Clear Choices

A Specifier's Guide to Commercial Glazed Facade Systems

alspec
ALUMINIUM SYSTEMS SPECIALISTS

Introduction

At their best, glazed facades result in some of the most memorable designs in modern architecture. Visually light yet structurally strong, glass is renowned for its ability to open up buildings to the outside world, while providing protection against the elements. In recent years, innovations in design have enabled glass to be utilised in sustainable buildings, delivering comfort and energy efficiency without compromising style.

However, glazed facades are not simple architectural solutions. There are several types of glazed facade systems on the market, from shopfronts and window walls to curtain walls, each with their own respective strengths and limitations. To the naked eye they may look similar, but each has unique properties that are better suited to different architectural applications.

Architects, designers and specifiers need to understand the different variables in facade design to choose the right glazed facade system for their project. This starts with understanding the different types of systems that are available, and addressing such considerations as installation, site conditions, and glazing types, all of which impact project cost, time and building performance.

In this whitepaper, we dispel any confusion about the different glazed facade systems used for commercial buildings, and discuss the key factors that go into choosing the best solution for your next project.

Different Types of Glazed Facade Systems

SHOPFRONT WALLS

Shopfront walls refer to a non-load bearing glazed facade system that spans between the floor slab and the building structure above. Such systems are available in aluminium-framed or frameless configurations and are typically used for ground floor single-storey units. Larger applications are possible, such as for car showroom fronts.

As they are used to front commercial premises, shopfront walls will typically include enhanced security and integrated door systems. They are used to maximise the amount of natural light for the optimal presentation of goods and services, and to contribute to a positive, consumer-friendly atmosphere.

WINDOW WALLS

A window wall system is selected when the glazing system is to be installed between floor slabs, often creating a distinct separation between floor levels. The window wall assembly is fastened to the floor slab, supporting the vertical load of the unit. The top of the unit sits within a sub-head that is fixed to the underside of the slab overhead.

Early versions of the window wall left an exposed slab edge. More recently, window walls can include a spandrel panel spanning the depth of the slab. Building designs are increasingly pushing window wall components further outboard of the rough opening (over the slab edge). This aligns the insulated glazing with the exterior cavity insulation,[1] which maximises thermal performance, but impacts structural support conditions and perimeter detailing.[2]

CURTAIN WALLS

A curtain wall is an external, non-loadbearing wall that separates the exterior and interior environments. Unlike window walls that are suspended between reinforced concrete slabs, a curtain wall is hung off the slab edges by anchors.

Curtain walls can comprise the entire outer skin of the building and may be designed as a complete system that integrates frame, wall panel and waterproofing materials. They consist of glazing as well as opaque spandrel panels, which are usually thermally-insulated units in the curtain wall. The exterior finish on the spandrel panel may be glass, forming a continuous exterior envelope. Aluminium is used almost exclusively as framing.

STICK-BUILT OR UNITISED

Curtain walls are often classified as either stick-built or unitised systems. The differences lie in the construction of the system itself. Stick-built curtain walls are fabricated for the curtain wall frame and glass or opaque panels to be installed onsite and connected together piece by piece. This construction uses more on-site labour, and requires specialised skills and additional storage space for materials onsite.

Unitised systems are made of larger panels or units that are assembled and glazed in the factory, then shipped to the site and erected on the building. The larger the application, the more suited it is for unitised curtain walls, as it will allow for quicker installation and eliminates external access issues.

“Determining whether a shopfront wall, window wall or curtain wall is best suited for the project at hand will require architects, designers and specifiers to assess site conditions and the application context.”

Which Glazed Facade System Is Right For You?
Key Considerations

APPLICATION AND SITE CONDITIONS

Project specifications should include a list of performance criteria or requirements for the glazed facade from which to design and evaluate the proposed assemblies. Determining whether a shopfront wall, window wall or curtain wall is best suited for the project at hand will require architects, designers and specifiers to assess site conditions and the application context.

The location of building is a relevant factor. The orientation of the building will impact the extent to which daylighting and heat gain will need to be managed. The climatic conditions of the site will call for specific design measures to achieve the required thermal performance. Furthermore, projected wind loads for the site will help determine structural requirements for the system.

The number of floors can also determine which system is better suited for the proposed application. Shopfronts are designed for low-level applications. Window walls are usually used from the second floor up, but are not limited by building height. Curtain walls also span multiple floors but are often designed to meet elevated design requirements for thermal expansion and contraction, building movement, wind loads, water diversion and thermal efficiency.

BUDGET AND TIME

Each type of glazing system has different time and cost implications. In general, shopfronts and window wall systems are more cost effective than curtain wall systems. They are easier to install, and contractors are readily available with the appropriate skillset for the job. By comparison, multi-storey curtain walls are time and labour intensive, and demand specialised skills and equipment.

However, installation costs are only one factor and building performance needs to be considered. Taller buildings typically have more demanding performance requirements, making curtain walls the ideal choice in delivering an efficient facade design. A building with a low-performing facade will be more expensive to run over its lifetime and runs a greater risk of being non-compliant with Australian standards and regulations.

Within the curtain wall category, the choice between stick-built and unitised systems will also have cost implications. Stick-built systems take longer to install as they are assembled onsite, but they may be more appropriate for tight job sites or jobs with low required volumes. Unitised systems are significantly faster to install as the glass units are created and glazed within a factory and thus are better suited for projects where a large volume of prefabricated panels are required.

SOURCING LOCALLY OR OVERSEAS

Internationally-sourced products may be “cheaper” in comparison to locally-sourced products. However, the risk of delays is greater when opting for overseas building products. Longer lead times and delivery times are required and you will expose yourself to the risk of global supply chain disruptions that can blow out project schedules.

Sourcing a facade system locally can have huge benefits, including transparency around compliance, faster delivery and enhanced flexibility. This is particularly advantageous for complex builds for several reasons. It is easier to work with local suppliers in terms of scheduling deliveries and the shorter supply chain. You will have easier access to support and customer service. Local suppliers and installers will have better knowledge and experience in designing systems that meet Australian building regulations and standards. Sourcing products locally also has greater sustainability outcomes, including reduced transport requirements and supporting the local economy.

GLAZING

Site-glazed or Factory-glazed

Unitised curtain walls are traditionally manufactured and glazed off-site. Factory-glazed units not only reduce installation time and labour costs but are generally of high quality, especially at the joint seals, because they are built in a climate-controlled environment with strict quality controls. Onsite glazing may still be advantageous for some projects as the lead times for such systems are shorter for the materials to be delivered to the site when compared to prefabricated unitised units, which can take many months for delivery.

Interior Glazing or Exterior Glazing

Interior glazed systems allow for glass to be installed from the interior of the building whereas exterior glazed systems feature glass panels installed from the exterior of the building. Interior glazing is generally specified for applications with limited interior obstructions to allow the appropriate access for installation. Exterior glazing requires swing stage or scaffolding access to the exterior of the facade.

In low-rise applications and shopfronts, exterior glazing is typically specified due to the uncomplicated nature of the job site. In high-rise construction, interior glazing may be preferred due to access and logistical concerns.

Structural Glazing or Captive Glazing

Structural glazing refers to glass that is bonded or anchored to the frame. Captive glazing uses either a glazing bead or screw-applied pressure plate (with a snap-on face cap) to “capture” or trap the glass inside the pocket. Each type of glazing has its own strengths and limitations.

Structural glazing enables a more continuous exterior with greater transparency and less visual disruption. However, in comparison to captive glazing, it is more complicated to install onsite. While captive glazing is easier to install, the pressure plates and caps may act as thermal bridges conducting heat in or out of the facade. Structural glazing is less susceptible to thermal bridging as it features little or no exposed exterior metal.

Span of Glazed Sections

Some projects have architectural requirements for glazing that is high and/or wide in span. As the spans of glazed sections increase, the facade must be strong enough to accommodate the heavy weight of glass and higher wind loads. Higher wind loads will generally call for shorter spans, but some facade systems can handle large glazed sections unsupported or with minimal support. Certain facade designs anchor the glass to the frame to achieve the requisite structural integrity.

SYSTEM PERFORMANCE

Wind Loads

Wind load refers to the amount of pressure caused by wind that the facade must be able to resist. Local wind pressures are to be calculated according to AS/NZS 1170.2:2011 “Structural design actions – Wind actions”. A site engineer will determine the Ultimate Limit State (ULS) and Serviceability Limit State (SLS) pressures specific to a building in a particular location.

The ULS and SLS determine the required strength of the facade system to prevent building failure and non-compliance. This will impact structural aspects of the façade design including glass thickness, frame dimensions and capacity, and joints and anchors.

Water Penetration

Facade system are susceptible to water penetration around joints and seals. Window walls have more interfaces that must be sealed, increasing the risk of water and air leakage. Curtain walls do not necessarily have an advantage in terms of water penetration and air leakage. The key factors for air and water tightness is the interface between the insulated glass units, mullions and rails, less exposed parts and simpler connections.

Thermal Performance

Section J of the National Construction Code (NCC) sets out energy efficiency requirements for commercial buildings. Facade systems must be specified to meet performance requirements for U-Value (the rate of transfer of heat through the unit) and SHGC (Solar Heat Gain Coefficient, which measures how much solar radiation passes through the unit).

The NCC 2019 also addresses thermal bridging, which occurs when an insulation layer is bypassed by a very conductive material allowing heat to readily transfer through the unit.[3] The effects of thermal bridging have to be fully accounted for when calculating the thermal performance of building components.

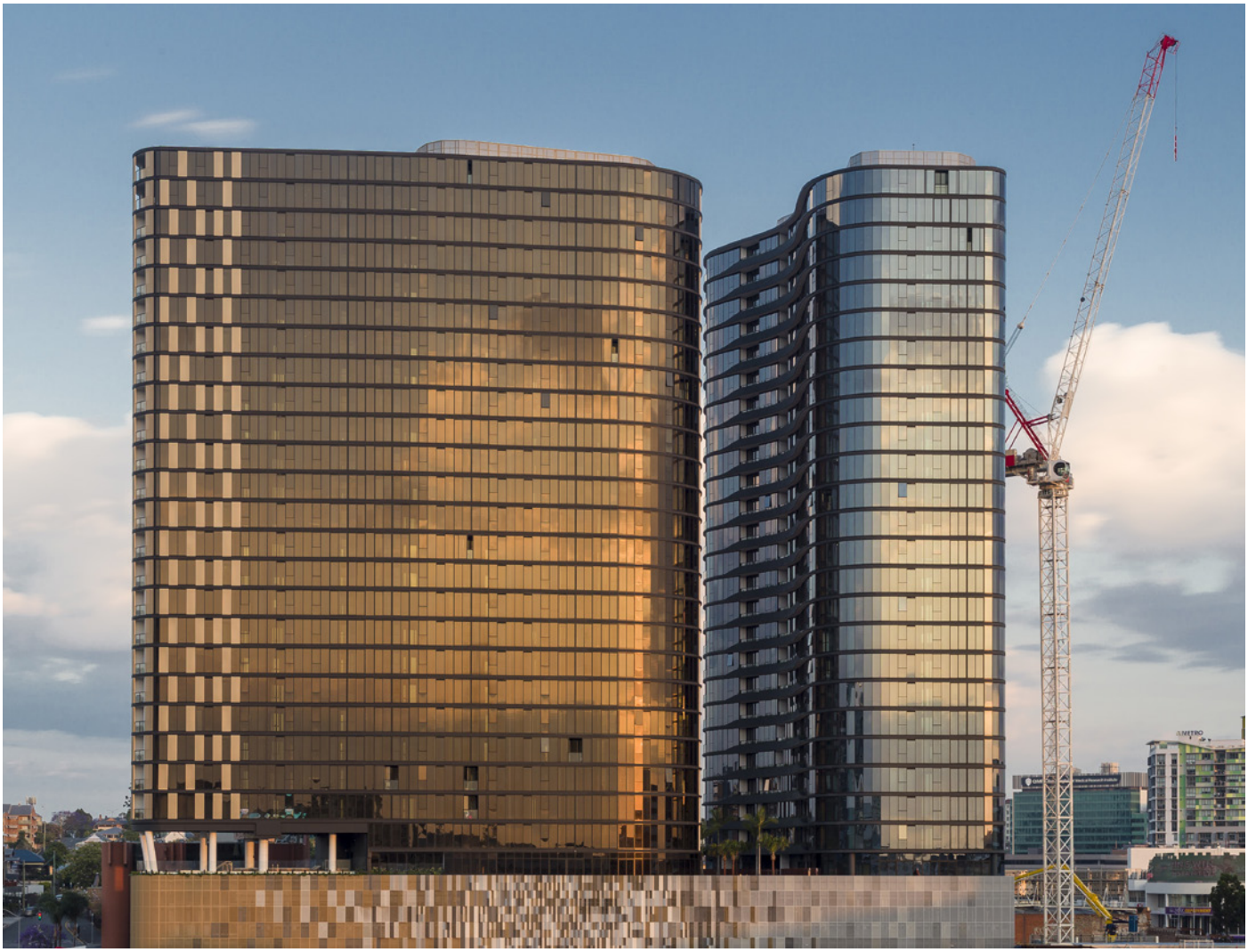
Standard wall and glazing systems may not meet the minimum required thermal performance once thermal bridging is factored in. To achieve the required performance, designers and specifiers will need to consider glazing systems with thermally broken framing. A thermally broken frame includes a reinforced polyamide strip fixed between the inside and outside aluminium profiles. Due to its low thermal conductivity, the polyamide strip acts as an insulated barrier preventing heat and cold transfer through the frame.

Alspec
Commercial Framing Systems

Established in 1974, Alspec is the market leader in the design and distribution of innovative aluminium systems to the architectural, industrial and home improvement markets. Alspec has invested heavily in research and development to ensure a continual supply of ground-breaking systems, improved products and new technology. With direct access to a NATA-accredited testing facility in Brisbane, the company's extensive product range is extensively tested, providing customers with high quality, compliant solutions for a wide range of applications.

Alspec offers a selection of commercial framing systems to suit any project – from standard shopfronts to the most challenging structural and energy requirements.
The company's product range includes:

- **ecoFRAMEplus Centre Pocket Double Glazed Framing.** When energy efficiency is paramount, the versatility of ecoFRAMEplus allows countless specifications to be achieved.
- **Hunter Evo Single Flush, Double Flush and Acoustic Glazed Framing.** The most versatile and flexible of the Alspec Commercial Framing Systems, it is ideal for shopfronts and low-rise curtain wall applications.
- **Hunter Evo Curtain Wall.** A versatile and flexible commercial curtain wall system, it can be either captive glazed or structurally glazed and has self-draining sub sills to solve water leakage problems.
- **ecoWALL 225 Flush Glazed Framing.** The ecoWALL 225 is arguably Alspec's greatest engineering achievement, eliminating the requirement of unsightly and often very expensive steel frames to support the system.
- **ThermAFrame® Flush Glazed or Centre Glazed.** Using European polyamide thermal break technology, ThermAFrame offers the best thermal efficiency in an easy-to-fabricate and install system that is suitable for a range of applications.



"Sourcing a facade system locally can have huge benefits, including transparency around compliance, faster delivery and enhanced flexibility."

REFERENCES

1 Frederick, Philip, Brian Rose and Brad Carpenter. “Window Walls: Blurring the line between glazing products.” Construction Specifier. https://www.constructionspecifier.com/window-walls-blurring-line-glazing-products (accessed 4 September 2021).

2 Ibid.

3 Connection Magazines. “Thermal Bridges.” BUILD. https://build.com.au/thermal-bridges (accessed 4 September 2021).

All information provided correct as of September 2021

alspec
ALUMINIUM SYSTEMS SPECIALISTS