

# THE ULTIMATE HOME-ICE ADVANTAGE

Crown Coliseum Advances with New Ammonia ColdLoop™ Chiller



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Crown Coliseum Ice Arena, Fayetteville, NC - Home of the Marksmen

## A New ColdLoop™ Chiller for the Crown Coliseum

The Crown Coliseum, home of the minor league Fayetteville Marksmen, used an aging R-22 system for their ice arena. When Cumberland County in North Carolina decided to upgrade the Crown Coliseum ice arena, they brought in Scott Ward, PE, with B32 Engineering Group. Scott Ward's experience with over 200 ice arena projects made him an obvious choice for designing the new chiller system. When Cumberland County evaluated the qualified suppliers, Scott Ward recommended Zero Zone as a partner they could count on to provide a dependable system.

Zero Zone Industrial Sales Manager John Collins, PE, explained that "Zero Zone worked closely with the project design team from the inception of the job all the way through its installation and start-up. We were part of the engineering and construction team and were able to deliver a successful project for the Crown Coliseum." The combined forces of B32 Engineering Group, prime contractor CIMCO Refrigeration, and Zero Zone worked together to develop, design, manufacture, install, and commission a ColdLoop™ Ice Arena Chiller that is perfectly suited to the Crown Coliseum and the Fayetteville Marksmen.

**ColdLoop™**  
ice arena chillers

# Choosing Ammonia

When replacing an aging R-22 system, a different refrigerant must be chosen since R-22 has officially been phased out as of January 1, 2020. For the Crown Coliseum ice arena, they wanted to future-proof their project by choosing the right replacement refrigerant. John Collins noted that “the refrigerant of choice is changing, and there’s more than one choice. Zero Zone can work with customers that have an aging R-22 system and offer them multiple options that best fit their facility needs.” The options included a synthetic (HFC) replacement for R-22 or a natural refrigerant like CO<sub>2</sub> or ammonia.

The design team settled on using ammonia as the primary refrigerant to cool a secondary loop with glycol. “Ammonia as a refrigerant is an excellent choice,” Collins explained. “It is perfectly suited for a low-temperature chiller application: highly efficient and very reliable.” Ammonia has been an option for industrial refrigeration since the early 1900s, and Zero Zone has decades of experience designing and building systems using ammonia.

Building an ammonia refrigeration system requires that certain safety features are included in the design. Ammonia has an ASHRAE safety classification of B2L for toxicity (B) and low flammability (2L). This limits where and how ammonia can be used. The risks with ammonia can be minimized by choosing a low charge system<sup>1</sup> or by using a remote mounted chiller with a secondary coolant loop routed through the occupied areas of the facility.



**John Collins, PE,  
Zero Zone Industrial Sales Manager**



Custom Electrical Mechanical Center (CEMC)

The old Crown Coliseum system was installed inside the building in a crowded utility corridor. Placing the new ColdLoop Chiller in the same place as the old system was not a feasible option for logistics or design. Zero Zone builds a product that is perfectly suited for the job: a custom electrical mechanical center (CEMC). A CEMC is a remote building with the chiller inside that is pre-built by Zero Zone, shipped to the site, and installed on the roof or outside of the main building. “There is a minimal risk of any impact should there be an ammonia leak,” Collins explained about keeping the ammonia outside of the Crown Coliseum itself.

The CEMC and ColdLoop Chiller are designed with leak detection, ventilation, lighting, and other safety

features to ensure that the Crown Coliseum will be safe. The Zero Zone CEMC and chiller made ammonia the right choice.

<sup>1</sup> Check out our white paper evaluating potential risks of ammonia systems: [Minimizing Risk With Low-Charge Ammonia Systems](#).

# Understanding the Chiller

Cumberland County chose to have their ColdLoop Ice Arena Chiller housed inside a weatherproof CEMC built by Zero Zone. The custom-built room is pre-wired and pre-piped, which reduced installation time and helped ensure the project was completed on time. But it's more than just a mechanical room. It ensures the safety of using ammonia, and the equipment is accessible for ease of operation and maintenance.

Inside the CEMC is a complete chiller with all the components needed to circulate the chilled glycol through the Crown Coliseum ice arena. The CEMC includes a low-charge, flooded plate heat exchanger, industrial screw compressors, refrigerant vessels, heat reclaim system, electrical equipment, and a fully integrated PLC control system.

The industrial-grade controller has the capability to operate the refrigeration equipment smoothly through all conditions while running the rink chiller and heat reclaim pumps to respond to the changing facility needs. The control system is integrated with the building monitoring system (BMS), and it can be accessed remotely for support and troubleshooting from offsite.

Heat rejected from the ColdLoop Chiller is accomplished by an evaporative condenser, and it also uses a heat reclaim system that repurposes the heat from the compressor discharge gas. The heat of compression is put to good use at the subfloor under the ice, which must be warmed so the subfloor will not freeze and crack. The combination of heat reclaim, evaporative condensing, fully integrated PLC controls, and other energy saving features make this a highly efficient and reliable system.

This chiller uses screw compressors “for high capacity, in a small footprint, and a long lifespan” according to Collins. Screw compressors provide years of efficient and reliable service, which reduce maintenance costs.

This ColdLoop Chiller also comes equipped with variable frequency drives (VFDs) on both the pumps and the condenser fans. The VFDs allow the chiller to be “optimized for efficient operation. We are able to run the system at as little as 10% capacity all the way up to



ColdLoop™ Ammonia Ice Arena Chiller in CEMC



Evaporative Condenser



Heat Exchanger for Heat Reclaim System

a full 160 tons of capacity.” Collins said this gives Cumberland County the flexibility to operate the chiller exactly how they need it to maintain the best ice for the Fayetteville Marksmen and still be energy efficient.

Cumberland County can also be sure that their ice is perfect because of the temperature control system. “It monitors the temperature of the ice at four locations, as well as the glycol incoming and returning temperatures,” Collins shared. The ColdLoop Chiller will adapt to their load requirements according to the ice temperature.

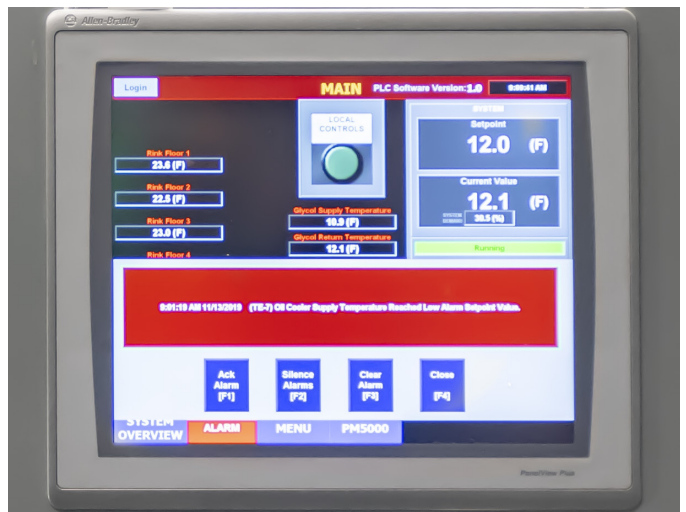
Each step of the way, the ColdLoop Chiller was designed for optimal energy efficiency and ice conditions. Cumberland County benefitted from partnering with Zero Zone because Zero Zone provided a complete system that was then customized to suit their exact needs.

## Benefitting All End Users

Cumberland County set goals to have a future-proof, energy efficient chiller system, but their most challenging goal was their deadline.



Variable Frequency Drives (VFDs)



Temperature Control System

It needed to be ready before the Fayetteville Marksmen regular season.

Collins described the schedule as “aggressive.” “The order was placed in April. We shipped in August. And the system was operational before October. We were able to meet the demands for a highly efficient system, future-proof refrigerant, and a safe and effective system in a very short time frame.” He said Zero Zone was able to do that because of the expertise of the Zero Zone engineers and manufacturing team.

The design of the ColdLoop Chiller allowed for a smooth transition. The CEMC and the chiller were installed outside of the Crown Coliseum, allowing the old system to run until the new chiller was ready. The installers were able to pipe the ice sheet to the new chiller and install the electrical systems before removing the old system. Zero Zone supported the installation team by being available on site for installation and start-up, making sure the Crown Coliseum would be operational in time. “When the system shipped, the job wasn’t over for Zero Zone,” declared Collins.

Selecting the right refrigerant influences the rest of the chiller design. Because the design team decided on ammonia, it became logical to choose a CEMC for the location of the chiller. This meant the new chiller could be installed outside of the building without worrying

about the limited indoor space that the old system was occupying. Once everything was ready, the old system was shut off, the new one started, and the Fayetteville Marksmen could start their season without delay. This was a huge accomplishment that made this project successful.

“The Crown Coliseum project has been a great example of what Zero Zone brings to our customers. We bring value to the project beyond just the equipment,” John Collins said, elaborating that it takes more than quality equipment to have a successful project. It also requires expertise, support, and responsiveness. You can count on getting that support with every Zero Zone product.



**Coldloop**<sup>TM</sup>  
ice arena chillers

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