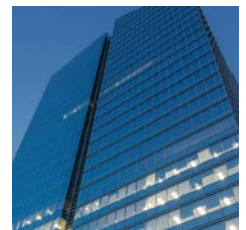
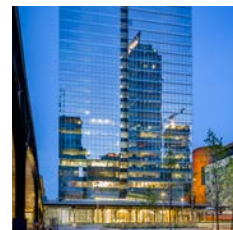
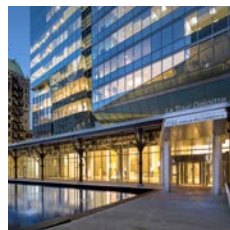


Deloitte Tower Uses Energy Efficient Glazing in Quest for LEED Platinum Certification

TGI-Spacers Played a Key Role in Curtain Wall Vision Glass and Spandrel Panels



TECHNOFORM **GLASSINSULATION**

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Project: Deloitte Tower

Location: Montreal, Quebec, Canada

Owner/Developer: Cadillac Fairview Corporation, Limited

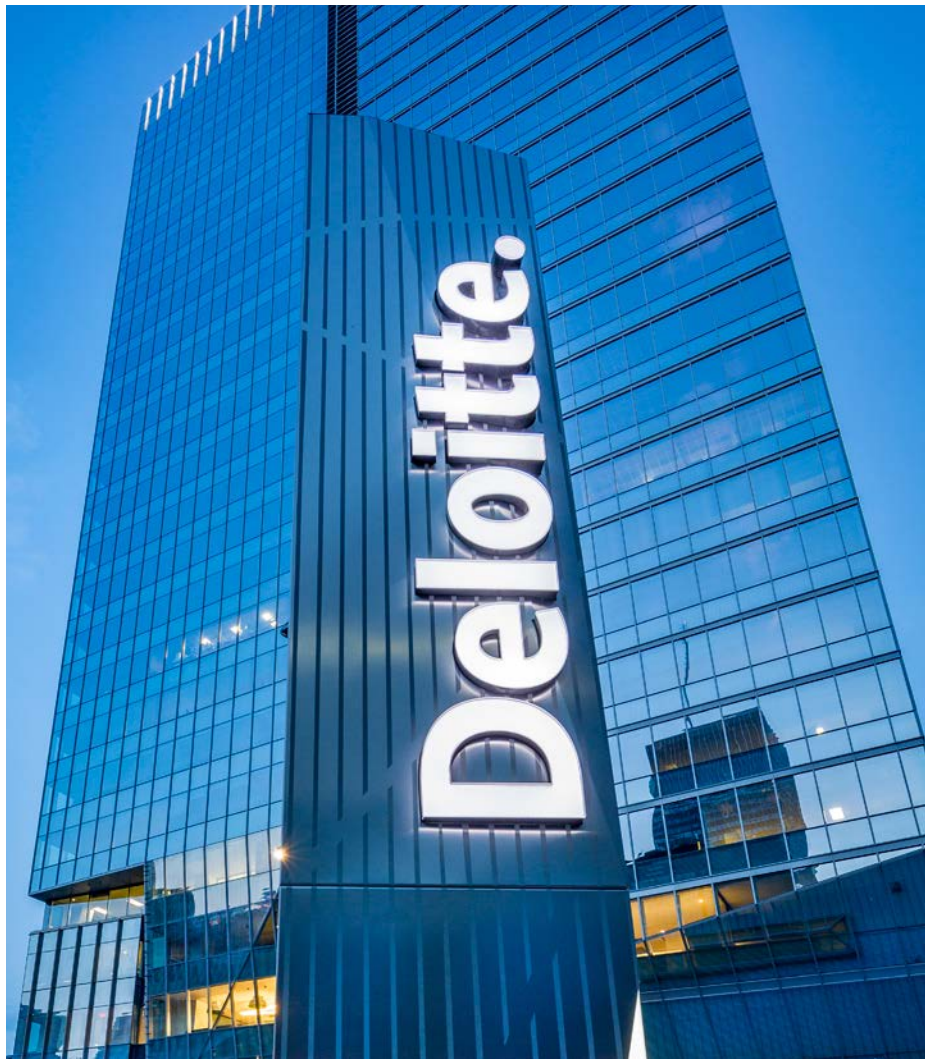
Architect: Kohn Pedersen Fox (KPF) with Bregman & Hamann (B+H) Architects

Size: 560,000 square feet (52,100 square meters), 28 stories

Budget: \$200 million

The Setting – Downtown Montreal

IGU Fabricator: Multiver Ltée, established in 1969



The Setting – Downtown Montreal

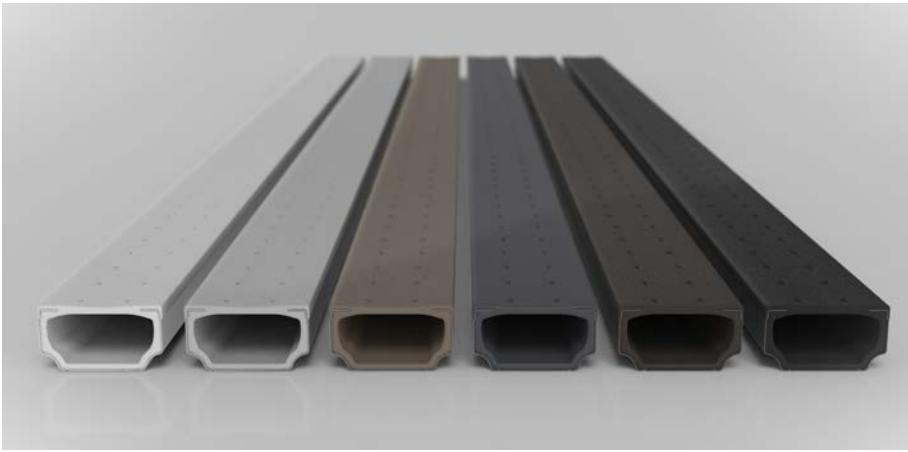
The Cadillac Fairview Corporation Limited, along with its major tenant Deloitte, has helped create the first, new, privately-owned and financed commercial office tower in more than 20 years to be built in the city of Montreal, Quebec. This marks the first step in a \$2 billion multi-year plan to develop a prime sector of downtown Montreal creating a vibrant new neighborhood known as Quad Windsor. The tower is located next to the heritage-designated Windsor Station entertainment venue and connects directly to the Bell Centre, home of the Montreal Canadiens professional hockey team. This 560,000-square-foot project provides premium office space and approximately 230 parking spots in a vibrant and very visible part of downtown Montreal.

The spirit of the city is seen as alive and strong in this setting, despite its cold climate.

The Challenge – Aggressive Green Building Performance

Cadillac Fairview has initiated a nationwide effort known as Green at Work. This program tracks energy consumption, water usage and waste diversion in developments that the company manages across Canada with the objective of progressive improvement each and every year. For the Deloitte Tower, the decision was made to target a LEED® Platinum CS certification for the Core and Shell of the building. Tenants, including Deloitte, are subsequently requested to pursue LEED® CI for Commercial Interiors

at the gold or platinum level. This progressive approach puts the development and its tenants at the forefront of sustainable office design in Canada. The challenge includes allowing plenty of natural daylight to reduce electric light usage while still efficiently keeping heat gain and loss under control. The intent is to realize energy cost savings of 35-40% and reduced greenhouse gas emissions from lower power consumption. The Canadian Green Building Council (CaGBC) oversees the Leadership in Energy and Environmental Design (LEED) program in Canada. Other goals of the certification include sustainable site work, water conservation, indoor environmental quality, and sustainable use of materials and resources.



The Design Solution – Abundant Daylight and Views

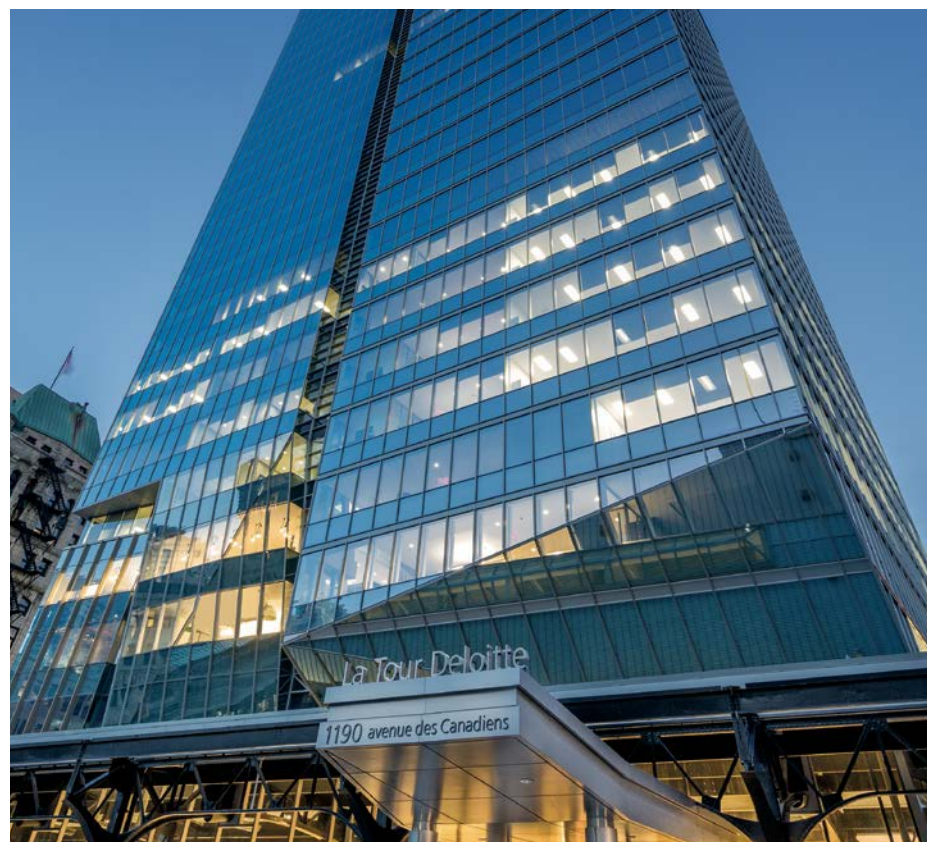
Early in the planning phase, the architectural teams collaborated with glass and curtain wall fabricators to ensure the best possible selection of suitable products to optimize both the energy efficiency and the visual appeal of the building. They ultimately settled on a curtain wall design using lightly tinted grey vision glass to allow abundant daylight to enter virtually the full width and over 80% of the height of the perimeter walls on all of the office floors, which also affords spectacular vistas of the city in every direction. Grey tinted windows are an upcoming trend in architecture, according to the Efficient Windows Collaborative. Grey tinted windows offer a more reflective look from the outside of the building, while providing occupants of the building with a greater sense of transparency in the glass than darker tinted windows. Based on these characteristics, Guardian Industries glass, color AG50 crystal grey, was specified by the architects for the glazing.

Optimizing Energy Performance with Insulating Glass

In order to control heat gain and loss, the glazing in the project is made up of dual pane insulat-

ing glass units (IGUs) with a low emissivity (low- E) grey colored coating on the inside surfaces. The glass supplier and fabricator of the IGUs was Multiver Ltée of Quebec. Throughout the planning and design process, they assisted the architects with performance calculations, color selection, and other support. They recognized that the total performance of the glazing would be influenced not only by the glass itself but by the individual products that held the dual panes together, commonly referred to as glass spacers. Numerous independent tests and certification

organizations have confirmed that selecting an inferior glass spacer results in the edges, as well as the center of the glass, performing poorly in terms of heat transfer. If the seal along the edge of the spacer does not hold up, then air and water vapor can seep into the glass space otherwise filled with an inert gas. When that happens, the glass appears streaked or stained on the inside and performs even worse. Further, in cold climates like Montreal, condensation can form on the inside of the glass along the cold edges causing other problems for the building components nearby. Together, the architects and Multiver researched and chose glass spacers manufactured by Technoform Glass Insulation (TGI) since they met their design criteria for both excellent energy efficiency and the ability to meet unique aesthetic requirements. Specifically, they selected a 17/32" (13.44mm) TGI®-Spacer in a light grey tone to match the glass color beautifully.



Multiver V.P. of Operations, Luc Cormier states “Our pre-build simulations clearly indicated that the TGI®-Spacer offered superior U-factor, vapor barrier, site-line temperature and condensation resistance - exactly the right combination of quality, value and appearance for the tower project. We simply could not achieve this any other way.”

- TGI®-Spacer is a unique hybrid spacer system incorporating a high-performance polymer and low conductivity stainless steel to provide minimal heat transfer, while maximizing protection against gas leakage and moisture penetration.
- TGI®-Spacer’s straight sightline, light grey color and smooth matte finish complemented the desired overall appearance of the glazing and ultimately the whole building.
- To maintain a congruent aesthetic appearance throughout all glass units, Multiver also used the TGI®-Spacer in the spandrel glass panels they provided. Opaque spandrel glass is used in areas that do not require vision glass, such as the horizontal sections along the floor lines where concealing the structure and other building components are required.

Multiver fabricated the IGUs for the Deloitte Tower in a variety of sizes and shapes to meet the building design, the largest unit being 96” x 140” (2.4384m x 3.556m).

Putting It All Together – The Curtain Wall System

Epsilon Concepts, Ltd. of Quebec, Canada designed, engineered, manufactured, and installed the curtain wall system. Epsilon is known as a leader in specialized high energy efficiency curtain walls making them ideal to meet the demands of the Deloitte Tower project. They also conduct an evaluation of all their products in regard to LEED certification for materials and vetted all products for compliance with the LBC “Red List” of 14 potentially toxic substances.

Because of the size and expanse of the curtain wall system, a pre-fabricated, unitized system was quickly determined to be the best choice. Generally, these systems are used on mid-rise to high-rise structures that are 20,000 square feet and up where there is high repetition, tight job site access, and high installation labor costs. These systems hold up over time better than others because each curtain wall panel is installed to be able to expand and contract independently from the supporting structure and retain its ability to be completely weather tight.

The design team next considered traditional curtain wall systems compared to structural silicone systems. Traditional curtain wall systems use continuously gasketed aluminum pressure plates or caps that can conduct large amounts of heat in or out of the façade resulting in “thermal bridging”. Structurally glazed curtain wall systems consist of glass that is bonded or anchored back to a frame with engineered silicone sealant that can reduce or eliminate the thermal bridging along the joints between adjacent IGUs. The aesthetic benefit of a structural silicone glazed

system is the creation of greater transparency than traditional systems. There are less visual interruptions due to the lack of metal on the exterior, creating a seamless, continuous glass look. This system creates a completely clean, flush exterior appearance with superior energy performance. It can also be much more technically complex than a traditional system so the skill and quality control of the Epsilon team was heavily relied upon.

The structural silicone glazed system selected was Epsilon Platinum Series 60.075 – 2S which is the highest performing curtain wall offered by Epsilon Concepts, Ltd. It is a pre-fabricated, unitized system, with structural silicone on 2 sides that allows multiple glazing types and materials to be combined into one ‘unit’ in a quality controlled shop environment. Precision is needed in sealing the units together since there is no outside metal frame to cover any irregularities or imperfections. That goes for the glass spacers used too, since in some cases they can be left partly



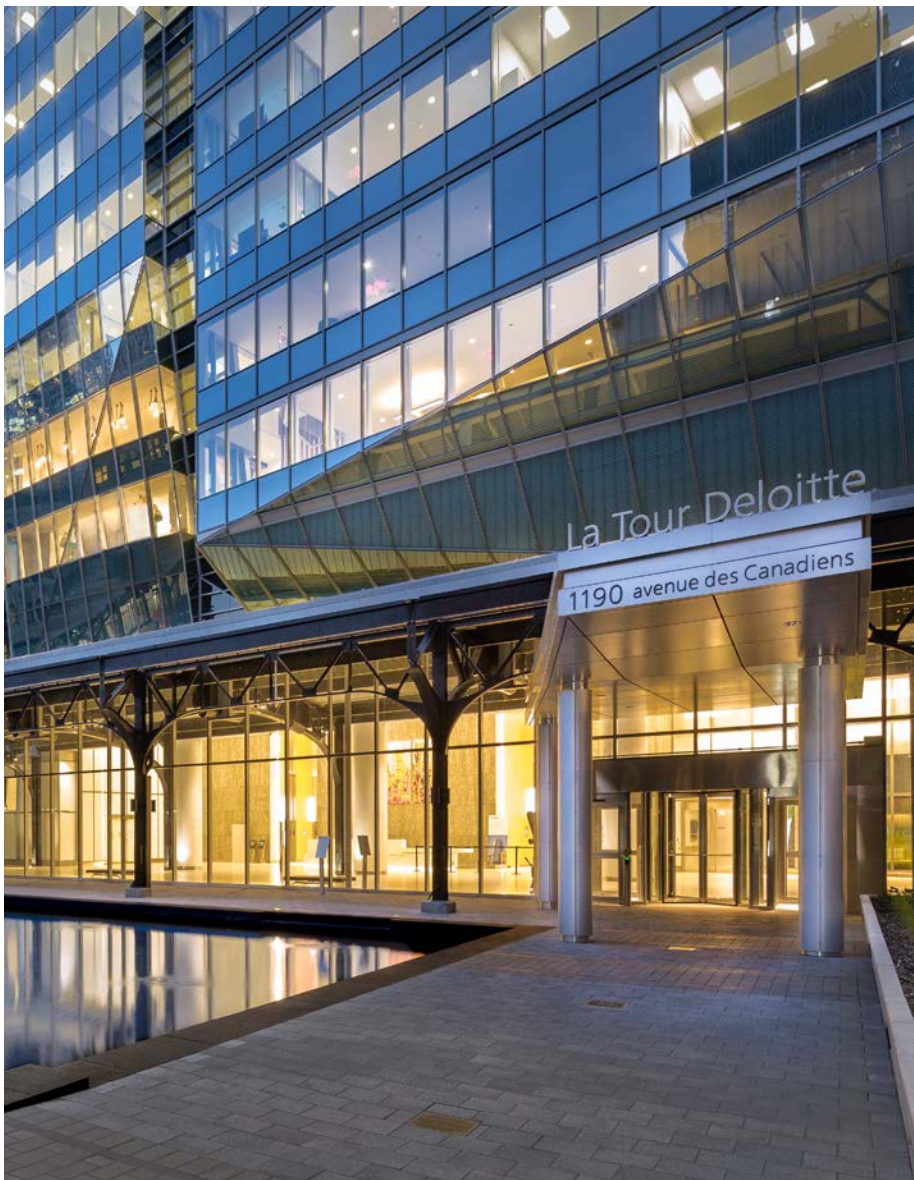
exposed and create an unintended visual appearance. The TGI®-Spacer used in this project extends the colored polypropylene through an extended sidewall ensuring minimal opportunity for stainless steel peek through and overcoming this common quality control issue on structural silicone glazed units. After the IGUs and spandrel glass are glazed into unit frames within the shop, they are transported and installed at the job site by crane. The installed units then receive additional silicone and or EPDM gaskets on the exterior creating “stack joints” as the complete air and moisture barrier of the system allowing a weep at each floor.

The Result – High Design and High Performance

The Deloitte Tower is a stunning example of design and functionality coming together beautifully by paying attention to the details of the glazing system. The collaborative effort of the owner, design team, fabricators, and installers created an environment that eliminates visual barriers offering a desirable and productive office setting. All in all, with the goal of LEED Platinum, the Deloitte Tower will certainly be a jewel for the downtown Montreal area. The TGI-Spacer played an appropriately subtle but very important role in seeing these results achieved.

About Technoform Glass Insulation North America (TGI)

For more than 45 years, Technoform Glass Insulation has been helping customers worldwide make the strongest high-performance window, curtain wall and IG products. Technoform’s global network of industry specialists is ready to assist with all steps of the design and manufacturing processes to create the systems required by today’s architects and fabricators. A world leader in its field, the company has manufacturing facilities in Kassel, Germany; Milan, Italy and Twinsburg, Ohio, USA. Technoform Glass Insulation is a member of the Technoform Group, along with Technoform Bautech, Technoform Extrusion Tooling, and Technoform Kunststoffprofile. Please visit <http://www.glassinsulation.us> for more information on TGI® Products. Follow Technoform Glass Insulation NA on Twitter LinkedIn Facebook Google+



About Multiver Ltée:

Multiver, established in 1969, provides glass products from floating glass and sealed glass units to tempered, laminated and spandrel glass products. Multiver has worked on notable projects such as the Montreal Airport, Jewish General Hospital, and Le Journal De Montreal’s building—The largest newspaper in Quebec. With a strong team of passionate associates, from factory to engineering and customer service, Multiver was the natural choice to meet the challenges designed for the Deloitte Tower.

www.multiver.ca