Curtain Wall Inspection: Common Defects and Inspection Methods

Curtain wall inspection singapore — practical guidance for building owners and managers

Facade Inspection Singapore — BCA-Approved Competent Person

Curtain Wall Inspection: Common Defects and Inspection Methods

Curtain wall inspection in Singapore — stick, semi-unitised and unitised systems, common defects in mullions, transoms, gaskets and sealants, and what BCA expects.

Curtain walls are the defining facade type of modern Singapore — the glass-and-aluminium skins on every Grade A office tower, hotel and prestige residential block. They look uncompromising, but every one of them is fundamentally a kit of mullions, transoms, gaskets, sealants and brackets, and every one of those components has a finite service life. A serious curtain wall inspection in Singapore is the difference between catching a tired EPDM gasket on a Tuesday and watching a panel pop out on a Sunday.

This post covers what curtain walls are made of, how the three main systems differ, the failure modes a BCA Competent Person should be probing for, and the regulatory perimeter the inspection sits inside.

Stick, semi-unitised and unitised — what's actually on the wall

A curtain wall is a non-load-bearing facade hung off the structural floor slabs. The system carries its own dead load plus wind, transfers it through brackets to the structure, and must accommodate building movement without cracking the glass or shearing the seals.

There are three system architectures:

- Stick curtain wall — mullions and transoms are installed piece-by-piece on site; glass and spandrel panels are then glazed in. Most flexible to detail; most labour and weather-dependent on site.
- Semi-unitised curtain wall — mullions are installed on site, but glazed panels are pre-assembled in the factory.

- Unitised curtain wall — entire storey-height panels (with mullions, transoms, glass and spandrels) are factory-assembled and hoisted into place. Standard on tall towers because of the weather and quality control.

The components an inspector must individually verify across all three are: aluminium mullions and transoms, glass (vision and spandrel), gaskets and sealants, fire safing at slab edges, flashings and floor brackets.

Performance criteria — what the curtain wall must still deliver

A curtain wall is engineered to perform across six axes: aesthetic, structural integrity, water tightness, air seal, acoustic/thermal, and buildability. A periodic inspection isn't designing the system — it's confirming that, after years of UV, thermal cycling, building movement and the occasional construction impact, it still meets each axis.

Structural integrity

The wall must continue to withstand dead, wind and live loads, accommodate building movement (including structural settlement at brackets), and visually appear safe with limited deflection. Inspection focus areas include angle plate and channel connections at the floor brackets, evidence of deflection or rotation at the support points, and any visible distortion of mullions or transoms.

Water and air tightness

Water ingress and air infiltration are the failures owners notice first because they show up inside the building. Pressure equalisation (PEq) is the design strategy used to keep wind-driven rain out of the cavity — the inspector should know whether the wall is a face-sealed or pressure-equalised design and look for symptoms appropriate to each.

Acoustic and thermal

Heat gain and loss, glare, condensation and acoustic leakage are inspectable. Verifications start with the original drawings and prototype test reports and move to on-site checks for missing capping, displaced gaskets and condensation staining.

Common curtain wall defects

The defect set repeats across buildings and is the substance of most close-range curtain wall inspection findings.

Frame and panel defects

- Misaligned or loose transoms — usually traceable to bracket fatigue or thermal cycling
- Missing capping — exposes screw fixings and gaskets to UV and water
- Cracked or loose window panels
- Dangling windows or broken hinges at openable units

Gasket and sealant defects

- Loose or compressed EPDM/silicone gaskets at the panel edge — gaskets lose elastic recovery with age

- Cohesive failure in structural sealant (crack or breakage within the sealant body)
- Adhesion failure at the substrate
- Three-sided adhesion caused by missing backer rod
- Improper width-to-depth ratio — recommended T/D ratio of 2, with minimum depth around 6 mm

For structural glazing, sealant failure is the failure of the system. The inspector should record sealant condition systematically across each elevation.

Setting block, spandrel and stack joint defects

- Setting blocks displaced or compressed at the bottom of the vision panel
- Spandrel panel insulation showing thermal scarring or moisture damage
- Stack joints (the horizontal expansion joint at every typical floor) showing cohesive sealant failure or accumulation of debris

Brackets and embedded items

- Corrosion at floor brackets, particularly where dissimilar metals are in contact
- Loosened mechanical fixings between bracket and slab edge
- Movement evidence at the angle plate

Inspection methods for curtain walls

A curtain-wall inspection blends remote and direct techniques:

- Remote visual — high-resolution camera, drone (especially for super-tall towers and irregular geometries), thermography of the facade to map cold spots and air-leak paths
- Direct visual / close-range — from the BMU (building maintenance unit), gondola, MEWP or rope access; inspect every typical detail (mullion, transom, stack joint, spandrel, capping)
- Tactile — gentle hand pressure to confirm panel restraint, gasket compression checks, sealant probing
- Internal inspection — common areas, plant rooms and units to look for water staining at sill level and condensation at frame transitions

For Singapore's climate, infrared thermography is especially useful for detecting the thermal anomalies that indicate insulation displacement behind spandrel panels and air leaks at gaskets.

Singapore regulatory context

Curtain walls are explicitly within the scope of "facade" under the Building Control (Periodic Inspection of Buildings and Building Facades) Regulations 2021, and the BCA periodic facade inspection covers cladding, curtain wall, exterior brackets and add-on features. The SCDF Fire Code 2023 governs spandrel-zone fire stopping at slab edges; under wall-integrated PV and unitised systems, the opening at the junction between the structural floor and the curtain-wall back-pan must be sealed with fire-stopping of the same fire resistance rating as the elements of structure, to prevent floor-to-floor smoke and flame spread. The Workplace Safety and Health Act governs the access method itself — gondola, MEWP or rope access — under MOM rules.

Common red flags during a curtain wall inspection

- Hardened or chalking external sealant at any storey-typical detail
- Gaskets sitting proud or visibly displaced from their groove
- Missing or cracked capping on stick systems
- Misaligned transoms (a 1–2 mm offset is enough to indicate bracket movement)
- Water staining inside at sill level on multiple units of the same orientation
- Condensation patterns on spandrel panels suggesting insulation has slumped
- Visible corrosion at any exposed bracket, especially at the lower three floors where chloride and ground-level pollutants concentrate

What to do next

If your tower has a curtain wall older than 15 years and has not had a comprehensive inspection, the right starting point is a desktop review of the original shop drawings and the BMU access design, followed by a remote visual sweep to flag the worst elevations. From there, a Competent Person can size the close-range coverage to where the risk actually is — typically the southern and western elevations that take the worst UV and thermal cycling.

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- Service overview: facadeinspection.com.sg
- Periodic facade & structural inspection: Periodic Structural Inspection
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Sources & references

• Source training material: 3.1-Curtain-wall-2021-0331-Kelvin — Certificate in Façade Inspection (IES Academy, 8th Run, Sept 2021).

• Building and Construction Authority (BCA) — Periodic Facade Inspection (PFI), Building Control Act and Building Control (Periodic Inspection of Buildings and Building Facades) Regulations 2021. www1.bca.gov.sg

• Ministry of Manpower (MOM) — Workplace Safety and Health Act 2006 and subsidiary regulations including WSH (Risk Management), WSH (Work at Heights), and WSH (Scaffolds) Regulations. www.mom.gov.sg

• Singapore Civil Defence Force (SCDF) — Code of Practice for Fire Precautions in Buildings 2023 Edition (effective 1 March 2024). www.scdf.gov.sg