



Refrigeration Plant Information

Introduction



For 100 years, it's been accepted that ice rinks come with a multitude of expensive and reoccurring problems; not to mention astoundingly high energy costs. Much of this is due to the fact that outdated rink technology is still commonly manufactured and installed throughout North America, potentially leaving rink owners with more of a liability than a worthwhile investment. With truly cutting edge technology and unprecedented flexibility, **blü line™** seeks to transform an industry that has been notoriously slow to change.

For everything from the pump station, pipe grid, and project-designed chiller to fittings, accessories and ice maintenance products, **blü line™** only sources high quality, durable components packaged for optimal value and longevity. Our products and installation processes aren't just updated versions of old technology and methods; they're truly the **next generation in ice rink technology.**

Our ice rink technology will last longer, save more money, use less energy, and will simply provide you with the best product in the market. A **blü line™** ice rink can be installed in virtually any climate across the globe, for any situation, event, time period, or size requirement. For short-term needs, **blü line™** will come to you with a fully mobile rink that utilizes the same core technologies as our permanent rinks. Our foolproof mobile rinks can be quickly installed and broken down by local labor anywhere in the world, saving time and money.

With our core principles of simplicity, efficiency, and flexibility, we seek to provide the new industry standard in ice rinks for any occasion – no matter how demanding.

Air Condensed Chiller

blü line
next generation ice rink technology

A **Refrigeration Plant Chiller** is the equipment that generates and maintains the ice in a rink. The Chiller is comprised of four major components of the vapor-compression refrigeration cycle (compressor, evaporator, condenser, and a metering device). The rink chiller uses primary refrigerant and removes the heat from the rink via secondary refrigerant - a glycol solution which is pumped through a total of 45.5 (72 km) of rink piping.

Our packaged Chiller offers you the advantages of proven technology that's designed, rink tested, and built by skilled engineers. The combination of refrigeration engineering expertise, time-tested balanced components and shop quality control makes it possible for you to enjoy the advantages at an extremely competitive price.



The **blü line™** chiller is air cooled and eliminates the need for an evaporative condenser which uses additional power, space, masses of water and additional inputs such as water softener, algacide, and higher maintenance costs that if forgone could create a breeding ground for pathogenic bacteria such as Legionella.



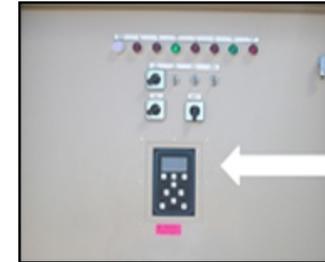
125 HP Indoor Chiller plant and pump station compacted to save space.

Air Condensed Chiller

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blü line™ Chillers are computer controlled* and produce detailed graphics and historical data to help monitor and manage conditions, making **blü line™** chillers one of the most accurate systems available. This feature is not available at most rinks and not offered by many competitors. The only historical information contained in some competitors' chillers is what rink operators must manually log in on a daily log sheet. Thus, the signs detected by infrared sensors that concerning conditions are occurring are obscured in the inaccurate, insufficient, or totally unavailable historical data.

The **blü line™** Chiller is low maintenance; simply check the fans and clear debris away from the condenser air intake. There is no noisy mechanical room inside your building, no outdoor water condensing unit, no water bill, no mildew, no slime, and no mess. Our Chillers have fully welded structural steel bases and are built to industrial standards.



*Features 80 character alphanumeric liquid crystal display with easy to use self driven menu options and built in protection against potential mechanical failures



- No maintenance
- Ice temperature maintained within 0.3°C of the set point.
- Fully packaged system – connect electrical & plumbing and it is ready to run.
- Air condensed refrigeration, no water tower to mess with = no corrosion.
- Helical Rotary Screw Compressors.

Air Condensed Chiller (Compressors)



Our Hanbell RC2 Series Screw **Compressors** are manufactured and inspected under the ISO 9001 quality assurance program and given a final factory run test to verify reliability. All of our equipment must pass our own above industry standard quality control requirements prior to delivery. ISO 9001 certification assures that each compressor is manufactured under world-class strict controlled quality manufacturing guidelines and procedures. The Hanbell RC2 Series will provide superior life & performance when installed, operated, and maintained with the same attention to quality.

Each of the two Compressors incorporates built-in safety features to handle operational reliability. They include:

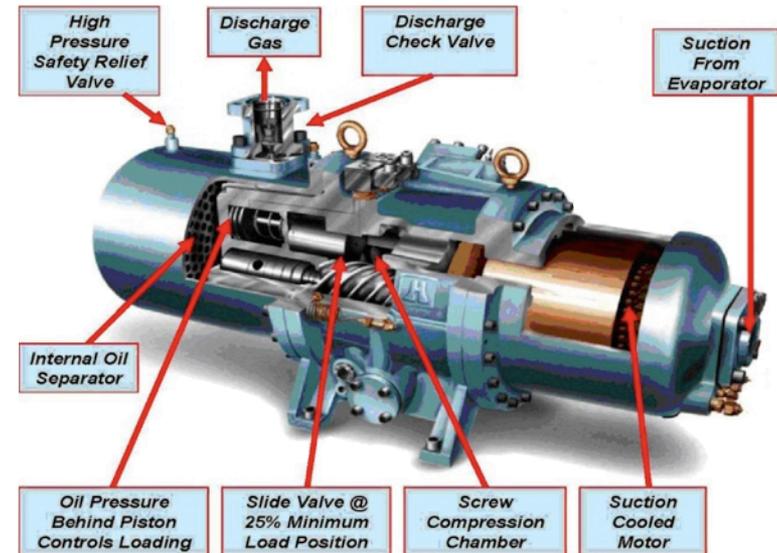
- Thermal monitoring of motor temperatures
- Discharge-gas temperature protection
- Phase sequence control
- Manual reset Lockout



Semi-Hermetic Rotary Helical Screw Compressors



Oversized Receivers - used for all low ambient Chillers. Prevents cycling and operational damage of components.



Air Condensed Chiller (Condenser)



Condenser and Fans

The **blü line™ Air-Cooled Condenser** hosts 16 aluminum fins per linear inch (25 mm) which are mechanically bonded to the 3.2 mm (0.38 inch) copper tubes, this results in maximum efficiency of heat transfer between the circulating refrigerant and the air stream. Condensers are factory proofed and leak tested at 450 psig. Condenser fans are direct drive, at 1,140 rpm, with vertical discharge. Fans are separated by partitions to eliminate fan back spin.

OIL CHARGE

The initial oil charge for the compressors is factory installed.

REFRIGERANT CHARGE

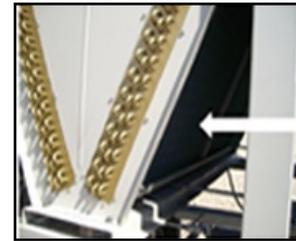
The initial refrigerant charge is factory installed.

GAUGES

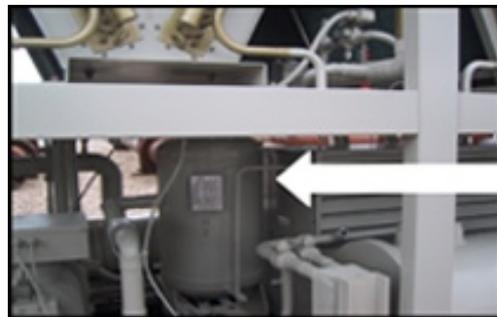
Discharge and suction pressure gauges for all circuits are installed.



Air-Cooled Chiller and Condenser



Hydrophilic Coil Coating



Exterior Oil Separator



Air-Cooled Oil Cooler



Condenser Floodback

Floodback control is the optimal control for high wind, low ambient operation. As liquid refrigerant begins to flood the condenser, the micro controller monitors refrigerant levels and opens or closes solenoid sets while minimizing condenser fan cycling.

Air Condensed Chiller (Evaporator)

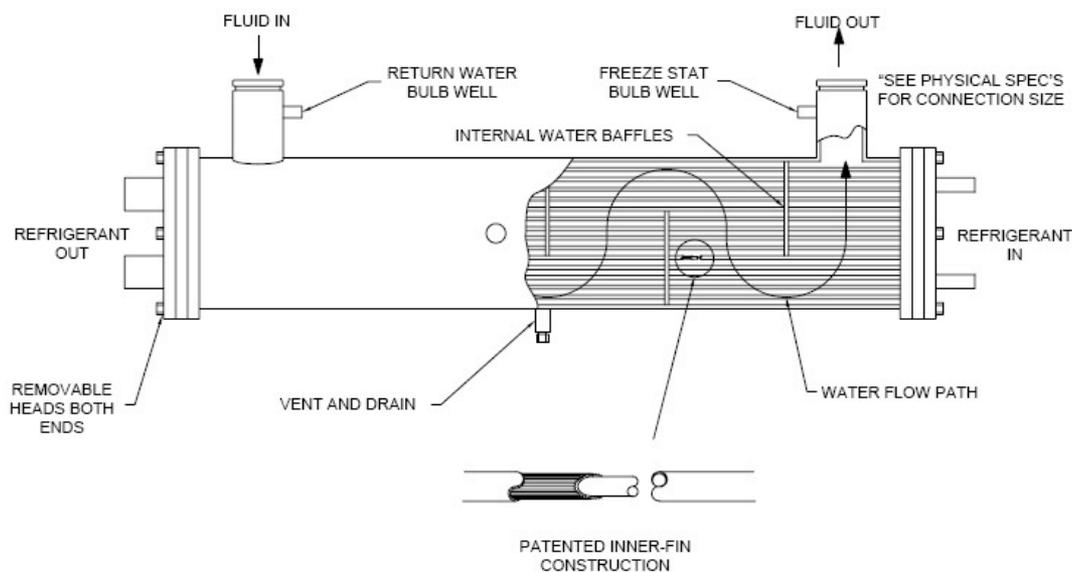
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Glycol Shell & Tube Evaporator

The **blü line**™ evaporator vessel design is a tube-in-shell heat exchanger with internally finned 12.7mm (0.5 inch) copper tubes for compact chiller design and weight reduction. Vent and drain connections and fittings for temperature control sensors are included on the vessel.

The evaporator is designed, tested and stamped in accordance with ASME, 300 psig on the refrigerant side, and 200 psig on the water side.

Typical design for 2 circuit Evaporator:



The evaporator vessel is insulated with a 50mm (2.0") PE closed cell foam insulation layer. Insulation also covers the liquid and suction lines and evaporator heads.

The shell and tube evaporator has independent dual circuits; each circuit is designed to handle a compressor. Many other chillers using DX evaporators must be entirely shut down for repair if one circuit goes down.

Pump Station

A **Circulation Pump Station** circulates the glycol solution from the Chiller to the rink surface then back to the Chiller in what's called a closed loop plumbing system. One pump functions at a time, circulating approximately 425 to 510 gpm through the system. The second pump is a "stand by" which eliminates the risk of any down time caused by a problem with the main pump. Butterfly valves and check valves isolate the pumps on the suction and discharge sides, for easy servicing of a pump. Key components are insulated and metal clad.

The **blü line™** Pump Station also features an automatic air venting system and an oversized glycol reserve/expansion tank with a liquid level "sight tube." Necessary electrical controls are mounted on the onboard control panel. Pumps are constructed from cast iron and are fitted with a bronze mechanical seal.

- The Electrical Controller Box, Expansion Tank, Pump Motors and Piping are mounted on a Skid.
- Pump is Pre-Fabricated at our factory.
- No welding at the site required.
- Easy to hook up and operate.
- All Controller Interfaces are digital.
- Double Door Electrical Control Box for Outdoor Protection.
- Pipes and Expansion tank are insulated with 1" High Density Styrofoam and clad with 0.06" thick aluminum sheet.



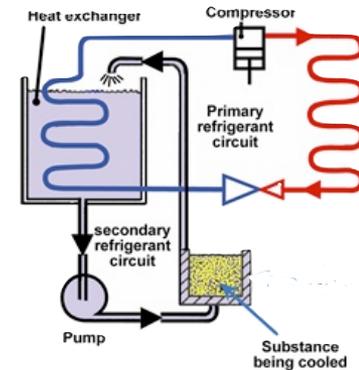
Pump Station



The **blü line™** Pump Station features two end suction pumps for the circulation of your environmentally friendly propylene glycol (secondary refrigerant*). One pump functions at a time with the second pump acting as a standby. Butterfly valves and check valves isolate the pumps on the suction and discharge sides of the Pump Station for easy servicing. A Wye style strainer is included on the suction side. All Key components are insulated and metal clad for greater protection. All Pump Station components are factory built and packaged.

The **blü line™** Pump Station also features an automatic air venting system and a glycol reserve/expansion tank with a sight tube. Switchboard controls are mounted on the Pump Station panel.

* A secondary refrigerant (**Ethylene Glycol Solution**) is provided for Freeze Protection in quantities to sufficiently “charge” the Rink System. Outdated “brine” (salt) solutions (Ca Cl) are corrosive and will not be used in any **blü line™** product.



blü line™ Pump Station



Redundant Glycol Pump

A completely redundant second process pump is installed with included starters, circuit breakers, and automatic or manual lead LAG controls

Pump control is integrated into the micro controller for ease of use which greatly reduces maintenance time, training, and unnecessary trips

Pump and seal are rated for -40°F service

Transmission Piping System



The **Secondary Refrigerant Transmission Piping System** is fabricated of machined Schedule 80 Poly Vinyl Chloride (PVC) high-impact resistant polymer, again eradicating all liquid-to-metal components. Our Refrigeration Pipe Grid, transmission, and header piping prevent corrosion. Valves, expansion joints, flex piping and fittings are provided to complete the rink layout as per the rink MEP Design.

Easy Installation – PVC pressure pipe and fittings are environmentally friendly, lightweight, approximately one-half the weight of aluminum and one-sixth the weight of steel, resulting in reduced transportation, handling, and installation costs.

Chemical Resistance - PVC pressure pipe and fittings are resistant from attack by a wide variety of strong acids, alkalis, salt solutions, alcohols, and many other chemicals.

Fire Resistance - PVC pressure pipe and fittings are self-extinguishing, and do not support combustion.

Internal Corrosion Resistance - Schedule 80 pipe and fittings resist chemical attack by most acids, alkalis, salts, and organic media such as alcohols and aliphatic hydrocarbons, within certain limits of temperature.

Freedom from Toxicity and Odors - PVC pressure pipe and fittings systems are nontoxic and odorless.

Low Friction Loss - The smooth interior surfaces of PVC Schedule 80 pipe and fittings assure low friction loss and high flow rate. Because PVC pipe and fittings do not rust, pit, scale, or corrode, the high flow rate continues for the life of the piping system.

Low Thermal Conductivity - PVC pressure pipe and fittings have a much lower thermal conductivity factor than metal pipe. This ensures that fluids maintain a more constant temperature. In most cases, pipe insulation may be required.

Low Installation Cost - The many advantages of PVC Schedule 80 pipe and fittings ensure a lower installed cost than for alternative piping systems.

Maintenance Free - PVC pressure pipe and fittings systems do not rust, pit, scale, corrode, or promote build-up on the system interior culminating in years of trouble-free service.

Contact



Thank you for viewing our ice rink brochure. Please feel free to contact us with any inquiry.



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