

Selecting the Best Industrial Chiller for your Application

Selecting and purchasing an industrial chiller can represent a significant investment of time and money: one that should make financial sense upfront and for the life of the equipment. Careful planning before a chiller purchase — along with proactive maintenance and informed use throughout the equipment's life — can significantly decrease the total cost of ownership, making your chiller investment pay off in the long run.

Numerous factors affect the total cost of ownership. Many are unique to the specific use and demands of a given application. However, every proposed purchase can start with some universal considerations. Asking the following questions as you work through the specification process will help improve the reliability of your process as well as optimize total cost of ownership.

- Is the chiller's design sized properly for current application capacity?
- Should the chiller be designed for future capacity changes?
- How will the location, footprint and chiller heat release affect the design?
- Have plumbing length/height and piping been communicated to the designer?
- Does a standard model meet your needs or will a custom design be more effective in the long run?
- Who will perform the typical maintenance or future service needs on the chiller?
- Does the chiller manufacturer have a robust warranty, service and repair program?
- Are stock parts available from the chiller manufacturer?

This article will take a closer look at how the answers to these questions affects chiller selection and operation.

Chiller-Sizing Concerns

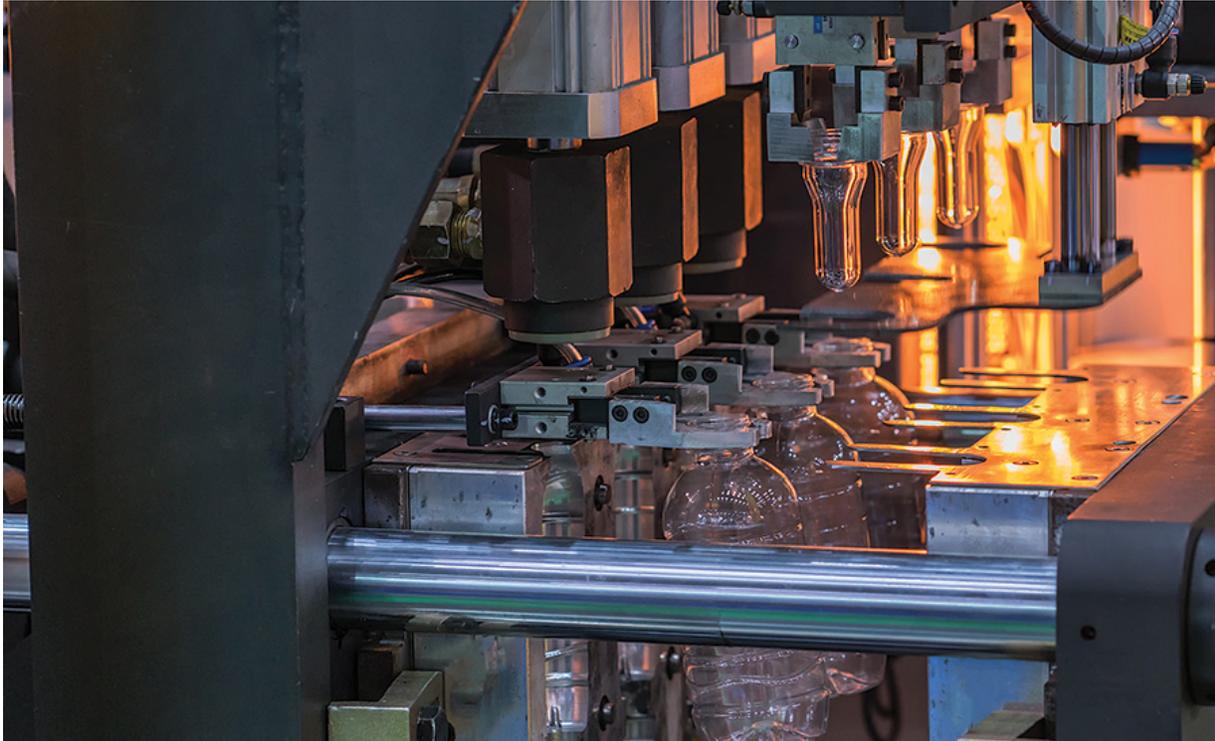
Estimating the cooling capacity required for an application is the first step in determining what size chiller to purchase. With your chiller manufacturer, discuss:

- The incoming fluid temperature from the process.
- The desired leaving fluid temperature.
- The desired pressure and flow rate.

A thorough understanding of the process requirements will help determine the capacity best suited to your application's needs. Other considerations such as the maximum production load and the highest ambient conditions also should be taken into account.

If a chiller is inadequately sized, it may cost you more than necessary. Experienced chiller manufacturers often use established application-based sizing rules. Undersized chillers may not be able to handle the demanded capacity, resulting in costly repairs and downtime. Conversely, oversized chillers typically carry a higher purchase price. Yet that increased investment may not result in greater longevity.

Chillers that are oversized may be subject to short cycling once installed. This can compromise the life of the compressor and, ultimately, waste investment capital.



Food processing and food packaging applications require reliable indirect cooling equipment to maintain precise and reliable temperature control.

Discussing the required setpoint also is important. If the chiller needs to operate above or below the standard operating range of 50 to 85°F (10 to 29°C), then special features may be needed to allow the chiller to meet the expectations. If such customizations are not included at the outset, the chiller may not operate effectively or consistently. One key takeaway is that if precise temperature control is required for critical applications, provide this information to your chiller manufacturer. This will help ensure the chiller is upgraded as needed to meet the proper tolerance for the outlet temperature.

Accommodating Future-Capacity Requirements

Whether you are specifying a chiller to add to an existing application or designing the chiller from the ground up, knowing what physical space you can dedicate to the cooling equipment — now and in the future — is important. Most chiller manufacturers offer options to save space and provide maximum application efficiency. While taking advantage of these where necessary, be wary of losing sight of future growth. If you expect the demand for cooling capacity to increase over time, consider whether expandable and redundant chiller offerings make sense.

Modular chillers allow you to increase existing cooling capacity by adding an identical unit. The additional modular chiller expands flow and capacity. N+1 or 2N designs also can be used to

create a redundant system. This is suited for processes that cannot tolerate shutdowns, where 100 percent uptime is required.

Whether you opt for a larger chiller investment initially or plan to add capacity, considering any potential increases in cooling capacity demand is sound. When making your equipment selections, be careful not to pigeonhole yourself into requiring a total chiller upgrade to accommodate growth in the future because of poor spatial planning and capacity evaluation at the outset.

Cost savings and chiller **customization.**

Your knowledgeable dealer can help you specify a standard model or add a critical component to meet your capacity needs now and in the future.

- Bypass Valve
- Pressure Relief Valve
- Auto Water Fill
- Phase Monitor
- Predictive Maintenance

Knowing when to buy a standard model vs. specifying customizations is a conversation to have with your chiller supplier. If the standard model meets all your needs and future projections for growth, you may not need to spend extra time and capital pursuing a custom model.

You also need to be aware of where the heat will be rejected from the chiller process. If you are going to install the chiller indoors, the additional heat load added to your facility must be considered. Other considerations are whether the heat will be rejected toward people or temperature-sensitive equipment. Alternately, will it be located where the chiller will recycle its own heat? In addition to heat released, noise from the compressor, pump and fan also are factors to think about.

Features to Extend Chiller Longevity

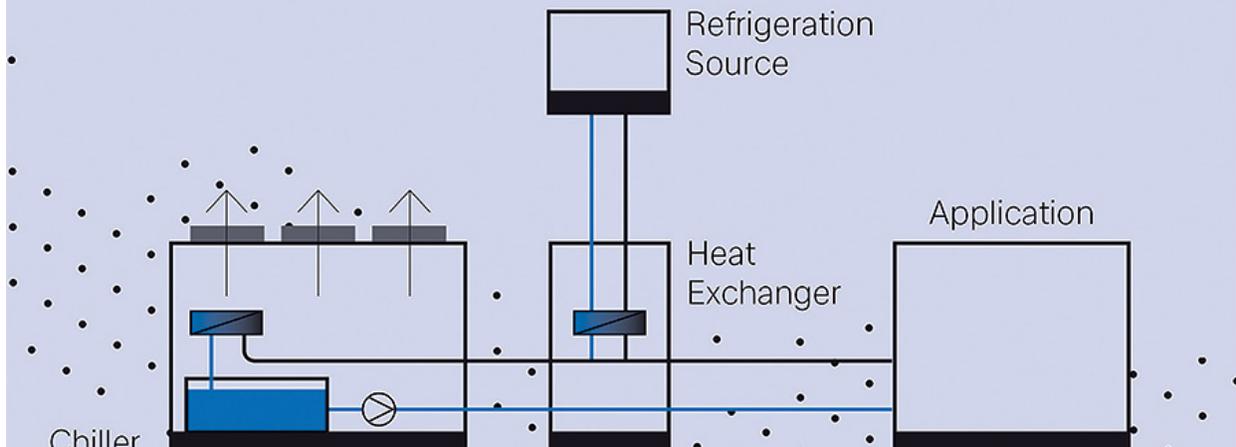
Because one chiller design does not fit all applications, it is important to work with the chiller manufacturer so the appropriate features can be included. While such customization may add to the initial cost, the total cost of ownership of the chiller will be lower: It will be properly designed to meet the application and environment requirements.

Depending on the process, there are many great opportunities to extend the life and usability of a chiller. Sharing the piping and plumbing of the process with your chiller manufacturer can prevent production interruption and chiller downtime. If the flow to the process is stopped or blocked, the pump could malfunction. Something as simple as a bypass valve to return excess flow back to the tank will protect the pump from cavitating or dead-heading. An automatic water-fill option should be considered if you need to maintain a consistent liquid level in the tank.

Time for installation?

Communicating details keep cost down.

Optimize installation and operation by telling your chiller supplier key details: the number of electrical drops and wiring, type of plumbing, piping diameter, length and height of run, and how many elbows, drops, valves or meters are installed. Knowing these details is critical to smooth installation, system startup and managing the total cost of ownership.



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If the installation location has an imbalance between incoming legs of power, a phase monitor will safeguard for incoming voltage. If the chiller is located outside or in an isolated area, then a remote-control box with start/stop/fault/temperature control capability may come in handy.

As chillers increasingly adapt to building-system management and are integrated into machine-to-machine systems, some systems may need a predictive maintenance model. These systems — in which sensors monitor machines in real time and send alerts immediately — can help plants save money on labor and replacement parts. Most chiller manufacturers should be able to help you create a predictive schedule that includes equipment monitoring as well as recommendations for stocking replacement parts to reduce or eliminate downtime.

Installation Can Impact Design and Operation Costs

Beyond selecting the proper type and size of chiller, how the chiller is installed also can impact costs. Installation involves multiple facets, including permits (if required for site work), electrical drops and wiring, plumbing, anchoring and startup.

Attention should be paid to the piping diameter, length and height of run; how many elbows, drops, valves or meters are installed in the lines; and the type of plumbing used. Selecting an inadequately sized pipe can cause backpressure concerns and lack of flow at end locations. When the size of pipe from the leaving-fluid outlet is different than the size to the pipe leading to the process, it can cause a change in flow and pressure, affecting the heat transfer.

When sizing the pipe, make sure all of the items added into the line are accounted. They will impact the pressure supplied to the end process. If plumbing runs upward for a long distance, a backflow valve will be required. This valve ensures that when the pump shuts off, the volume moving from the plumbing line to the tank will not cause it to overflow.

Failure to note any of the plumbing and piping considerations above may create problems during installation or ongoing issues during operation. Both types of problems will increase the chiller's total cost of ownership.

In conclusion, uptime is the name of the game when it comes to industrial chillers. From food preparation to plastics to laser applications, a number of industries count on chillers to keep their processes up and running. A key factor in preventing and decreasing costly downtime is planned and prepared maintenance. With guidance from your chiller manufacturer, you can create a schedule for recommended maintenance.

Depending on the specifics of your process and equipment, on-site staff can be trained to perform regular maintenance and identify problems that may require assistance from the manufacturer. Ignoring problems until the point of full shutdown will hurt the total cost of ownership just as much as calling for repair unnecessarily. A reputable manufacturer will partner with you for the duration of your chiller's lifespan, from specification to decommissioning, and provide support and insight to know what issues warrant professional intervention.

For help selecting the best chiller for your application, contact us:

Production Engineering (888) 654-9353

sales@productionengineering.com