Green Cooling Solutions for Your Showers and Instruments

FastCool™ Passive Cooling Technology

SMITH APPLIED SOLUTIONS

Hot Water in Emergency Showers

The first few seconds after corrosive chemical exposure are critical and a slight delay in decontamination may cause serious injury. Emergency showers provide immediate decontamination and act as the first line of defense and are critical in saving lives. They must be located within 10 seconds reach.

Showers are unusable due to high water temperatures

Shower water temperature in the Middle-East can reach as high as 55C to 60C during peak summer. These high temperatures cause scalding and aggravate the chemical reactions. Thus, the emergency showers become unusable during the 4 to 6 months of the year, causing a grave safety concern. ANSI Z358.1 recommends a safe water temperature limit between 16C and 38C.

Present Solution: Chillers

Some companies have been adopting the chiller based solutions to circulate the chilled water to the safety showers through a network of insulated return piping network. Others are using individual tank showers with built-in electric chillers.

Centralized Chiller Solution

First and foremost drawback of water chillers is that they require energy to operate. Also, they require regular maintenance, and have a high total installed cost due to the need for a large insulated piping network. This pipework installation is even more expensive if carried out in an existing plant. Although we need safety showers only during emergencies, chiller systems consume continuous power to compensate for the heat loss through the large piping network and re-circulation pumping.

Tank Showers with Built-in Chillers

Individual tank showers with built-in chillers have similar drawbacks. Additionally, each unit requires electrical installation, which adds to the upfront cost.

Hence a cooling solution for the emergency showers is needed which is reliable, green and cost-effective.

FASTCOOL™

Patented

PASSIVELY COOLED EMERGENCY TANK SHOWERS

FastCool™ Emergency Tank Shower

" FastCool™ system uses a combination of heat transfer augmentation techniques to enhance this heat transfer and achieve very fast cooling."

FastCool™ passive cooling solution developed by Smith Applied Solutions eliminates the use of expensive chillers for emergency showers. It provides a green, maintenance-free, and cost-effective solution to keep the water in the shower water temperature within ANSI limits.

FastCool™ technology uses a patented passive cooling technology powered by diurnal temperature variation to cool the water in the tank.

No form of power is needed for the cooling. The device utilizes a combination of heat transfer augmentation techniques to achieve very fast cooling effects. Thus, the FastCool™ system achieves a higher cooling capacity than that of a 3 kW electric chiller typically used in tank showers. The commissioning time of the shower after each use is thus extremely short and the shower will be ready for use within the same shift of the next shift. A regular passive cooling system will take a few days for such recommissioning.

We subjected the system to extensive testing for two years in the UAE to ensure that the results were consistent. (See the test report)

Working Principle

FastCool™ system utilizes the diurnal temperature difference to cool the water in the tank. Although daytime temperature in hot climates may reach as high as 55C, the nighttime temperature is usually between 28 and 34C. The safe water temperature in the shower is anything below 38C. Thus an efficient cooling system is required to keep the water within this limit.

When the ambient temperature rises above the water temperature during the daytime, the heat transfer stops due to the diode nature of the system. Thermal insulation ensures that heat gain through the tank walls is negligible. Thus, the system can work in the highest recorded temperature environments.

Working Principle and System Details

FastCool™ system consists of a well-insulated tank to store the water. An internal heat exchanger located inside the water is connected to an external heat exchanger using a diode system. This connection only allows the heat to flow from the internal heat exchanger to the external heat exchanger and not the vice versa. As soon as the ambient temperature drops below the tank water temperature, the cooling process starts automatically. The internal tank absorbs the heat from the water and expels it to the ambient via the external heat exchanger.

Unique Enhancement Techniques

This heat exchange system is completely sealed and stand-alone. The system uses natural convection to dispel heat from the system. However, usually, such natural convection is an extremely slow process and it takes a few days before the hot incoming water cools to a safe temperature limit. FastCool™ system uses a combination of heat transfer augmentation techniques to enhance this heat transfer and achieve very fast cooling. The cooling capacity surpasses that of a traditional 3 kW electric chiller, especially during the commissioning time. Thus, the FastCool™ system can achieve a similar commissioning time as that of electric chillers and becomes ready for reuse within the same or the next shift.

Fast cooling:
Short commissioning time

The FastCool™ system uses a combination of superconductors and natural convection enhancement techniques for faster cooling. The temperature difference (DT) between hot tank water and the cooler ambient air helps power the cooling system. During the commissioning or after the shower has been used, hot incoming water fills the tank and needs to be quickly cooled down. At this point, the temperature difference, DT is is maximum which leads to faster cooling. FastCool™ technology takes advantage of this higher DT and reaches up to 4 kW cooling capacity, which surpasses the cooling capacity of a traditional 3 kW electric chiller

We believe in

ZERO

Zero
Power Use

Completely green. Does not require any power to operate

Zero
Maintenance

No moving parts and robust design makes it maintenance free.

Zero
Operation Cost

Unlike chillers, this standalone system does not require any operator intervention.

Electric chillers require energy to offset the heat gain through your plant's large piping network. However, cooling is absolutely free, and with our green FastCool™ system. With the help of this technology, you can reduce the carbon footprint of your plant and maintain a safe workplace for your employees. Also, the system has no moving parts and hence is truly maintenance-free. The self-cleaning design of the external heat exchanger fins facilitates the deflection of sand and dirt particles.

Unbeatable Economics

- No electric installation cost
- Lifetime electricity free operation
- Maintenance free
- No extra cost for hazardous areas

FastCool™ provides the most economical solution for the emergency showers in hot climates. A non-electric design makes it suitable for hazardous area locations and eliminates expensive electrical installation costs. The unit does not require any power and thus saves thousands of dollars in operating cost over your plant's lifetime. Additionally, its robust and zero moving part construction guarantees a maintenance-free operation and does not give additional load to your maintenance and operations team.

Uncompromising Employee's Safety

FastCool™ is a reliable system that maintains water within safe limits suggested by ANSI Z358.1 even during the scorching hot summer. A gravity-fed system eliminates the requirement of mobile safety showers during the shutdown of the plant.

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