

Innovative Conversion Program Targets HCFC-22 Rinks

BY LUC BOILY



From an interview with Claude Dumas (l), Eng., rink cooling system expert for Montreal City DSTI services (Direction des Stratégies de Transactions Immobilières), technical expertise and

quality assurance division. Dumas was accompanied by Costas Labos (r), Eng., who is involved in the arena upgrade program.

The City of Montreal has been moving forward with a cooling system conversion program for rinks still using HCFC-22 refrigerant. This motivated in part by the pressures of the Montreal Protocol, which will result in the phase out of HCFC-22 by 2020.

The City owns and operates 47 cooled rinks: 41 inside and six outside. Currently, 13 rinks use ammonia (R-717), one is now in conversion, eight are in the design or quotation stage, and 29 are still chilled with HCFC-22. The conversion rate target is four arenas per year.

CURRENT STUDY

Aware of the breakthroughs that carbon dioxide (CO₂) systems have made in the cooling industry, the City asked the Natural Resources Canada's CanmetENERGY Research Centre to investigate the technology, and provide a comparative study against other available technologies. Ammonia (NH₃) is currently the standard for its rink fleet.

"It is important to adopt a standard design for our rink upgrade project; for environmental, energy, economic and maintenance concerns," explained Claude Dumas.

ACKNOWLEDGMENT

The DSTI Services selected the R-717 after consulting the Montreal Public Health Department (PHD) and the Civil Security Centre (CSC). Its standard design has also been acknowledged by the Commission de la santé et de la sécurité du travail (CSST) and the Association québécoise pour la maîtrise de l'énergie (AQME).

The City was a finalist at the 2012 Quebec Health & Safety Great Awards for its new air cleaner device specially designed for the purpose of cleaning the mechanical room in the case of an ammonia leak. It also received Sustainable honours at the AQME's 2012 Énergia Gala for its Rink Conversion Program.

RECOMMENDATIONS

As the arenas are located in densely populated areas, the City has had to review the usual design for ammonia-based cooling systems. The first goal was to decrease the refrigerant load. "Our systems use a critical load of 250 lb. (113 kg) of ammonia for a cooling capacity of 71 RT (249.6 kW), which reduces the risk in case of a leakage," said Costas Labos. As such, the installation of a U shape droplet separator (see *Figure 1*) helps to reduce the refrigerant load even more, down to 100 lb. (45.3 kg) while minimizing the footprint.

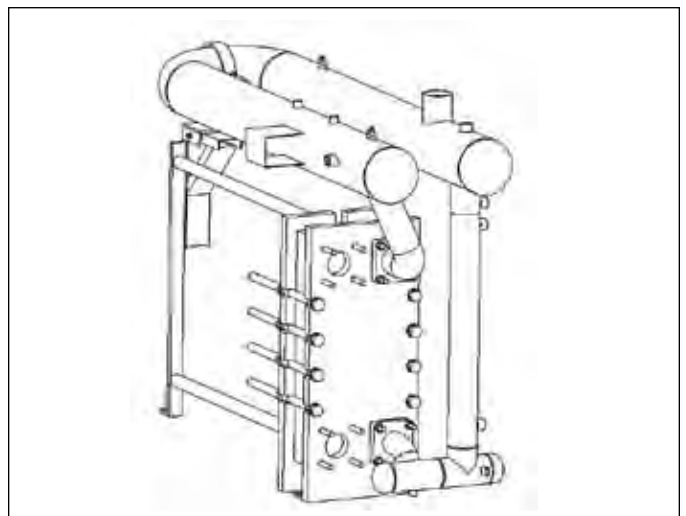
"In addition, by separating the class T mechanical room in two areas – engine room and control room – it's possible to create a pressure differential between both rooms, isolating the cooling appliances from the electrical and control devices, which increases the personnel safety," added Dumas.

The development of a closed-loop oil recovery system – another original design by the city of Montreal – reduces risk during maintenance work and allows the recovering and recycling of compressor oil. In addition, brine is run through the cooling slab in four short loops. Developed by the city in 1991, this innovation is now a design reference for other arenas.

SPECIAL APPLICATIONS

In order to optimize system operation, two ammonia heat pumps were installed for heating in Pierre "Pete"-Morin and Père-Marquette arenas in 2012. Their reliability and efficiency of performance (COP) are now under analysis.

FIGURE 1 U SHAPE DROPLET SEPARATOR



Dumas is waiting for the CanmetENERGY research results, which will be released this summer, to comment on the report that will compare technologies using NH₃, halocarbons and CO₂, in terms of viability, resistance and safety. Developed for the agri-food industry, the CO₂ technology is relatively new for rink applications, and the City of Montreal's questions and concerns have not all been answered. <>

Luc Boily is the managing editor of Plomberie, Chauffage et Climatisation (PCC), HPAC's sister publication. He can be reached at lboily.pcc@videotron.ca.



Mechanical room example – Michel-Normandin Arena, Montreal.

TRAINING

EDUCATIONAL OPPORTUNITIES ACROSS CANADA

AC Installation Optimization Training Program

This one-day training course covers the importance of best practice installation for energy efficient equipment and is based on the CSA C273.5-11 Standard "Installation of Air Source Heat Pumps and Air Conditioners." The course covers six key installation factors directly affecting system efficiency. All technicians installing equipment under the Heating and Cooling Incentive (HCI) initiative will be required to complete the one-day training program by December 31, 2013. Effective January 1, 2014, participation in the HCI initiative will be restricted to companies whose technicians have completed the training.

www.hrai.ca/PDFs/OPA_HCI_TrainingOntario.pdf

CMCEF National Seminar Program

The Canadian Mechanical Contracting Education Foundation's National Seminar Program Catalogue & Calendar is available online. It contains more than 100 programs available for on-site training for companies and associations. Programs range from a half-day to two days in duration. To request a seminar, contact your local association or the CMCEF office at tel. 613.232.5169. www.cmcef.org

TECA Quality First Training

To register for the Thermal Environmental Comfort Association's (TECA) Quality First training courses, tel. 604.594.5956.

www.teca.ca

HRAI SkillTech Academy

The SkillTech Academy course teaches participants the technical competence to design and install HVAC systems for residential and small commercial applications. NRCAN will be providing a \$200 subsidy to those attending a residential training program. For more information contact Dorothy Allen by e-mail dallen@hrai.ca. www.hrai.ca

Dollars to \$ense Energy Management Workshops

Natural Resources Canada's Office of Energy Efficiency is once again offering workshops focusing on improving efficiency, reducing greenhouse gas emissions and lowering operation costs. A workshop schedule is available online. <http://oe.nrcan.gc.ca>

Canadian Hydronics Council

CHC's course descriptions and training schedules are available online. Introduction to Hydronic Heating Installations is a starting point for anyone interested in the professional installation of hydronic heating systems. The Essentials of Hydronic System Design intermediate level program is geared to helping practitioners understand key design principles and the different options and solutions required to meet client needs. Participants must have previously completed CHC's Introduction to Hydronic Heating Installations.

www.ultimatecomfort.ca

LEED Canada Training

Workshops by the Canada Green Building Council (CaGBC) include: LEED Green Associate Exam Preparation; Introduction to Passive Housing Design and Construction; and Overview of the LEED-ND Rating System for Canada. tel. 613.241.1184.

www.cagbc.org

CSA Learning Institute

CSA Learning Institute's course calendar is available online.

www.csa.ca/cm/ca/en/training

RETScreen Training Institute

The RETScreen Training Institute is delivered in collaboration with the Faculty of Environmental Studies at York University in Toronto. The Institute offers intensive instruction on how to properly assess the viability and performance of clean energy projects using RETScreen software. A certificate is awarded on successful course completion.

www.retscreen.net/ang/home.php

GeoExchange Training

The Canadian GeoExchange Coalition (CGC) has added a national accreditation program for geothermal loop installers, which is valid for commercial and residential installations. An updated CGC training calendar is available now.

www.geoexchange.ca