Gardner Denver

DRY FLUID | EVAPORATIVE FLUID | OPEN TOWERS & CUSTOM

Cooling Systems

Close the Loop on Inefficient Cooling Water Systems

The operation of costly cooling water systems is one of the most wasteful procedures found in industry today. Water purchase, sewer discharge, EPA regulations, chemical treatment and maintenance are some of the high operating costs associated with most systems.

Industrial Cooling

We are industrial cooling system specialists. Our systems have replaced once through cooling, saving companies thousands of dollars per year in energy, chemical and maintenance costs. Gardner Denver closed loop systems are designed to substantially decrease or even eliminate the hidden costs of operating your water cooled equipment. Depending on your current operation, installed payback on a closed industrial cooling system can be achieved in months.

Gardner Denver has experience designing for a variety of applications in all industries. Our knowledge and technical expertise enable us to create the best solution for your particular needs and assure that your system is right the first time.

Our experience includes cooling systems for:

- Air compressors
- Refrigeration compressors
- Hydraulic presses
- Welding equipment
- Molding machines
- Engines
- Bearings
- Printing presses
- Furnaces
- Ovens

Our System Performance Guarantee

Gardner Denver guarantees the performance of all cooling systems as quoted, based on design specifications and heat load data as provided by the end user of our equipment, and contingent upon proper installation and maintenance of said cooling equipment. Gardner Denver reserves the right to correct any detected performance deficiencies in order to provide total customer satisfaction.

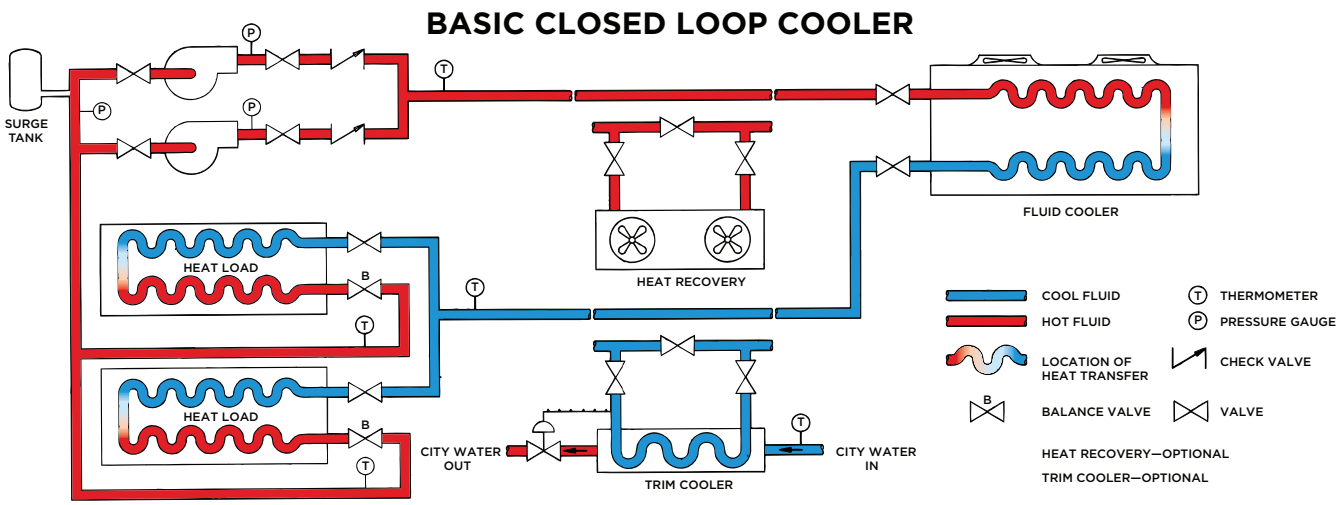
Gardner Denver: Guaranteed to Perform to Your Specifications

We specialize in closed, sealed, glycol coolers for a wide variety of non contact cooling water applications as well as open systems. Our systems are affordable and efficient.

We precision engineer all cooling systems to meet the exact requirements of your application. Gardner Denver will determine precisely what you need and respond with a tailor made solution, not an off the shelf product.

Systems are designed to match the heat load under the most demanding conditions to ensure that it exceeds performance expectations. In fact, we guarantee system performance.

OUR COMMITMENT IS TO YOUR TOTAL SATISFACTION



Closed-Loop Fluid Cooling Systems

In its most basic form, a closed loop cooling system consists of four elements:

1. Heat Load: Industrial process or equipment that produces heat as a by-product, for example, an air compressor or furnace.

2. Heat Exchanger: Device to transfer heat energy to a cooler medium, for example, a fluid cooler or radiator.

3. Pump System and Controls: Recirculate heat transfer fluid from heat load to heat exchanger.

4. Conduit System: Pipe and valves used to connect the system components. Permits fluid circulation between heat load, heat exchanger and pump system.

The pump/control system circulates a heat transfer fluid through the conduit system that captures the heat produced by the heat load. The pump transports the fluid to the heat exchanger where it is dissipated by one of several possible cooling methods, i.e., ambient air cooling, evaporative cooling or refrigeration.

Gardner Denver considers several factors when designing an industrial cooling system:

- Maximum inlet temperature to heat load
- Ambient air conditions and elevation
- Water quality and availability
- Environmental conditions

Calculating Heat Load

To design an industrial cooling system, the heat load must be determined. Total heat load is expressed in BTUH, or British Thermal Units per Hour.

British Thermal Unit (BTU): Energy required to raise the temperature of one pound of water one degree Fahrenheit.

Total Heat Load can be calculated by using the following heat transfer formula:

BTUH = 500 × TEMPERATURE RISE × FLOW

500 = Weight of one gallon of water × 60 minutes.

Flow = The flow of coolant through the heat load expressed in gallons per minute (GPM).

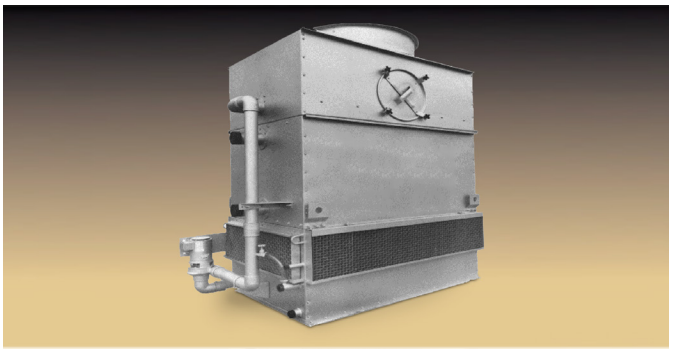
Temperature Rise = The difference between the entering and leaving coolant temperature.

This formula is valid for **water** as a coolant. For any other liquid, correct with the specific heat and gravity.

Heat Load in BTUH

- Brake Horsepower (BHP) × 2546.4 = BTUH
- Kilovolt Amperes (KVA) × 3415 = BTUH
- Watts × 3.415 = BTUH
- Foot Pounds × 0.00128= BTUH

DRY FLUID COOLER: DRY BULB SYSTEMS



EVAPORATIVE FLUID COOLER:
WET BULB BASED SYSTEM

Basic Form of Industrial Fluid Cooling

Dry Fluid Coolers utilize a sealed, pressurized closed loop system that provides a clean, efficient, and low maintenance solution to industrial cooling applications. Dry coolers utilize ambient air to dissipate heat. Warm water/glycol fluid is recirculated from the heat load through a finned tube heat exchanger while ambient air is drawn across the coil circuit.

Precision Engineered to Your Specifications

Gardner Denver Dry Fluid coolers are sized to match your heat load under the most demanding conditions (ASHRAE 1%). Our coolers are delivered assembled and pre-wired for easy installation at your site and are constructed of all corrosion resistant materials. We offer either one complete module for outdoor mountings, or as two separate modules, enabling you to install the pump/control module inside and remote mount the air-cooled heat exchanger outside.

The Advantage of Trim Cooling

The practical implementation of a dry fluid cooler is limited by maximum ambient temperatures. Optional trim cooler packages are used with dry fan-coil units to ensure cool operations during unexpected high ambient temperatures. Trim coolers are used when it is mandatory to hold fluid temperatures to specific conditions. Gardner Denver trim coolers are available in tube-in-shell or plate and frame type and are sized for 2 to 1 flow to save water. A quality temperature-controlled water regulating valve is standard and uses only the amount of city water required, affording automatic economical operations.

Need Lower Fluid Temperatures?

A Packaged Evaporative Cooler System is the answer to cooling needs in high ambient locations using temperature sensitive equipment Gardner Denver Evaporative Fluid Coolers consist of a tube bundle, spray pump and cooling fan. The tube bundle is sprayed with water while a water glycol solution circulates through the tube bundle. Heat exchange occurs from the tube bundle to the spray water and is dissipated with the evaporation of the water. The cooler is sized for the area wet bulb (ASHRAE 1%) for heat sensitive loads.

The water/glycol mixture is circulated between heat load and evaporative cooler through a packaged pump/control module, factory pre-piped and pre-wired for easy installation. The sealed, pressurized recirculating system eliminates scale corrosion build-up in your piping and heat generating equipment by eliminating entrained oxygen in the system. Corrosion inhibitors contained in the glycol provide further protection.

Evaporative units are available with axial fans, centrifugal fans, fan cycling, dampers and pan heaters as options to fit your specific requirements.

Closed Industrial Fluid Cooling Systems are the solution to reducing high water and sewage costs. Eliminating high cooling tower maintenance costs, stopping water cooled equipment from fouling and conserve water to help your company become more environmentally friendly.

OPEN TOWERS & CUSTOM SYSTEMS

PUMP PACKAGE: THE HEART OF THE SYSTEM

Open Water Systems

Where open, contact water is unavoidable, Gardner Denver offers a complete line of open tower packages with fan cycling for precise temperature control, plus any and all options necessary for your particular application. Options include two speed fan motors, water storage tanks, pan heaters, and pan heaters. Stainless steel and fiber reinforced polyester (FRP) housing is available for reliable, extended life operation.

Additional Savings with Custom Systems

If you have a specific hybrid application, Gardner Denver can custom design the most efficient combination to meet your requirements. We have the technical expertise for systems such as quench tank cooling, free cooling for chillers, specialty chilled water/glycol systems and plate & frame type heat exchangers for challenging applications.

Heat Recovery for Even More Savings

Most installations have the potential to offer you additional dollar savings in some form of heat recovery. We can assist you in converting your waste heat into usable energy, seasonable or year round. This can be in the form of simple space heaters, pre-heated boiler water or process water. Gardner Denver can custom design each heat recovery application for full automatic operation to maximize your return on investment.

Pump Station

The center of all cooling systems is the pump station, the primary control device. The design of the pump station is of critical importance for the control and performance of your system. Improper pump station design can cause serious problems ranging from high installation costs, to excessive downtime, and years of inefficient operation. The quality of our pump station is second to none. Gardner Denver designs feature ASME coded surge tank, fabricated channel steel frames for rugged durability and close coupled centrifugal pumps for low maintenance and long service life. The pump station is pre-piped and wired for easy on site installation at your facility. With the technical excellence of Gardner Denver, the success of your system is guaranteed.

Pump Selection

Gardner Denver engineers a cooling system based on the unique characteristics of your installation. Significant emphasis is placed on pump selection to ensure efficient operation. We utilize flow switches versus pressure switches to eliminate false signals. A NEMA 4 control panel provides indicating and warning lights to keep you informed on system performance... Gardner Denver can custom design pump package systems to meet specific system needs and/or space requirements.

Design Options
to Meet Virtually Any Application

Standard Equipment

Pump Package

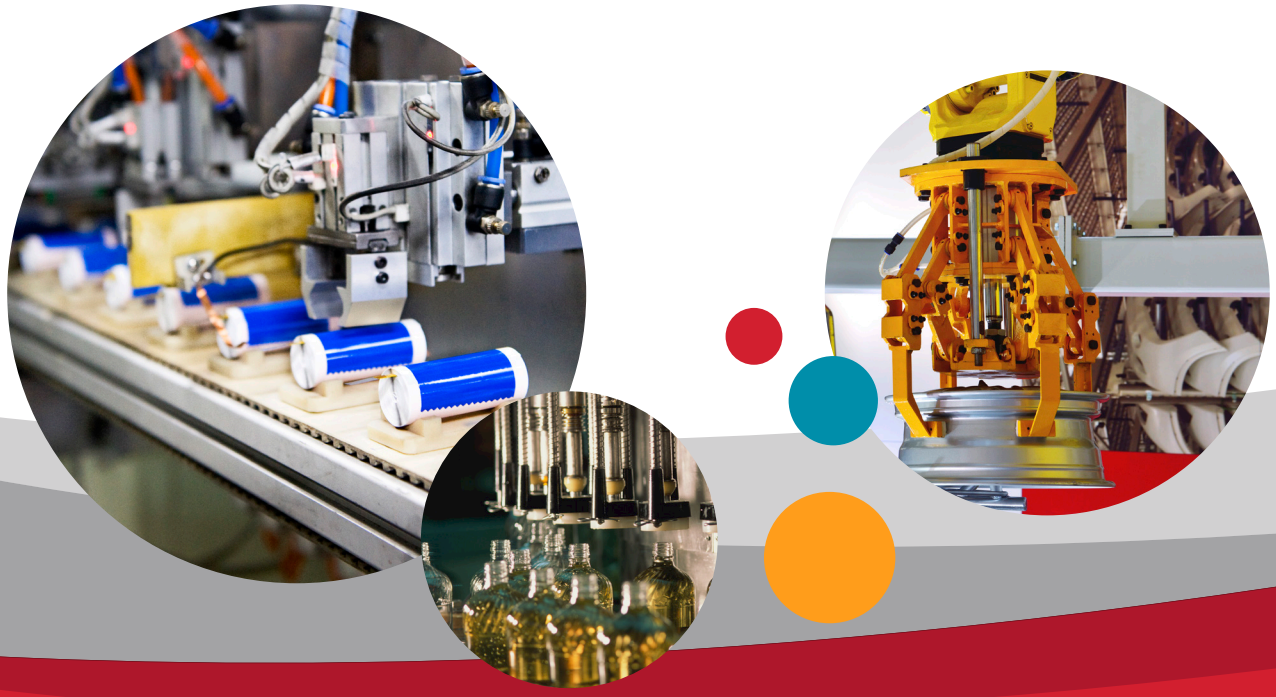
- Nema 4 Control Panel
- ASME Coded Surge tank, (25 Gallons)
- Safety Valve Sight Glass
- Purge Point
- Flow Switch
- Check Valves
- Isolation Valves on Both Sides of
- Pump(s)
- Pressure Gauges with Gauge Valves
- Temperature Gauges with Thermal
- Wells
- Fill Station
- Close Coupled Centrifugal Pumps
- Fabricated Steel Base
- Pre Wired and Piped
- Auto Switch Over on Duplex

Dry Fluid Coolers

- Direct Drive, Balanced Fans
- Weather Protected Motors
- Thermal Overload Protection on
- Motors
- Johnson “350” Fan Cycling Controls
- Weather Resistant Control Panel
- Fan Guards
- Corrosion Resistant Construction
- Galvanized Steel Unit Cabinets
- Galvanized Steel Legs
- Manifold Kits for Double Wide Coolers
- High Efficiency Copper Coils
- Compartmented Fans
- Coils Tested @ 400 PSIG
- Manifold Drains and Vents

Evaporative Coolers

- Axial Fans
- Corrosion Resistant Construction
- TEFC Fan Motors
- Fan Cycling on Multi Fan Units
- PVC Water Distribution System
- Mechanical Water Make Up
- NEMA 4 Panel With 120 Volt Controls
- PVC Eliminators
- Stainless Steel Strainers
- Closed Units
- Centrifugal Spray Pump
- Galvanized Steel Coils
- Bleed Line
- TEFC Spray Pump Motors



Useful Formulas

BTU = Energy required to raise one lb. of water 1°F

BTUH = 500 × TR × GPM

- (TR = Temperature Rise, = Difference between entering and leaving fluid temperatures.)
- (500 = 8.333 lbs. × 60 minutes)
- (8.333 lbs. = weight of one gallon of water)

TR = BTUH (500 × GPM)

GPM = BTUH (500 × TR)

- GPM is dictated by TR and BTUH and will vary from original equipment specifications when used at higher (fluid) operating temperatures.

BTUH = BHP × 2546.4 (SENSIBLE DUTY)

- BHP × 15,000 (LATENT DUTY)
- KVA × 3415
- WATTS × 3.413
- FT. POUNDS × 0.00128

One gallon of water = 8.333 pounds.

One pound of water = 11.99 % of one gallon.

Gallons = cubic feet × 7.4805

PSIG = 2.31 feet of water, (ΔP).

One foot of water = 0.4335 psig, (ΔP).

Evaporation rate is one pound of water per 1,000 btuh.

BTUH ÷ (1,000 × 60) × 0.1199 = GPM

GLYCOL CORRECTION FACTORS

% GLYCOL	FREEZE PROTECTION (°F)	CORRECTION FACTOR
10	+25	.984
20	+14	.968
30	+3	.938
40	-13	.891
50	-33	.856

The leader in every market we serve

by continuously improving all business processes

with a focus on innovation and velocity

AIR SERVICES COMPANY
COMPRESSED AIR SPECIALISTS

www.AirServicesCo.com
Sales@AirServiesCo.com
800-323-8162

Gardner Denver®

Gardner Denver, Inc.
1800 Gardner Expressway
Quincy, IL 62305
866-440-6241
www.gardnerdenver.com/gdproducts

GA-COOL-SYS 1st 3/20

Please recycle after use.