It is crucial to consider several factors, including operating costs and desired temperature, when determining what type of process fluid cooling system is right for your application. So, what are the similarities and differences between a fluid cooler and cooling tower? Simply put, a cooling tower is a device that rejects heat. It takes in heat and puts that air into the atmosphere at a much cooler temperature, thanks to the cooling process of a water stream. You will generally find these large applications in chemical plants, nuclear power plants, HVAC systems and oil refineries. Cooling tower sizes will vary depending on location. The largest towers currently used measure more than 600 feet tall. These cooling towers, known as hyperboloid towers, are used mainly in nuclear power plants. Cooling towers were initially developed in the 1800s, used for steam engines. By the time the next century began, many newer evaporative methods for recycling water were underway. These devices were especially popular in urban areas that lacked municipal water mains. The very first hyperboloid cooling tower was built in the Netherlands in 1918. Here is a short list of common cooling tower versions: Crossflow cooling towers Counterflow cooling towers Factory assembled cooling towers Forced draft cooling towers Induced draft cooling towers A crossflow cooling tower, because of its design, makes the hot process water flow down the fill media due to the force of gravity. This occurs while the air blows horizontally across the falling water, which cools it down. The air flow, of course, is the reason why it is named crossflow. In these towers, water requires only gravity for downward flow since there is no other force going against its direction. Hot water basins are placed above the fills, allowing for the water to be evenly distributed. In counterflow cooling towers, the hot process water flows downward on the fill media to continue its flow down to drain onto the cold water basin. In this model, though, the air will enter the tower in a lower section, compared to the crossflow towers. The air will flow upward, passing through the water flowing the fill, resulting in a cooling down phase. The pressurized pipes and nozzles are also placed further apart than in crossflow models, as to not restrict airflow to the tower. These towers are used for HVAC and industrial applications in situations where a high cooling efficiency is not needed and limited space is available. Easy transportation and installation are the two biggest benefits of factory assembled versions. Factory assembled cooling towers are very popular models because they can be custom made to fit your industrial area’s exact specifications. Most industrial plants enjoy the benefits of using forced draft cooling towers. These models are extremely powerful, yet economical at the same time. Forced drafts remove low-potential heat generated within the production process. A counterflow of air and hot water in the cooling fill will result in a transfer of heat. These are ideal towers for the chemical and paper industries. An induced draft tower features a fan at the top of the tower which pulls the air upward. The fan then induces the hot, moist air out of the discharge. The end result is a powerful exiting air velocity, reducing possible recirculation within the tower. These models will prevent any discharged air to flow back into the air intake point. Fluid cooler systems are typically utilized in applications with warmer temperatures. These systems feature copper tubes with aluminum fins and fans, acting as a radiator used to cool the process fluid via ambient air. The coolest practical leaving fluid temperature is nearly 10 degrees warmer than the air entering the application from the outside. Fluid coolers are not as efficient as cooling towers. They also come with a larger price tag and have a larger footprint, overall. However, once installed, these systems feature less maintenance needs than the average cooling tower. Typical operating costs of a fluid cooler fall between that of a cooling tower and chiller. Universal Tower Parts provides stainless steel and galvanized options, welded and gasketed, direct, gear reducer and belt drive units, with efficient Jedair fans, and Jedair low noise fans. Strainers, fan guards and louvers are well constructed, and designed to operate efficiently as they perform their function. Cool Core drift eliminators and fill are made by Universal Tower Parts expressly for our towers. In this article, I addresses both the important question what is cooling tower & how many types of cooling tower?Are you ready to learn?Let’s start..Cooling tower is simply a one type of heat exchange equipment where air & water comes in to the direct contact with each other.The main function of cooling tower is to reject heat of hot water into atmosphere & cooling down the water for further reuse. There are different types of cooling towerEvaporation of water is responsible for majority of heat rejected from water in cooling tower. Typically 75% to 80% of heat is removed from water by evaporation process. Remaining heat removed by passing airflow through the cooling tower. Cooling Tower is also a water saver equipment where you can save huge amount of water by recycling the water. Open recirculation system is very popular in all types of industries because of water recycling feature.In most of the industrial process, water is widely used as a cooling medium because it is very efficient, readily available & relatively cheap.Cooling towers are mainly divide in two categories.Natural DraftMechanical DraftLet us discuss each of them in detail.Natural draft cooling towers use very large concrete chimneys to introduce air through the media. Warm, moist air naturally rises due to the density difference compared to outside air which is cool & dry.Hyperbolic shape of tower drive moist air upwards (buoyancy) & pulls cold air into the tower. Due to the large size of these towers typically 350 to 500 feet, they are generally used for water flow rates above 45,000 m3/hr. usually, large utility power stations uses these types of towers.The principle is same as mechanical draft tower but here fan unit is missing because Heat removed from water by natural draft. This type of tower reduce both operating & energy consumption cost due to its natural draft given by height & stack dimension. Additionally, natural draft cooling tower has a long service life, low noise emissions & low maintenance.Mechanical draft cooling towers utilize power driven motor fans to force or draw air through the tower. These large fans force or suck air through circulated water.The water then falls downward over fill surfaces, which helps increase the contact time between the water and the air and maximizes heat transfer between them.Cooling rates of Mechanical draft towers depend upon their fan diameter and speed of operation.Mechanical draft towers are available in the following airflow arrangements:Induced draftForced draftAn Induced draft cooling tower is a mechanical draft tower with a fan at the discharge to pull air through it. The fan induces hot moist air out the discharge.This produces low entering and high exiting air velocities, reducing the possibility of recirculation in which discharged air flows back into the air intake.This fan/fill arrangement is also known as “Draw-through”.This is the diagram of counter flow induced draft design. in this design hot water enters at the top & air enters from the bottom and exit at the top of the tower.This is the diagram of induced draft cross flow cooling tower. In this arrangement water enters from the top and passes over the fill but here the difference is in the air inlet path. Air is enters form the side of the tower as you can see in the diagram. An induced draft fan draws air across the wet fill and expels it through the top of the structure.A Forced draft cooling tower is a mechanical draft tower with a blower type fan at the intake. The fan forces air into the tower, creating high entering and low exiting air velocities.The low exiting velocity is much more susceptible to recirculation. With the fan on the air intake, the fan is more susceptible to complications due to freezing conditions.Another disadvantage is that a forced draft design typically requires more motor horsepower than an equivalent induced draft design.The benefit of forced draft tower is ability to work with high static pressure. You can easily install in more confined spaces and even in some indoor situations.This fan/fill geometry is also known as “Blow-through”.Based on the movement of Air and the Hot Water Flow these can be classified into two types:Cross flow is a design in which the air flow is perpendicular to the water flow. Air flow enters one or more vertical faces of the cooling tower to meet the fill material.Water flows (perpendicular to the air) through the fill by gravity. The air continues through the fill and thus past the water flow into an open plenum area.A distribution or hot water basin consisting of a deep pan with holes or nozzles.Gravity distributes the water through the nozzles uniformly across the fill material.In a counter flow design, the air flow is directly opposite to the water flow. Air flow first enters an open area beneath the fill media and then drawn up vertically.The water sprayed through pressurized nozzles and flows downward through the fill, opposite to the air flow.Both Cross flow and Counter flow designs can be used in Mechanical draft cooling towers.Hope, this article is clear your concept of what is cooling tower & types of cooling towers. As industries and businesses evolve, cooling towers play a vital role in temperature control and energy efficiency enhancement for diverse equipment. This article explores crucial performance parameters and technical specifications of cooling towers, guiding you in selecting the ideal cooling tower for your needs.**Introduction:**Cooling towers have emerged as essential components for managing temperature and energy efficiency across industries. In this article, we'll delve into the key aspects to consider when choosing a cooling tower for your specific equipment requirements.**1. Cooling Capacity:**Understanding cooling capacity is pivotal in evaluating cooling tower performance. This metric quantifies the heat removal capacity of a cooling tower from circulated hot water, typically measured in kilowatts or megawatts. To ensure a suitable match, carefully assess your equipment's heat load against the cooling tower's capacity.**2. Water Flow Rate:**The water flow rate is a critical factor directly influencing cooling efficiency and energy consumption. Different applications demand varying water flow rates. Thus, selecting a cooling tower aligned with your equipment's water flow needs is essential for optimal performance.**3. Airflow Volume:**Cooling efficiency hinges on cooling tower airflow volume. Greater airflow yields superior cooling effects. The choice of airflow volume depends on tower design and installation placement. Aligning the tower's airflow with your equipment's heat load ensures efficient heat dissipation.**4. Efficiency and Energy Consumption:**Modern cooling towers prioritize energy efficiency and environmental concerns. Scrutinize a cooling tower's energy consumption and efficiency before selection. Some models feature advanced designs and technologies that significantly curtail energy costs while minimizing environmental impact.**5. Size and Layout:**A cooling tower's size and layout directly influence installation and adaptability. Tailor your choice to align with available space and existing equipment layout.**6. Materials and Durability:**Choosing durable materials contributes to extending a cooling tower's lifespan and lowering maintenance costs. Understand the materials and construction quality of a cooling tower to ensure consistent operation, even in challenging environments.**Conclusion:**Selecting the right cooling tower necessitates a comprehensive evaluation of various performance parameters and technical specifications. It's essential to grasp your equipment's requirements thoroughly and collaborate with experts when selecting the optimal cooling tower solution. Investing in a top-notch cooling tower can substantially enhance equipment efficiency, reduce energy costs, and drive remarkable benefits for your industrial or commercial operations. How can financial brands set themselves apart through visual storytelling? 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Explore our latest gallery of Editors’ Picks.Browse Editors' Favorites Universal Tower Parts was developed by a team of cooling tower industry professionals with over 80 years of combined experience. We are an aftermarket supplier of replacement parts for nearly every make and model of cooling towers, fluid coolers and evaporative condensers. Here you can find replacement parts & components for almost any make and model of cooling tower. We ship throughout the United States, Canada, Mexico, and many other regions around the world to help maximize the ability to sell our tower parts wherever the opportunity presents itself. It is our goal to provide the absolute Best Prices, Quality Products, Application Knowledge and Customer Service when it comes to Cooling Tower Parts, Components & Replacement Parts. We also build and manufacture new cooling towers. Free Pricing Quotes can be provided by simply letting us know the cooling tower make and model you need replacement parts for. Our primary audience/ clientele are commercial HVAC contractors, cooling tower manufacturer representatives, and mechanical contractors that service and maintain such facilities as commercial high rise buildings, city, state, county, and federal facilities which include office buildings, hospitals/medical centers, schools, military facilities, entertainment facilities, manufacturing and process facilities, and the like. Universal Tower Parts provides cooling tower parts such as replacement fill media, drift eliminators, air inlet louvers, and all mechanical devices. Universal Tower Parts is committed to helping our clients solve problems of component sizing for nearly all cooling tower parts and cooling tower applications. GIVE US A CALL TODAY AT 602-997-0403 FOR YOUR FREE QUOTE OR FOR MORE INFORMATION ABOUT OUR COOLING TOWER PARTS AND PRODUCTS! As the technology-leading cooling tower manufacturer, Delta’s cooling tower designs last longer, save on costs and eliminate downtime, translating to an unrivaled lifecycle. So, there’s no need to worry about replacements. And, Delta’s product quality is backed by a 20-year warranty. To learn more, contact Delta today. Click here! Explore Delta’s Cooling Tower Sizing Calculator To determine the perfect cooling tower design and size for your needs, Delta makes it easy with our downloadable sizing program. To discover Delta’s cooling tower sizing & selection program, simply click here. Narrowing Down Your Cooling Tower Selection If you are interested in learning the methods of determining the proper size cooling tower, rest assured that Delta is here with guidance. Explore our handy information. Click here to learn about sizing & selecting. Know Your Cooling Tower Capacity Calculation Whether your application is for industrial process cooling or HVAC condenser cooling, the data required is the same. The following design data is required for cooling tower sizing to properly select the appropriate model: Flow Rate in GPM Range of cooling in °F (T1 – T2) Area Wet Bulb Temperature in °F (Twb) Cooling Tower Heat Load Calculation The Design Heat Load is determined by the Flow Rate, and the Range of cooling, and is calculated using the following formula: Heat Load (BTU/Hr) = GPM X 500 X Range (T1 – T2) °F If the range of cooling, Heat Load, and one of the other two factors are known (either the GPM or the ° Range of cooling), the other can be calculated using this formula. GPM = Heat Load (BTU/Hr) / 500 X ° Range of cooling ° Range of cooling = Heat Load (BTU/Hr) / 500 X GPM The Design GPM and the ° The range of cooling is directly proportional to the Heat Load. Let Us Help You With Cooling Tower Sizing & Selecting How comfortable are you working up a cooling tower selection? The cooling tower selection table may look confusing, but after you have made a few selections, the process is straightforward. If you need a refresher, this may help. The following design data is required to select cooling towers: Flow Rate in GPM Range of cooling in °F (T1 - T2) Area Wet Bulb Temperature in °F (Twb) The Design Heat Load is determined by the Flow Rate, and the Range of cooling, and is calculated using the following formula: Heat Load (BTU/Hr) = GPM X 500 X ° Range of cooling. More importantly, if the Heat Load and one of the other two factors are known, either the GPM or the ° Range of cooling, the other can be calculated using this formula. For example: GPM = Heat Load (BTU/Hr), or 500 X ° Range of cooling ° Range of cooling = Heat Load (BTU/Hr) 500 X GPM So, as you can see, the Design GPM and the ° Range of cooling, are directly proportional to the Heat Load. And, 500 is the “fluid factor” which is based on water as the heat transfer fluid. The fluid factor is obtained by using the weight of a gallon of water (8.33 lbs.) multiplied by the specific heat of the water (1.0) multiplied by 60 (minutes/hour). The first step in selecting a cooling tower is to determine the Nominal cooling tower load. Since a cooling tower ton is based on 15,000 BTU/Hr, the formula is: Nominal Load = GPM X 500 (Constant) X ° Range of cooling, 15,000 BTU/Hr/Ton or, the more simplified version of the same formula, Nominal Load = GPM X ° Range of cooling 30 More on Sizing & Selecting Examples of Different Applications Once the Nominal cooling load has been calculated, a Correction Factor must be determined to calculate the Actual Rated cooling tower tons required for the specific conditions of service. The correction factor adjusts for the ease or difficulty of cooling based on the Theoretical Design of all cooling towers. The Nominal Ton Correction Factor is determined by using the COUNTERFLOW COOLING TOWER SELECTION AND PERFORMANCE CHART enclosed. Note that the curves are shown as three separate sections. The WET BULB CORRECTION SECTION, the APPROACH SECTION, and the CAPACITY MULTIPLIER FACTOR SECTION. First, find the Range line in the WET BULB CORRECTION SECTION in the upper left-hand section of the chart. Move along the Range line over to the intersection of the Wet Bulb line. Now move down along the Wet Bulb line to the APPROACH SECTION, in the lower left-hand section of the chart, and stop at the intersection of the Approach line. Move across to the CAPACITY MULTIPLIER FACTOR SECTION to the right-hand curves and stop at the intersection of the Range line and read the CAPACITY MULTIPLIER FACTOR. The Actual Rated cooling tower tons can now be calculated by multiplying the Nominal cooling tons, which was previously calculated, by the CAPACITY MULTIPLIER FACTOR. The Actual Rated cooling tower tons is the capacity required for the specific conditions of service, and the next largest size cooling tower should be selected for the application. Following are selection examples for three different applications. One example is based on conditions that are identified as "Theoretical Design," for reasons which will become apparent. The second example, entitled "Actual Design" is a selection based on adjusting from Theoretical to Actual design. The third example, "Modified Application", converts an actual once-through well water system to a cooling tower recirculation system. Sizing & Selecting Read on to Learn about the Cooling Tower Selection Procedure Example 1. Theoretical Design The following conditions are provided for selection purposes: The operating water flow rate is 600 GPM. Hot water temperature (T1) to the cooling tower is 95° F. Cold water temperature (T2) desired from the cooling tower is 85° F. The installation location's wet bulb temperature (Twb) is 78° F. You can now make a cooling tower selection with this information: The water flow is 600 GPM. The Range of cooling is 10° - (T1 - T2). The Approach to the wet bulb temperature is 7° - (T2 - Twb). First the cooling tower NOMINAL load has to be determined: Nominal Load = GPM x 500 x ° Range, = GPM x ° Range, therefore, 15,000 BTU/Hr 30 Nominal Load = 600 gpm x 10° Range = 200 tons of cooling required. 30 Since the Heat Load = Flow (gpm) x 500 x °Range of cooling= 600 gpm x 500 x 10° = 3,000,000 BTU/Hr and a cooling tower nominal ton = 15,000 BTU/Hr, the nominal cooling tower ton is derived from the actual heat load. Therefore, a heat load of 3,000,000 BTU/Hr = 200 nominal cooling tower tons. Now the Nominal Ton Correction Factor has to be determined for the conditions established: A 10° Range of cooling, and a 7° Approach to the design wet bulb temperature of 78°F, using the COUNTERFLOW COOLING TOWER SELECTION AND PERFORMANCE CHART enclosed. Find the 10° Range line in the WET BULB CORRECTION SECTION in the upper left-hand section of the chart. Move along the 10° Range line over to the intersection of the 78° Wet Bulb line. Move down along the 78° Wet Bulb line to the APPROACH SECTION, (the lower left-hand section), and stop at the intersection of the 7° Approach line. Move across to the CAPACITY MULTIPLIER FACTOR SECTION to the right-hand curve and stop at the intersection of the 10°Range line, and read the CAPACITY MULTIPLIER FACTOR, which is 1.0. To select the proper cooling tower for this application, multiply the 200 Nominal tons calculated, by the 1.0 CAPACITY FACTOR. As previously stated, the correction factor adjusts for the ease or difficulty of cooling in relation to the Theoretical Design. So in this case, since the CAPACITY CORRECTION FACTOR is 1.0, the Nominal and Actual Rated tons are the same as the Theoretical Design, and a Model DT-200I cooling tower can be quoted. Sizing & Selecting Cooling Tower Selection Procedure Example 2. Actual Design Now we will select a cooling tower for the same 200-ton Nominal Load as Example #1 but is different from the Theoretical Design. The operating water flow rate is 300 GPM. Hot water temperature (T1) to the cooling tower is 105° F. Cold water temperature (T2) desired from the cooling tower is 85° F. The installation location's wet bulb temperature (Twb) is 76° F. You can now make a cooling tower selection with this information: The water flow is 300 GPM. The Range of cooling is 20° - (T1 - T2). The Approach to the wet bulb temperature is 9° - (T2 - Twb). First, the cooling tower NOMINAL load must be determined: Nominal Load = GPM x 500 x ° Range, = GPM x ° Range; therefore, 15,000 BTU/Hr 30. Nominal Load = 300 gpm x 20° Range = 200 cooling tons required. 30 Since the Heat Load = Flow (gpm) x 500 x °Range of cooling= 300 gpm x 500 x 20° = 3,000,000 BTU/Hr and a cooling tower nominal ton = 15,000 BTU/Hr, the Nominal cooling tower ton is derived from the actual Heat Load. Again, a 3,000,000 BTU/Hr heat load = 200 Nominal cooling tower tons. Now the Nominal Ton Correction Factor must be determined for the conditions established; a 20° Range of cooling, and a 9° Approach to the design wet bulb temperature of 76°F, using the COUNTERFLOW COOLING TOWER SELECTION AND PERFORMANCE CHART enclosed. First, find the 20° Range line in the WET BULB CORRECTION SECTION in the upper left-hand section of the chart. Move along the 20° Range line over to the intersection of the 76° Wet Bulb line. Move down along the 76° Wet Bulb line to the APPROACH SECTION, in the lower left-hand section of the chart, and stop at the intersection of the 9° Approach line. Move across to the CAPACITY MULTIPLIER FACTOR SECTION to the right-hand curves and stop at the intersection of the 20° Range line, and read the CAPACITY MULTIPLIER FACTOR, which in this case is 0.62. The final step to select the proper cooling tower for this application is to multiply the 200 nominal cooling tons required, which was calculated above, by the CAPACITY FACTOR, which in this case is 0.62. The cooling tower Actual Rated tons for the conditions given are therefore 124 tons, and a Model DT-125I cooling tower can be quoted. Since the correction factor adjusts for the ease or difficulty of cooling based on the Theoretical Design, in this case, the Actual Rated tower conditions are easier than Theoretical Design. Sizing & Selecting Cooling Tower Selection Procedure 3. Modified Application The following is an example of modifying a "once through non-recirculating cooling application" to a recirculating cooling tower system. A cooling tower is required for heat exchanger process cooling, which is now being cooled using 55°F well water at a flow rate of (1 Million gallons/day - 300,000 sanitary = 700,000 gal per day). Approximately 500 GPM, and discharging to a lake at 80°F. With this information we can establish the Heat Load, which is 500 GPM x 500 x 25° R (80°F - 55°F) = 6,250,000 Btu/Hr. We can establish the cooling tower design for a 6,250,000 Btu/Hr Heat Load based on the installation location design Twb, which, for this example, we'll say is determined to be 76°F, and by establishing a reasonable cold water temperature at a 7° Approach to the Twb, at 83°F. What we have to determine now is either the design range of cooling or the appropriate design flow rate based on the established Heat Load. Let’s select the appropriate design flow rate by using a reasonable 15° Range of cooling; 83°F cold water + 15° = 98°F hot water. Use the Cooling Tower Heat Load Calculation to find the design flow rate as follows: Heat Load (BTU/Hr) = GPM X 500 X ° Range of cooling, or rearranged to determine the design flow rate. GPM = Heat Load (BTU/Hr) = 6,250,000 Btu/Hr = 835 gpm 500 X ° Range of cooling 500 x 15° R Now you can make your cooling tower selection based on 835 gpm, cooling from 98°F to 83°F @ a design 76°F Twb. The cooling tower selection is = 418 Nominal Tons x .83 DCF = 347 Rated cooling tower tons, or a 350-ton cooling tower selection. Alternate #1:

A commercial cooling tower can also be selected for this heat load based on a 25° Range of cooling. The conditions for selection would be 500 GPM, cooling from 108°F to 83°F @ 76°F Twb, which is equal to 418 Nominal tons x .62 DCF = 259 Rated cooling tower tons, for a 260 ton cooling tower requirement. Alternate #2: Or select for a design to cool 110°F to 83°F = 27° R of cooling, the design flow would be 6,250,000 Btu/Hr = 465 GPM. 27° R x 500 The selection for 465 GPM cooling from 110°F to 83°F @ 76°F Twb = 418 Nominal tons x .58 DCF = 242 Rated tons; so you can recommend a single Model DT-250I cooling tower.