

Why window walls are favoured for condos

Report aims to shatter misperceptions about performance of "glass towers"

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By Michelle Ervin

A new report aims to shatter what it suggests are lingering misperceptions about the performance of Toronto's so-called "glass towers."

The window walls commonly used to enclose condos have improved, addressing some of the issues associated with past generations of the glazed cladding, say the authors of *Window Wall and Curtain Wall: An objective review*. The [comparative analysis](#), conducted in collaboration by the Residential Construction Council of Ontario (RESCON) and the University of Toronto's (U of T) Building Tall Research Centre, found that window walls can compete with, and even best, the performance of curtain wall.

If comparable performance can be achieved with either system, then the question isn't which system is superior, but rather which system is preferable for the application. Its authors conclude that in the case of high-rise residential construction projects, window wall systems are the way to go, arguing that they are easier to customize, install and maintain; typically cost less as a result; and help to isolate smells and sounds in units.

"As long as systems are properly designed and installed, it (the report) shows that a window wall can perform equally to a curtain wall, and the benefits of a window wall are tailored to residential construction," said **Paul De Berardis, director of building science and innovation at RESCON**.

Cladding based on application

The report specifically compares window wall systems with the unitized curtain wall systems typically used in high-rise construction. This kind of curtain wall system is structurally engineered and anchored by crane to building exteriors in prefabricated panels that can span multiple units and floors, while window wall systems are inserted between slabs from building interiors in panels that span single storeys.

At around twice the price of window wall systems, aesthetically pleasing curtain wall systems give architects more design freedom with their sweeping, uninterrupted spans of glazed cladding, said Dr. Arash Shahi, associate director of Building Tall and a post-doctoral fellow at U of T's department of civil engineering.

“That’s why a lot of commercial buildings are using curtain wall — because you don’t have balconies, you don’t want people opening their windows and you want them to have a sleek look,” he said.

“Plus, in a commercial building, you don’t have occupants 24 hours a day, and nobody sleeps in the building at night, so the use-case is inherently very different. Also, there’s generally no cooking and no smoking in the units, so you’re not worried about the odours passing through units.”

Window walls help to compartmentalize units, preventing the transfer of smells and sounds that can cause quarrels between neighbours in residential buildings. Cost aside, that — and the ease with which the system can integrate balconies and windows — explains why it has become the preferred option for residential applications, according to the report.

Stigmas persist despite improvements

The Building Tall Research Centre was established to undertake research relevant to the residential construction industry that might otherwise get overlooked.

The group zeroed in on a comparison of curtain walls and window walls due to what De Berardis characterized as the stigmas surrounding window wall systems. Earlier versions may have had their challenges, he acknowledged, but the cladding type has matured with experience and time.

“Condo buildings nowadays definitely are different from condo buildings which may have used window wall 20 years ago, so some of the issues that may have existed back then are not commonplace anymore,” said De Berardis. “It’s just like any product out there; a modern car will likely have better fuel efficiency than a car which was produced 20 or 30 years ago.”

Along with industry innovation, building code changes and energy efficiency requirements have driven improvements to window wall systems by updating minimum standards, he said.

De Berardis pointed to balcony slabs as an example. Their concrete edges, which used to be exposed to the elements, are now insulated with covers, increasing their resistance to heat loss.

Dr. Shahi added that frames in window wall systems are now being formed from less conductive materials, with vinyl and fiberglass starting to take the place of aluminum, in another move that has advanced the thermal performance of window walls.

And water-draining rain screens have helped to address problems with moisture penetration, which, according to the report, were observed in both curtain and window wall systems when exterior face sealing was the main defence against leaks.

Performance hinges on installation

The report underscores that, if these performance improvements are to be realized, these systems must be installed properly.

Accordingly, it prescribes the use of field mock-ups of the systems so workers can get familiar with their assembly, among other things, and cautions against applying sealant in inappropriate weather in the final push to get the job done, as subpar workmanship can compromise its integrity. Some of the sealant used to give window walls air tightness and water resistance is now applied in factory, adding a measure of quality control.

The work isn't done after installation, as maintenance is integral to ensuring that perimeter sealants reach their expected service life of 10 to 15 years, the report notes. It recommends inspecting and repairing exterior sealant every three to five years.

And when it comes time to replace panels, the difference in the way the two systems are installed makes window walls easier to maintain than curtain walls, the report asserts. Work on a window wall panel is limited to a single unit, while swapping out the sweeping spans of curtain wall can disrupt multiple floors and tenants.

“If a window wall panel needs to be replaced, it’s a lot easier because you can access it from inside the unit,” Dr. Shahi added. “When it comes to curtain wall, you actually have to access it from outside, so you need to have a crane in place.”

Outside expert questions conclusion

Dale Kerr, senior principal at Pretium GRG Building Engineers, who was not involved in the report, said it provided a good overview of the two systems, but she wasn't convinced that window walls could outperform curtain walls. She suggested the way curtain walls are sealed is superior to the way window walls are sealed.

The report acknowledges the shortcomings of the sealant commonly used in window walls compared to the gaskets commonly used in curtain walls, but adds that gaskets are starting to be used in window walls.

Unfortunately, whichever type of sealant is used, it will generally fail before the aluminum and glass components of the system, said Kerr, and so the ability to replace the sealant easily is important. Window walls may have an advantage here, since some of this work can be completed from the interior.

“If you’ve got heel beads around the perimeter of the insulated glass unit, you could replace that from the inside of the unit, and it is true: that would be easier to do than a curtain wall, which you’d have to repair totally from the exterior,” said Kerr.

However, she pointed out that some of this work would have to be completed from the exterior for window walls too, citing the slab edge spandrel panels as an example.

Kerr recognized that window walls are likely the preferable choice for residential construction, but mainly from a cost perspective. Indeed, the report concludes that window walls are not only less expensive than curtain walls, but also provide an economical way to compartmentalize units. However, Kerr noted that, because of the way fresh air is supplied to apartment building units via corridors, there is a more important factor in compartmentalization.

“The big thing with compartmentalization is not as much what you’re doing with the window wall, or curtain wall, or whatever it is, it’s more what you do inside the unit to seal one unit off from another,” she maintained.

Cladding research to continue

The recent release of the report by RESCON and U of T’s Building Tall Research Centre marks the end of phase one of a two-phase study. Phase two, the results of which are due to be published before the end of the year, will shed light on the discrepancy in the way window-to-wall ratios are measured for high-rise versus low-rise homes.

For high-rise buildings the ratio is measured by dividing the total window area by the overall building area, whereas for single-family and town homes the ratio is measured by dividing the area of the windows by the area around the unit. Dr. Shahi said early findings show that when the window-to-wall ratio for high-rise residential buildings is measured on a unit basis, condo and home owners enjoy roughly equivalent proportions of glazing.

“The building might look all-glass from outside, but from an occupant perspective, living in a unit in a condo, they may only have one wall to the outside,” he said.

With unit sizes on the decline, the research will also look at alternatives to lowering window-to-wall ratios to improve the energy efficiency of residential buildings with glazed cladding. Some of the other options available to raise the thermal performance of these buildings include the use of low-emissivity coating and triple glazing.