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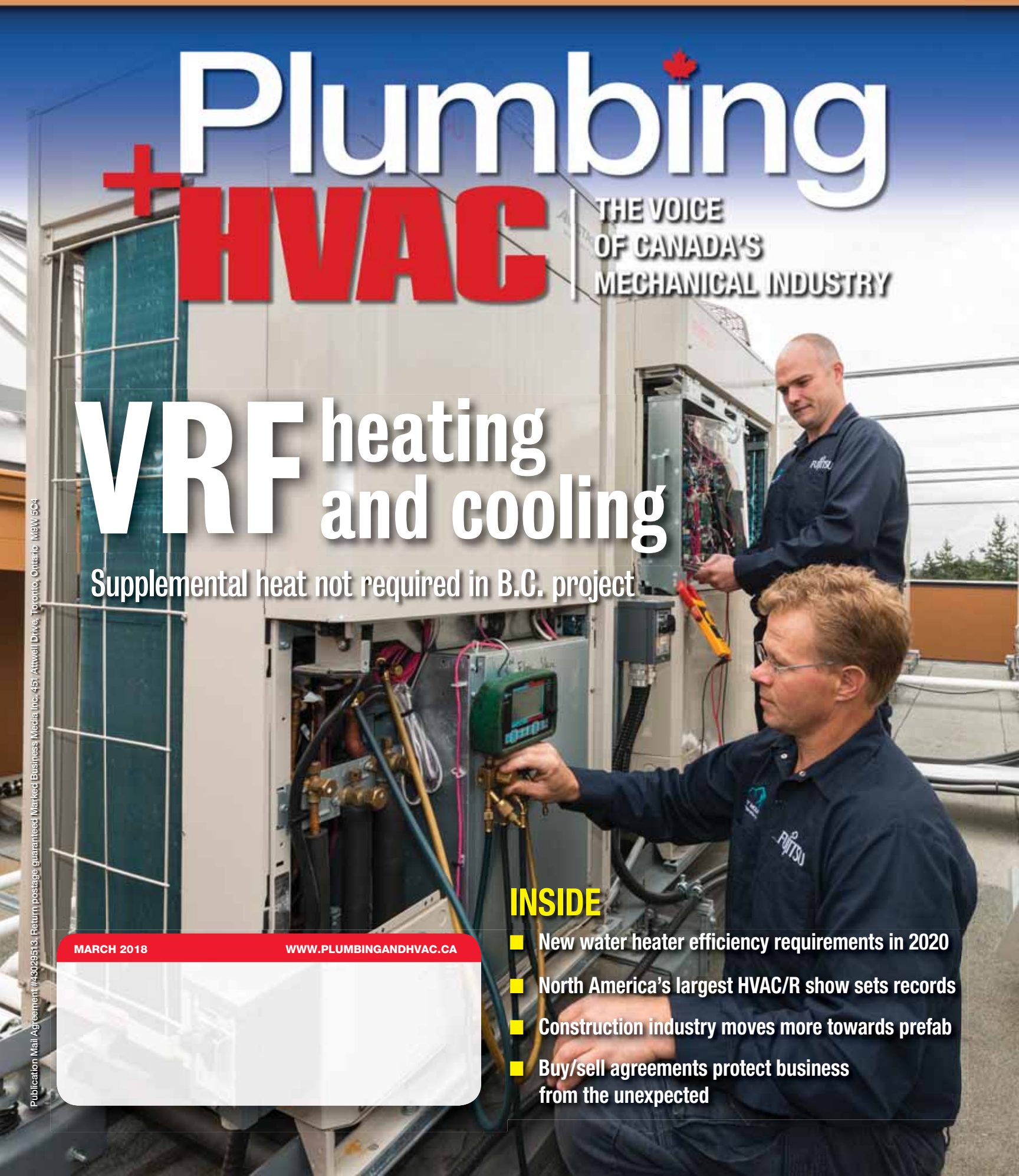
VRF heating and cooling

Supplemental heat not required in B.C. project



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INSIDE

- New water heater efficiency requirements in 2020
- North America's largest HVAC/R show sets records
- Construction industry moves more towards prefab
- Buy/sell agreements protect business from the unexpected

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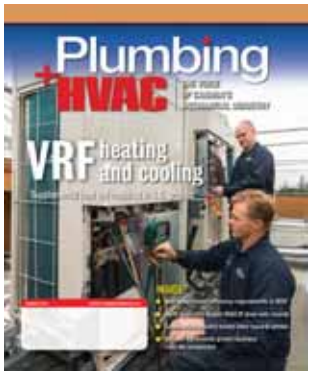
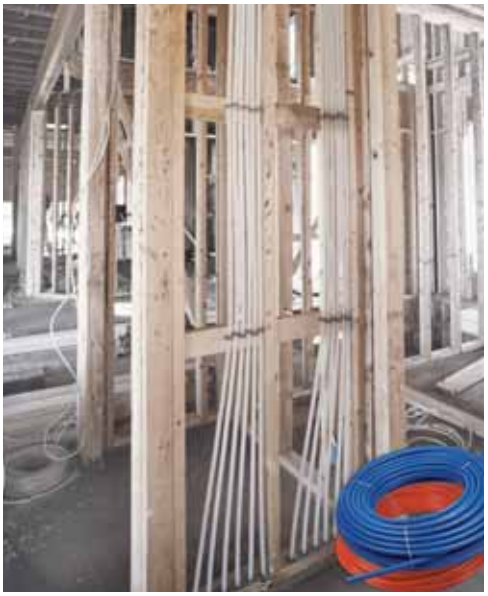


Cover: A VRF heating/cooling system proved an ideal solution for this B.C. condominium complex. Please see our article on page 18.

One very large HVAC/R show Chicago AHR Expo breaks attendance records

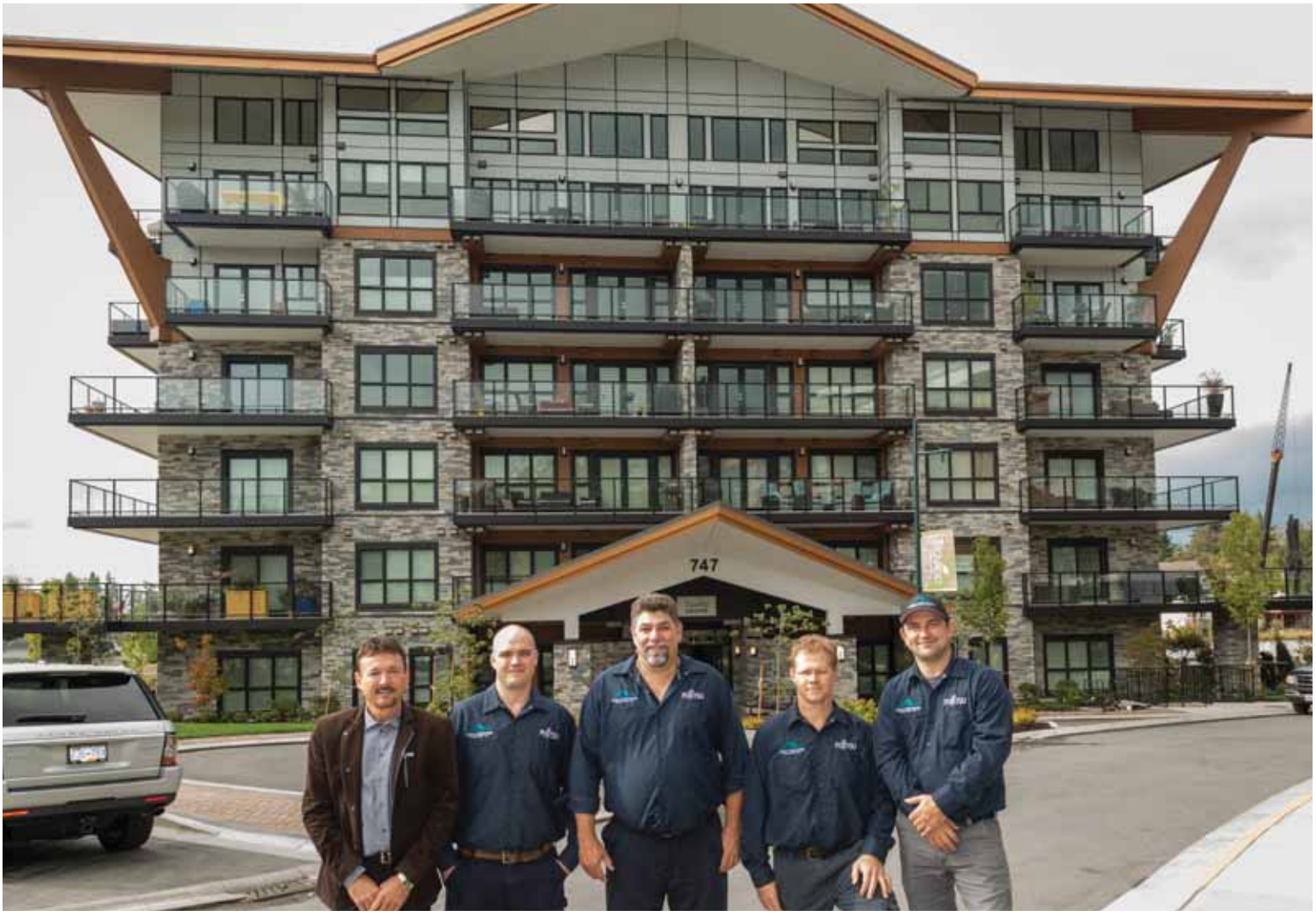
Features



Versatile PEX piping **59**
Coming to terms with new materials, practices

Residential tankless DHW **24**
Technology evolves to include space heating

Factory-built buildings **12**
Increased pre-fab drives different mechanical approach



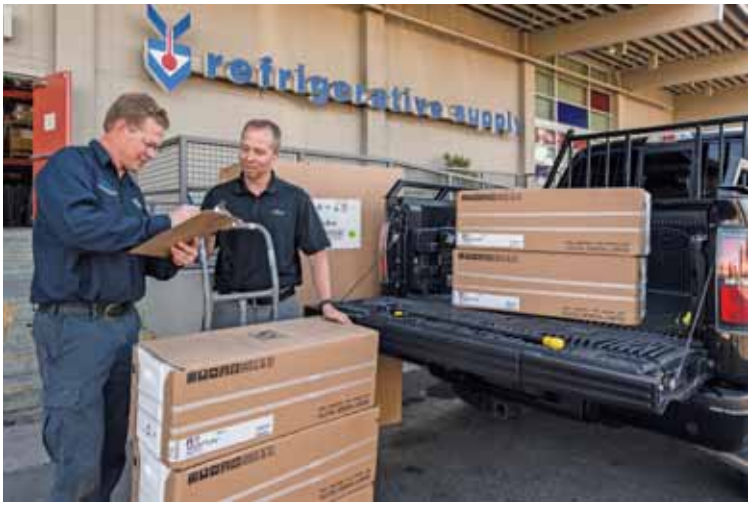
A job well done! From left, Ed Geric, president of Mike Geric Construction and Rocky Mountain Refrigeration's Geoff St Amant (construction foreman), Joseph Kobetitch (president), Chad Trim (service foreman) and technician Mike Hipwell gather for a photo after the completion of Phase 2.

VRF heating and cooling

Supplemental heat not required as system provides year-round comfort for B.C. condo project

Many Canadians are jealous of their westernmost residents. British Columbia boasts beautiful mountains, mild weather and access to the Pacific Ocean. Ultra-modern developments using green technology are also adding to the B.C. appeal.

The Travino development in Victoria consists of four phases of multi-residential condominium buildings set in a park-type layout with nine golf courses, parks and walking trails. Each of the phases put energy efficient technology to work – like solar-



Strong wholesaler backup is a must on a project like this. Chad Trim, left, of Rocky Mountain Refrigeration completes an order with Refrigerative Supply's Steve Chamut.

assisted water heating and heat-recovery VRF (variable refrigerant flow) technology for heating and cooling of interior spaces.

Phase 2, known as Travino Square, is a six-story building with 60 suites.

Kevin Jackson, P.Eng., the HVAC mechanical engineer from Avalon Mechanical Consultants Ltd., Victoria, describes the buildings as having "many other systems and amenities that will provide added value to the residents who occupy the building. The facilities were designed specifically to optimize both comfort and energy efficiency; a rarity. Residents are sure to enjoy unusual comfort and consistent air conditioning throughout the structure."

> "The VRF technology installed there allows heat to be removed from spaces with **solar gain**, then sent to cooler interior or shaded areas."

VRF heating and cooling

VRF cooling and heating technology was invented in Japan in 1982 and has been prevalent in Asia for the past 15 years. Within the last decade, its popularity has grown throughout North America and notably in western Canada.

Like typical mini-split or multi-zone HVAC systems, VRF technology uses refrigerants to transfer heat between indoor fan coils and outdoor condensing units. Multiple indoor units are connected to each VRF condensing unit. The systems, however, vary refrigerant flow to precisely meet demand, rather than the typical on/off operation so common for standard direct expansion (DX) systems.

In Western Canada, many typical multi-family buildings use chilled water systems for cooling, coupled with a boiler plant for heating. These main systems then serve fan-coils in individual units through a network of pipes. Depending on the building controls and design setup, heating and cooling systems are activated only during the relevant seasons. Shoulder seasons become challenging when both heating and cooling are required simultaneously.

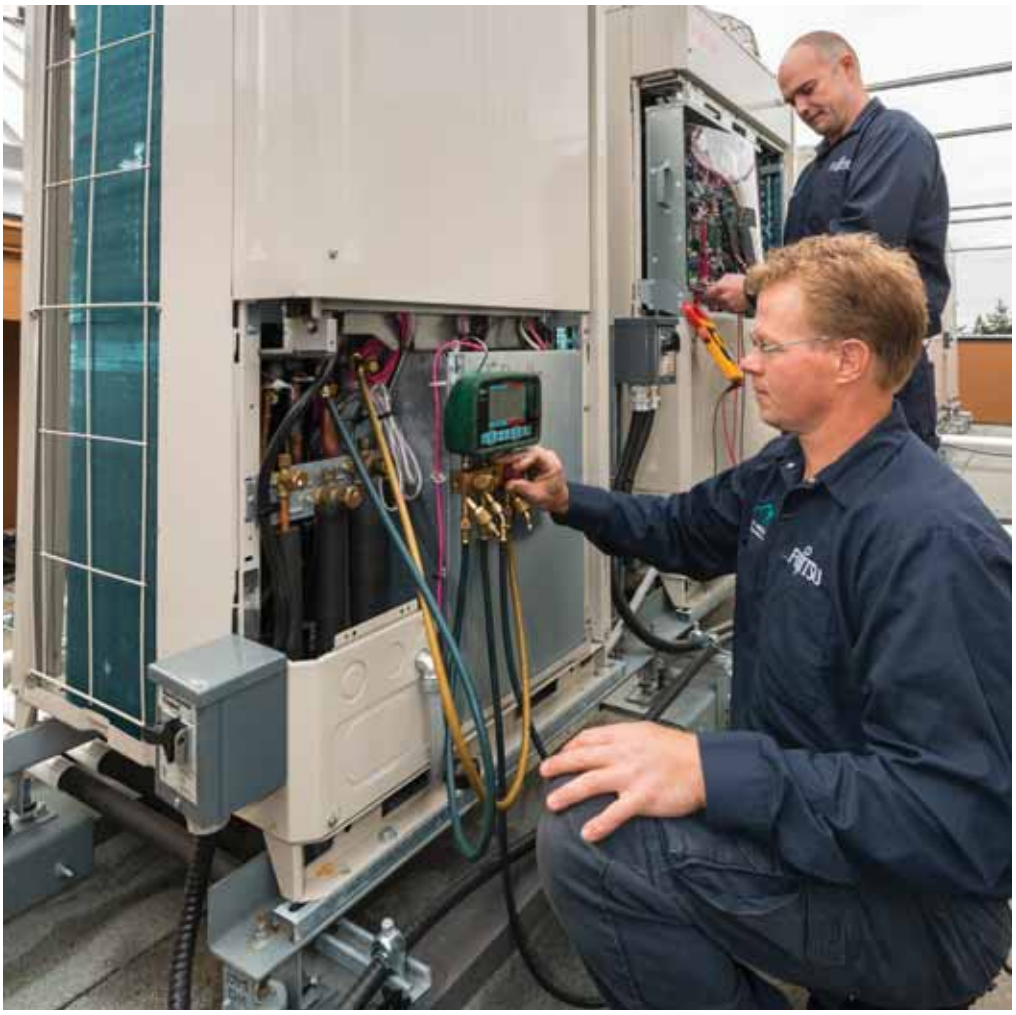
For years, this form of HVAC has required occupants to live with the need for "shoulder season" compromise while waiting for the switchover to full heating or cooling. Both heating and cooling plants may run during spring and fall seasons to meet demand, using more energy.

With VRF technology, that challenge is met handily – the systems are built to provide heating and cooling functions simultaneously.

Long shoulder seasons

Joe Kobetitch, owner of Rocky Mountain Refrigeration Ltd., Victoria, the HVAC contractor for the Travino development said, "The Victoria climate is perfect for VRF systems. It has long shoulder seasons that need

Please see 'One' on page 20



Chad Trim and Geoff St Amant commission the system.

One system per floor

Continued from page 19

heating and cooling at the same time, making it favorable for heat recovery. For instance, the VRF technology installed there allows heat to be removed from spaces with solar gain, then sent to cooler interior or shaded areas." This process provides precise heating and cooling independently to each space without any heat exchange to the outdoors.

Kobetitch knows – he's been installing VRF systems for the past 16 years, since the first technology of its kind made its way into Canada.

Jackson added that, "Refrigerant is used to absorb heat from any space that needs cooling. This heat is then transferred to those suites on the shady side of the structure that need heat. It's very clever use of unwanted Btu's."

Kobetitch's trusted source for products and expertise is Refrigerative Supply, Ltd. (RSL), based in Burnaby, British Columbia, with 14 branches in Western Canada.

"Business is brisk up here, but RSL has won our trust through years of steady help and assistance; they do their best to stay one or two steps ahead of us by ordering and stocking needed equipment and materials," said Kobetitch.

"For the Travino job, we had to keep pace with a demanding schedule so that the availability of equipment never became an issue," reported Refrigerative Supply's Steve Chamut.

How it works

The Travino Square building was separated into six systems – one per floor. Each system uses two 10-ton Fujitsu Airstage condensing units coupled with multiple indoor Fujitsu ASUA fan coils, serving each bedroom and living/dining room. This system allows for room-by-room comfort control with heat recovery between suites.

"It happens frequently within the buildings that living units on the south-west zone, basking in full sun, require cooling. The heat-recovery VRF technology automatically removes the heat, transporting it to suites in the north-east zone that need it," said Jackson.

There's no need for supplemental heating. "Until now we've always had to provide supplemental heat of some sort for DX or heat pump systems. VRF systems allow us to size the equipment for the building heat load then use the heat recovery mode to get air conditioning at each location, basically for free."

Capital and operating savings

Actual energy usage data confirms savings. For the first phase, the cost of operation for the entire building, including HVAC and water heating, averaged $55 per month per unit in the first year. "Typical systems," said Kobetitch, "are usually triple the cost of these VRFs when we include maintenance."

Capital cost is another deciding factor for developers; VRF systems win here too. Kobetitch stated, "The average cost per ton of a VRF system for a multi-residential building like Travino is $4,000, while a typical chilled water system is in the $6,800 to $7,000 per ton range.

Getting the aesthetics right

A common challenge with systems using indoor fan coils is locating them in areas

Please see 'Flexible' on page 23

Flexible configuration for better aesthetics

Continued from page 20

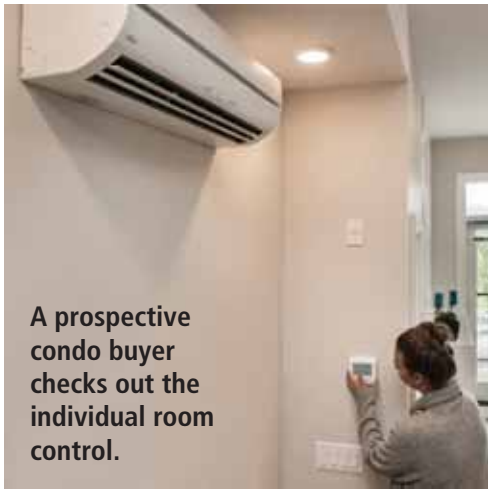
where the occupants aren't faced with the eyesore of visible sheet metal fixtures that also challenge furniture placement.

With the VRF technology, locating interior air handlers offers greater flexibility and is best when decisions result from collaboration between the engineer, architect, developer, contractors and new owners.

"Functionally, there are basic needs by the contractor, or plumber, to drain the condensate," added Jackson. "We wanted to avoid all that, while also avoiding the challenge of adding bulkheads or unnecessary piping."

Avoiding additional pipe length to a refrigeration-based system is critical for both cost and operational reasons. Jackson explained, "There are about a dozen different limits you can come up against depending on system configuration. Manufacturers have been really responsive in communicating these limits and helping engineers, designers and contractors, enabling designs that work within those restrictions."

Locating the outdoor units at the Travino development had some interesting twists. Condensing units, while very quiet, would be noticed if easily seen. As a complication, Travino's roof deck (often a good place to locate the systems) is accessible to residents.



A prospective condo buyer checks out the individual room control.

"So, a lot of thought was given to fencing and paddocks made to keep people away from the condensing units, and hiding them from view," said Jackson.

System communication

"One of the major benefits of the Fujitsu equipment is its system communication," said Kobetitch. Some systems are configured to shut down multiple fan coils if one goes down. This can interfere with individual control for adjacent units and pose a major inconvenience for residents in a multi-residential setting. The technology installed at Travino allows other fan coil units within the system to continue operation if one shuts down.

"Owners have excellent comfort and temperature control year-round and room to room, each with its own thermostat. They get cooling and heating at any time of year, all with a high degree of energy efficiency and comfort," added Jackson.

In a world where green technology has taken root and is growing, VRF systems like the one at Travino Square will become the new norm.

Higher efficiency and improved comfort. Who says you can't have it all? ✚

Thanks to the following people for their work in creating this article:

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