

Control Cooling with Chilled Water Systems

Get precise cooling and control for research and institutional greenhouse growing with chilled water cooling systems.

Researchers and institutional greenhouse growers need precision, efficiency and reliability in cooling and control. Because this type of growing demands tightly controlled environments, many institutions turn to chilled water cooling.

▶▶ **How Greenhouse Cooling Works**

Hydronics uses water as the heat-transfer medium in heating and cooling systems. Large-scale commercial and institutional buildings may include both a chilled and heated water loop for heating and air conditioning. While boilers heat the water, chillers and cooling towers are often used separately or together to cool the water.

Chilled water cooling is a hydronic process that circulates chilled water through a loop piping system. Circulator pumps force the water through a heat exchanger, and a fan draws warm air out and cools it as it passes over cold coils.

▶▶ **Flexibility and Controlled Climate Growing**

For flexibility, a chilled water system can be broken up into individual temperature zones, using either multiple circulator pumps or a single pump plus electrically operated zone valves.

Like a radiant heating system, chilled water cooling is regulated by the greenhouse's environmental controls. This gives growers and scientists the ability to precisely control the greenhouse climate, as well as the temperature of their plants. Direct digital controls make precision easy and also provide energy and cost savings.

▶▶ **Chilled Water vs. Evaporative Cooling**

Many commercial greenhouses rely on evaporative cooling to cool air to about 10 to 20 degrees below the outside temperature. These systems lower air temperature using mists, sprays, or wetted pads, because they introduce water into ventilation air – increasing the relative humidity while lowering the air temperature.

While this is generally an efficient process, evaporative cooling is limited by the relative humidity of the outside air introduced into the greenhouse. Under these conditions, evaporative cooling cannot provide effective space temperature control of the greenhouse under all operating conditions.

The Delta T Solutions' chilled water system uses hydronic cooling to precisely control greenhouse space temperature and humidity. This offers greenhouse operators unlimited controllability of the environment in various scenarios:

- Precise space air temperature control without removal of humidity from air (sensible cooling approach).
- Precise space air temperature and dehumidification (sensible and latent cooling approach).
- The chilled water system can provide precise temperature and humidity control under all outside operating conditions.
- Ability to provide precise space air temperature and humidity control in a closed contained environment, with minimal or no outside air introduction.



Customizing Greenhouse Cooling Solutions

Research and institutional greenhouse growers are using chilled water cooling because of its precise control. Delta T Solutions is experienced in the design and installation of customized chilled water-cooling systems. We work directly with institutional greenhouse architects and researchers to create custom specifications meeting the project's architectural and horticultural requirements. The result is a greenhouse heating and cooling environment suited exactly to the institution's needs.



Chiller Pump Station

Cooling System Custom Design Considerations

Consider these factors when selecting chilled water cooling systems:

- Installed cost
- Energy consumption
- Space requirements
- Freeze prevention
- Precision
- Building height, size, shape
- System cooling and heating capacity
- Centralized maintenance
- Stability of control

Our manufactured radiation materials are designed specifically for the demanding institutional environment, and we are a complete source for project mechanical engineering specifications, drawings, and installation of greenhouse HVAC systems.



Chilled Water Fan Coil Units

To learn more about creating precise growing environments, contact us at 800-552-5058 or email: sales@deltatsolutions.com

