



Opteon™

Martensville Recreation Centre Scores Big with First A2L Ice Rink in Canada





Introduction

With new ice rinks in Canada and the US facing increasing financial and environmental pressures, Ainsworth, with over 45 years of experience in commercial and ice rink refrigeration has successfully met the challenge by recently designing, installing and opening a new rink that ushers in an innovative era of icemaking technology. The Ainsworth solution far exceeds regulatory requirements and is delivering a dependable, efficient, and safe ice making plant.

The Canadian province of Saskatchewan has sent more than 500 players to the NHL, including "Mr. Hockey" Gordie Howe. In October 2024, a small community of about 12,000 situated 17 km (10 miles) north of Saskatoon opened the Martensville Recreation Centre, completing a 10-year journey made possible by a group of dedicated volunteers and grass roots efforts from the local community. The story of the rink is one of community engagement, innovation, and support from leaders in the refrigeration industry, including Ainsworth, RSL - Refrigerative Supply, and Chemours, manufacturers of Opteon™ refrigerants.

The recently opened center includes a main ice, practice ice, spectator lounge, climbing wall, indoor playground, field house - with space for two more sheets of ice.

"We worked closely with Chemours to use this proven system design but integrate an A2L refrigerant for the Martensville Recreation Center."

Rhett Svingen
Controls and Engineering Manager,
Ainsworth Saskatoon

Background

It all really began in the spring of 2014, when Mayor Kent Muench delivered a pointed message: "The city of Martinsville supports a new arena, but this needs to be driven by the community." The Martinsville Community Recreation Project (MCRP) – a volunteer-led charity -- was formed within a few weeks and began organizing and running events to raise funds for the new facility and to create awareness.

With excitement for the project at a fever pitch, it became clear it would require more than just one sheet of ice, and the vision grew into a multipurpose sporting facility, which included a regulation soccer-sized indoor turf pitch, a wall climbing area, a playground structure, and future options for up to three sheets of ice.

The doors officially were opened October 10th, with an emotional first skate event celebrating those who contributed through time and donations.

"Thanks to the MCRP, volunteers and generous donors, the City of Martinsville and the entire region now have this spectacular recreation center for generations to come. We are so grateful to the MCRP who catalyzed a community to make this dream a reality," said Mayor Muench. "This is a prime example of what community can do, together."

Innovation at Center Ice

The new ice making system for Martinsville was designed and constructed by Ainsworth and specifies Opteon™ XL40 (R-454A) refrigerant with a low GWP(AR4) of just 239, well under the 750 GWP required for new rink chillers in Canada (700 USA). The system's modular design is based on multiple independent refrigeration circuits. Martinsville's rink uses five modules that provide ~34 tons of cooling capacity each to meet the refrigeration needs for both a full-size ice rink and a smaller practice rink. Modular system designs have numerous benefits in terms of energy, reliability, and operational efficiency as detailed below.

Performance - Great Ice Even for Big Tournaments

Multiple modules can be brought into action exactly when required, for example during periods of peak demand, such as hockey tournaments with repeated resurfacing (hot water flooding) and a warm building filled with spectators.

Energy Efficiency - Reduced Electric Bills

To maintain the ice during normal operation, only a few modules are typically required to run. A modular design is good for reducing energy by closely matching refrigeration capacity with demand (load), especially when compared to a single or pair of large compressors, which even when unloaded consume a lot of energy.



Reliable Redundancy - Peace of Mind

The redundancy of multiple circuits built into the design makes it extremely unlikely to “lose the ice” due to a single component failure. With multiple, independent modules, even in the unlikely event of compressor failure or refrigerant leak, the other modules can more than carry the load and maintain operations during repair. This would not be the case with a large industrial system with one large compressor. Regarding compressors, Ainsworth has systems operating with over 70,000 hours on this compressor design.

Expandability - Low cost for Future Facility Expansions

If and when plans call for adding another sheet of ice or expanded operations (e.g. year-round skating) and the cooling capacity of the refrigeration plant needs to be increased, additional modules can simply be added.

Minimizing Refrigerant Leaks - Less Risk of Unexpected Costs or Business Disruption

With smaller, individual modules, even in the unlikely event of a catastrophic failure only a fraction of the total refrigerant would be lost compared to large single systems that would lose hundreds of kgs of refrigerant in a similar scenario. This not only reduces the cost for replacement refrigerant but also reduces the environmental impact as there is lower potential for refrigerant gas to be lost.



Avoiding Business Disruption

As any rink operator is aware, leaks from systems operating on highly toxic (Class B in ASHRAE 34, Acutely toxic under GHS) ammonia (R-717) have high likelihood to result in facility evacuations, emergency response, business shutdowns, impacts to employees, players and guests, as well as negative impressions on community neighbors. The modular design enhances safety not only from reduced charge sizes, but also by utilizing the lower toxicity (Class A) refrigerant.

Budgeting - For the Long Game

The system is very competitively priced when installed as a complete system, but has additional benefits unlike unitary legacy systems when it comes time for replacing the module system’s individual circuits. Spreading out the capital costs over many years rather than one large expense to replace an entire system is a financial benefit for many rink owners/operators.

Lower Service Costs

Since the compressors used in this system do not require rebuilding, oil changes, and maintenance on a yearly basis like most ammonia systems, maintenance costs will be lower. Additionally, since the system is similar to supermarket and other familiar commercial refrigeration systems, there are a lot more trained service technicians available. This helps avoid the need for specially trained technicians and turns out to be very important for rinks operating in remote regions and areas with limited-service options.

Parts and Service - Readily Available Components

As the system uses many of the same standard components that are common in commercial refrigeration and the supermarket industry, critical parts are readily available and typically at lower costs, through a vast network of refrigeration wholesalers.

About the Refrigerant Opteon™ XL40 (R-454A)

Opteon™ XL40 is in the Opteon™ family of refrigerants offered by Chemours to meet the demanding requirements of increased performance and reduced Global Warming Potential (GWP) while still delivering the energy efficiency, safety and lower total cost of ownership benefits that customer have come to rely on from Chemours refrigerants.

Opteon™ XL40 Refrigerant Properties

ASHRAE Number	R-454A
Composition (wt. %)	R-32/R-1234yf (35/65)
Normal Boiling Point	-47.8°C (-54.1°F)
Molecular Weight	80.5 g/mol
Liquid Density	1037.2 kg/m ³ (64.7 lb./ft ³)
Temperature Glide	~ 5 K (~9 R)
Ozone Depletion Potential	0
Global Warming Potential (AR4)	238
ASHRAE Safety Class	A2L

The refrigerant installed in the Ainsworth project at Martinsville, Opteon™XL40 is a low GWP (100 yr AR4 = 239) with an ASHRAE classification of A2L (lower toxicity, lower flammability). This is the same Class as Opteon XL41 (R-454B) that is being used in thousands of new residential air conditions and heat pumps around the world.

A2Ls have the same low toxicity we have trusted for many years with refrigerants like R-134a, R-22 and R-507. Opteon™ has a much better toxicity profile than ammonia (both acute and chronic) which allows for greater safety for those in the mechanical rooms, bleachers, or even neighborhood.

	ASHRAE/ISO Toxicity Class	Acute Toxicity Exposure Limit	Occupational Exposure Limit	Other escape impairing effects
R-454A	A	140,000 ppm	690 ppm	None
R-717 (ammonia)	B	320 ppm	25 ppm	Eye, Nose, and Respiratory Irritation

For system designers the Canadian Mechanical Refrigeration Code CSA B52 and the USA ASHRAE Standard 15 have clear proven requirements for the mechanical room designs.

Innovation and Collaboration: Keys to a Successful Project

In business as well as in hockey, “teamwork makes the dream work,” because success depends on collaboration and shared effort. This certainly was the key to the Martensville Rink project, starting from the initial ideation, through fundraising, and right up until the grand opening and first skate.

Based on decades of experience our modular ice plant system design is the best solution for most community ice rinks, and these systems have been well received by our customers. For the City of Martensville project, we required a long-term refrigerant that would achieve a 25-30 year minimum life cycle. “We worked closely with Chemours to use this proven system design but integrate an A2L refrigerant for the Martensville Recreation Center,” said Rhett Svingen, Controls and Engineering Manager at Ainsworth Saskatoon

And the collaboration continues after starting up with local businesses. Nustadia, who oversees and monitors rink activities, reported no concerns with the safety of the A2L system and the new ice plant operates efficiently, is very easy to use, making daily operations smooth and hassle free for their operations staff. Jason Keating with Nustadia commented, “Compared to other systems, this design is user-friendly and straightforward while maintaining high effectiveness and efficiency. Its simplicity does not compromise performance, making it a practical choice for maintaining ice.”

In addition, on-going support was provided by RSL – Refrigerative Supply, the leading refrigeration supply company covering western Canada, “RSL was pleased to support this effort from the start and going forward. RSL provides a centralized, one stop shop serving all our customers in the community by maintaining critical components, parts, and compressors, as well as Opteon™ refrigerant gas ready for our customers when and where they are needed” said Wayne Watson – National accounts Manager RSL.



Conclusion

The collaboration and community focus of Ainsworth working together with RSL and the Opteon™ Refrigerants team have developed a dependable, cost effective, compliant and sustainable refrigeration solution that will benefit the community for years to come.

The Family of Opteon™ A2L Refrigerants for New Equipment

Opteon™ XL40 (R-454A)
(GWP 239) Optimum efficiency and capacity meeting the requirement when less than 300 GWP is required (similar performance to R-404A)

Opteon™ XL41 (R-454B)
(GWP 467) Optimum efficiency and capacity for the A/C market where less than 700 GWP is required (Similar performance to R-410A)

Opteon™ XL20 (R-454C)
(GWP 148) Optimum efficiency when less than 150 GWP is required (similar performance to R-22)

Opteon™ XL10 (R-1234yf)
(GWP 4) Ultra-low GWP with an excellent P-T and performance match to R-134a that has been adopted by the global automotive industry for mobile AC.



Further information available at www.opteon.com