform spreading of the water over the wetted area of the tower.
Spray-filled water-cooling tower	A tower, which has no fill, and water to air contact depends entirely on the break-up of the water by means of pressure spray nozzles.
Spray nozzle	Device used in a distribution system to break up the flow of the circulating water into droplets and effect uniform spreading of the water over the wetted area of the tower.
Stairway	typical tread-and-riser device providing angular access to and from the top of the structure.
Standard air	Dry air having a density of 0.075 lbs./ft.3 at 70oF and 20.92" Hg.
Static pressure	The pressure of a gas or fluid in a system as referred to a state of rest or lack of motion. Static pressure is equal to total pressure minus velocity pressure. Unit: lbs./in.2
Sump	Lowest portion of the basin to which cold circulating water flows: usually the point of circulating pumps suction connection. Also known as Basin Sump.
Supply Header	Portion of the water supply system, which contains the valves and distribution boxes in a crossflow tower or the lateral pipes in a counterflow tower.
Thermal capacity	The number of gallons per minute (GPM) a cooling tower will handle for a specified range, wet-bulb temperature, and approach. Also simply known as Capacity.
Throat diameter	Diameter of the shell in a natural draft tower at its narrowest point.

Total pumping head	The total head of water, measured above the basin curb, required to deliver the circulating water through the distribution system. (See Tower Pumping Head.) Units: ft.
Tower dimension	(see Nominal or Overall Tower Dimensions).
Tower pumping head	that part of the "total pumping head" for which the design of the tower and the piping furnished with it are responsible. It is expressed as the head of water above the basin curb measured at the center of the inlet connecting the tower distribution system with the riser, and consists of the total pressure at the centerline of the inlet plus the vertical distance between the inlet centerline and the basin curb. Unit: ft.
Transverse	Always measured perpendicular to air intakes.

Terms | Definitions | Abbreviations | Letter symbols

Abbreviations and Letter Symbols

A	approach*
acfm	actual cubic feet per minute*
alt	altitude*
amb	ambient*
amp	ampere
atm	atmosphere
az	azimuth
bar.	barometer
bhp	brake horsepower
Btu	British thermal unit
CWT	cold water temperature*
cu ft	cubic foot
cu in	cubic inch
cfm	cubic feet per minute (see acfm, scfm)
dB	decibel

F	degree Fahrenheit
diam	diameter
DBT	dry bulb temperature*
el	elevation
fbm	feet board measure (board feet)
fpm	feet per minute
fps	feet per second
ft	foot
gpm	gallons per minute (U.S. liquid measure)
hp	horsepower
HWT	hot water temperature*
hr	hour
in	inch
ID	inside diameter
kw	kilowatt
kwhr	kilowatt hour
lin ft	linear foot
mph	miles per hour
OD	outside diameter
ppm	parts per million
lb	pound
lb per cu ft	pounds per cubic foot
lb per hr	pounds per hr*

psia	pounds per square inch absolute
psig	pounds per square inch gage*
R	range (cooling range)*
Rc	recirculation percent*
RH	relative humidity*
rpm	revolutions per minute
sec	second
shp	shaft horsepower
sp gr	specific gravity
sq ft	square foot
std	standard
scfm	standard cubic feet per minute*
temp	temperature
vel	velocity*
WBT	wet bulb temperature*

Content courtesy of Cooling Technology Institute