



## **How Stantec Tower Prevents Heat Loss Through Balconies in Frigid Alberta**

### **Structural Thermal Breaks Insulate and Support**

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Schöck North America

# Keeping Warm in Edmonton’s “ICE District” with Structural Thermal Breaks

EDMONTON, ALBERTA —The landmark of Edmonton, Alberta’s ICE District, the Stantec Tower is Western Canada’s tallest skyscraper and the city’s first mixed-use high rise. The 251 m (823 ft) building’s 66 storeys provide office space on lower floors, residential condominiums on upper floors, and a challenge to engineers and architects: how to keep interior floors opposite exterior balconies warm while minimising energy use in one of Canada’s coldest cities.

As the architectural and engineering firm designing the structure, Stantec solved the problem by positioning load-bearing structural thermal breaks at the building envelope between balconies and the floor slabs supporting them. “Thermal breaks create an insulated gap between the concrete on the outside of the building and the slab inside without impacting structural integrity,” explains Steven Weinbeer, Project Engineer from the Stantec Edmonton office.

The goal is to prevent thermal bridging where building envelope penetrations conduct heat from the interior floor slab and dissipate it into the environment. In addition to wasting heat energy, uninsulated balcony slabs chill interior slabs, promoting condensation and mould formation on adjacent surfaces.

## A showcase building in the ICE District

The Stantec Tower is part of a 25-acre mixed-use entertainment, shopping and sports complex in downtown Edmonton, housing Rogers Place (a venue for hockey and concerts), offices, retail outlets, high-end residences, hotel space and restaurants.



*The Stantec Tower, under construction, is the tallest building in Western Canada and includes 200 balconies.*

The office portion of the Stantec Tower houses the headquarters of Stantec and workspace for other firms. Floors 30 to 66 will house 483 “Sky Residence” condominiums of varying sizes and prices.

## Continuous insulation of the building envelope

To insulate the building envelope, the designers utilised a high performance, thermally broken double-glazed curtain wall system. Sealed double-glazed units have thermally broken spacers with high performance low e-coating and argon filled gas. System thermal performance is about 1.45 W/m<sup>2</sup>K,” he continues.

Curtain wall glass allows natural light in, while keeping moisture and air out.

To prevent 200 balcony slabs from conducting heat energy through the insulated envelope and into the environment, the architectural and mechanical team installed Isokorb® Type CM load-bearing structural thermal breaks.

Terrance Wong, project architect and principal in charge of architecture from Stantec Vancouver, says, “The team installed the thermal breaks in Edmonton for thermal comfort because of the extreme cold. The owner was convinced that omitting them would incur huge additional mechanical costs.”

While Wong had not used them previously, he says, “It’s a product I’ve known about for five years.”

Supplied by Schöck North America, the structural thermal breaks consist of graphite-enhanced expanded polystyrene insulation modules and high-strength stainless steel tension and shear reinforcement for structural integrity. The rebar extending from both sides of the module is tied into the rebar of the balcony and floor slabs.

Weinbeer concedes that construction firms are sometimes wary about the extra step of installing structural thermal breaks, but says the cost benefit outweighs any installation concerns.

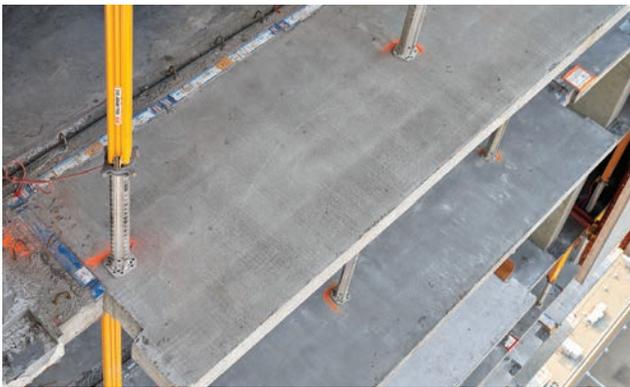
### Calculating energy savings

Weinbeer says it’s too early to determine actual energy savings, but that thermal modelling performed by Stantec in 2015 indicates the interior temperature of slab edges equipped with Isokorb® thermal breaks would be “six to seven degrees higher” than interior slab edges lacking them. Wong adds that installing these modules eliminated the need for baseboard heating at balcony doors and windows.



*Structural thermal breaks are installed between each interior floor slab and exterior balcony before concrete is poured.*

The findings are consistent with a July 2013 report by the building envelope consulting firm Morrison Hershfield, which used EnergyPlus simulation software to analyse the potential performance of a 32 floor, 422-unit residential building constructed using Isokorb® structural thermal breaks at balcony penetrations. The study determined that the thermal breaks would reduce heat loss through the balconies by 75 percent while “significantly reducing the risk of condensation and mould growth.”



*Structural thermal breaks are cast into the interior floor slab and the exterior balcony slab at the building envelope of Stantec Tower.*

Morrison Hershfield also concluded “the thermal breaks would reduce the overall heating energy consumption by 7.3 percent compared to a building with conventional balcony slabs.”

### **Meeting higher building code standards**

“Because this was a LEED Building, we had to use a higher standard than the Alberta Building Code 2006. Instead we referred to ASHRAE 90.1 and NECB (National Energy Code for Buildings),” says Wong.

As formulated by the American Society of Heating, Refrigeration and Air-Conditioning Engineers, ASHRAE 90.1 sets baseline standards for energy-efficient building design. NECB is a Canadian standard, published by Natural Resources Canada (NRC, a government ministry) which also sets criteria for energy efficiency in new buildings.

The latest version of the National Energy Code of Canada for Buildings “...is an important step toward Canada’s goal for new buildings, as presented in the Pan-Canadian Framework, of achieving ‘Net Zero Energy Ready (NZER)’ buildings by 2030. The NECB supports this goal by reducing the overall thermal transmittance of roofs, fenestration and doors; reducing losses through thermal bridging in building assemblies...”

Thermal breaks can play a major role in meeting standards set in codes and in lowering heating costs. At the Stantec Tower, they serve the basic function of keeping high-rise condominiums warm in a northern region with frigid winters.

“It’s really about thermal comfort ... That was the driver behind deciding to put this product in the building,” concludes Wong.



At Stantec Tower, interior and exterior sides of concrete casting are supported and insulated at the building envelope using Schöck Isokorb® structural thermal breaks.



Isokorb® Type CM load-bearing structural thermal breaks consist of a graphite-enhanced expanded polystyrene insulation module penetrated by high-strength stainless steel tension and shear bars which tie into the rebar of the balcony and floor slab.

Details	
<b>Project</b>	Stantec Tower
<b>Location</b>	Edmonton, Alberta
<b>Architect</b>	Stantec Architecture Vancouver
<b>Structural Engineers</b>	Stantec Edmonton
<b>Building Envelope Consultants</b>	Morrison Hershfield
<b>Building Envelope Consultants</b>	RDH Building Science
<b>Owner Developer</b>	Ice District Properties

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