No Holes in Glass (NHG) Glazing Systems Overview

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The Isabel - Queen's University - Kingston, ON

McMaster Health Campus - Hamilton, ON

With the architectural desire for maximum transparency in buildings and the increasing use of double and triple glazing systems in structural glass applications, a cost effective, thermally efficient solution is Stella's **NHG Glazing System**. The principle of the NHG system is to provide ledge brackets below each panel of glass, located at the bottom corners.

The weight of the glass is carried via the ledge bracket into the structure behind (which could be glass fins, steel structure or an alternative support system). The ledge brackets are responsible for carrying the deadload (weight) of the glass whilst out of plane loads (such as wind loads) are transferred to the support structure by bonding the glass to the substructure along its vertical edges.

Because there are no holes in the glass, the exterior is completely uninterrupted!

While various support systems are options, the focus here is on glass fin support systems.
The glass fins in these systems are constructed from multi-layered tempered and laminated glass to provide redundancy if one (or more) of the lites break simultaneously.

OPTIONS FOR LOADING NHG GLASS FIN SYSTEMS

Top Hung

The entire weight of the fins and the face glass is carried up into the structure above.

A top hung system requires the fin to be suspended from the structure above and retained in the fin shoes at the sill. Provision is made at the base for the face glass and the fins to move up or down to facilitate vertical movement of the structure above.

Bottom Loaded

The entire weight of the fins and face glass is carried down into the structure below.

In a bottom loaded fin system, each glass fin is retained in the fin shoes, top and bottom, with the upper fin shoes allowing vertical movement from the connecting structure above.

In both options, the wind load is shared between the upper and lower structures.
It is common that full height glass fins push the envelope on glass panel sizes and thus fins are comprised of multiple glass panels to achieve increased glass wall heights. Common elements of top hung or bottom loaded glass fin support systems are their use of vertical stainless steel fin connector splice plates. Splice plates include flush mounted, high strength bolts, passing through ferrule bushings set into holes in the glass fins.

Cantilevered Fins

Allowing a greater use of floor space, the entire weight of the fins and face glass plus most of the loads created by wind are carried by the structure above.

Cantilevered fins project from the structure above and typically terminate approximately 2400mm [8'] above floor level. Since the fin is only fixed at the top, it is subject to significantly higher loads than full height fins. Cantilevered glass fins are typically thicker than full height fins. Their increased thickness and weight means heavy-duty brackets are needed to attach the fin to the structure above. Fin connector splice plates may be required, depending on height.

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PREPARATION OF THE GLASS FINS

Glass fins are pre-assembled in the installer's shop prior to site delivery. This controlled environment ensures accuracy and suitable ambient conditions to allow epoxy and silicone to set.

The fins are laid out end to end with the fin splice plates acting as templates to ensure full alignment. Epoxy is inserted into the fins' holes to set the location of the side and splice plates with the most accuracy.

Once fully set, an aluminum flat bar is placed along the fin's leading edge and bonded to the fin using structural silicone.

INSTALLATION OF THE GLASS FINS

Fins are transported to site and erected into the head and sill mounting shoes or brackets. They may be installed as full length fins or disassembled and re-assembled in position on the site, depending on available equipment and field capabilities.

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Project Hardware

TOP HUNG FIN SYSTEMS usually require the installer to hang the upper portion of fin from the brackets mounted at the head. Subsequent
pieces of fin are joined to the piece above.

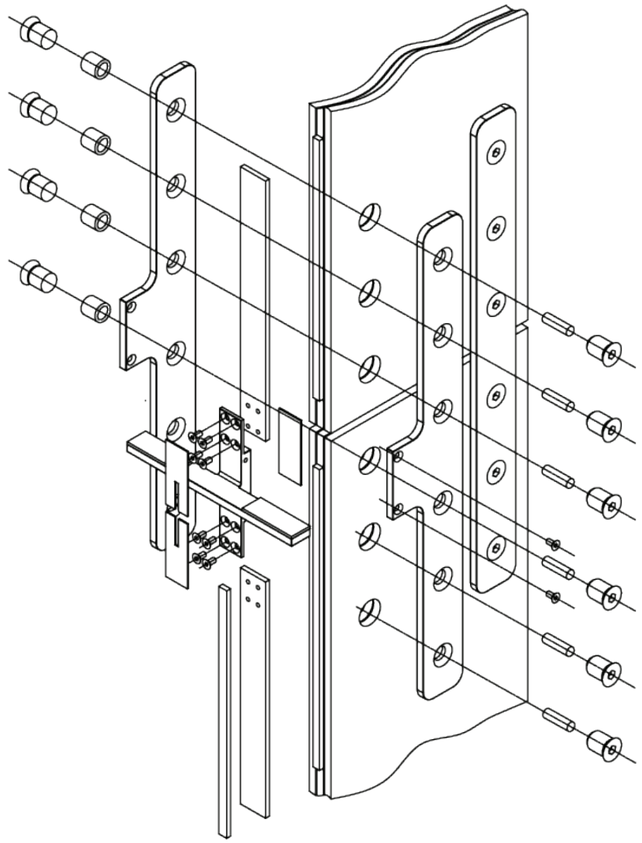
BOTTOM HUNG FIN SYSTEMS require the lowest piece to be installed first and temporarily supported until all pieces above have been installed and bolted in place.

MOUNTING "LEDGE BRACKETS" TO THE FINS

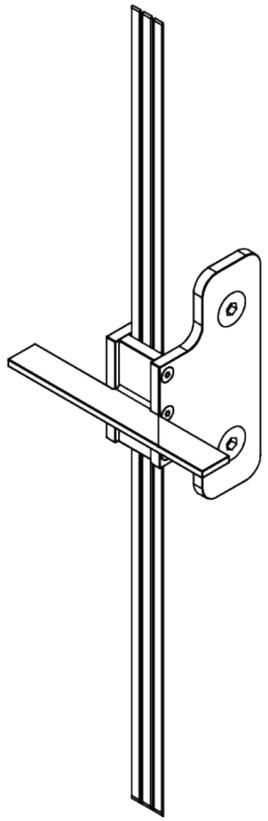
The stainless steel ledge brackets are bolted to the glass fins with stainless steel side plates that keep the ledge bracket in its final position.

When ledge brackets coincide with joints in glass fins, the side plates serve double duty acting as fin connector splice plates and retaining the ledge brackets in position.

"The stainless steel deadload ledge brackets are integrated into the fin splice plates."



Deadload bracket with fin splice plates



Ledge bracket connected to glass fin

FACE GLASS LAYOUT

Vertical joints in the glass are usually retained at a typical width of 12mm [1/2”] whilst the horizontal joint width is increased to +/-19mm [1/2”]. This increased horizontal joint facilitates the thickness of the ledge bracket, setting blocks and a nominal tolerance of about 3mm [3/32”] between the underside of the ledge bracket and the top of the glass panel below.

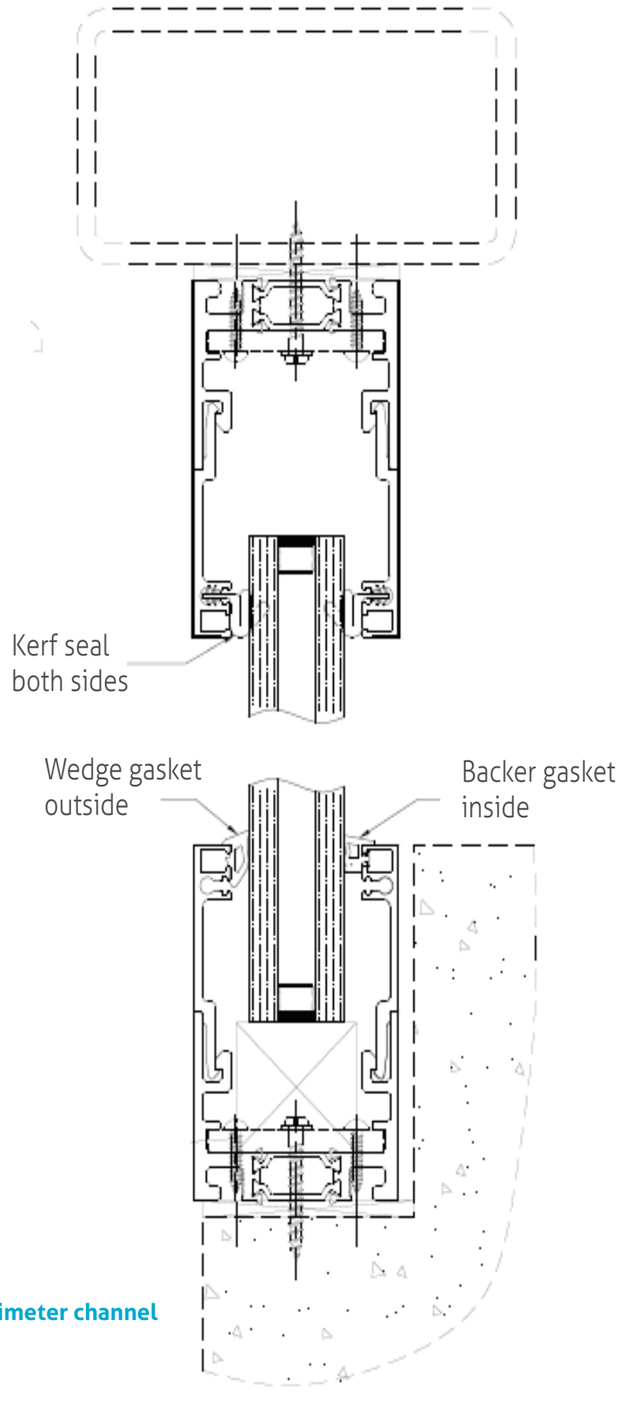
Glass fabrication tolerances need to be significantly tighter than traditionally advertised.

Installation of the face glass is usually carried out from the bottom rows upwards although this is not specifically required. As each panel is installed against norton glazing tape, temporary “dutchman clips” are fastened through the vertical joint into the aluminum flat bar mounted to the fin.

Structural silicone is then applied between the inside of the face glass and the aluminum flat bars bonded to the glass fins. Once cured, the “dutchman clips” are removed and the butt joints between the panels of glass are sealed for weather resistance.

PERIMETER CHANNELS

A custom-designed perimeter channel, suitable for thermally and non-thermally broken conditions is provided to the head, sill and jambs. Perimeter channels retain the glass and make installation easier using site-applied glazing clips and dry wedge-type gaskets. In addition to providing an effective seal, this system also allows for deflection of the structure and ease of replacement in the future. Each perimeter channel system is designed to meet the specific requirements of the project.



Stella thermally broken perimeter channel

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