

H13 STRUCTURAL GLASS ASSEMBLIES

To be read with Preliminaries/ General conditions.

TYPE(S) OF STRUCTURAL GLASS ASSEMBLY

115 STRUCTURAL GLASS ASSEMBLY – SWAN STREET 'PICTUREHOUSE' SHOPFRONT

- Drawing reference(s): A 2200 Window Schedule; A220_ Window details
- Supporting structure: Varies – refer to drawings
- Structural glass system:
Manufacturer and reference: Pilkington Architectural, Alexandra Works, Borough Road, St. Helens, England WA10 3WA
Tel:01744 692264 Fax: 01744 692988.
Product: Optiview Low Reflective Glass (or equal and approved Laminated annealed glass 10mm thickness)
Type: Single glazed shopfront
Manifestation: 3M M Scotchcal Series 7725 Dusted Crystal product
- Assembly fixings: Steel u-channel (min. 50mm depth) to carry thickness of glass pane, fixed back to structure using steel L angles. Concealed by external finishes
- Glass:
Optiview shopfront glazing
- Glass to glass jointing: Silicone sealant as clause 740 (for non-structural sealing)
Silicone sealant as clause 750 (for structural sealing)
Nominal joint width: 12 mm.

116 SWAN STREET 'PICTUREHOUSE' SHOPFRONT – CURVED GLASS

- Drawing reference(s): A 2200 Window Schedule; A220_ Window details
- Supporting structure: Varies – refer to drawings
- Structural glass system:
Manufacturer and reference: Runcorn Glass and Bending Bridgewater Foundry, Delph Bridge, Victoria Road, Runcorn, Cheshire, WA7 5RU. Tel. 01928 572253
Product: Laminated shopfront glazing – bespoke curved
Type: Single glazed shopfront
- Assembly fixings: Steel u-channel (min. 50mm depth) to carry thickness of glass pane, fixed back to structure using steel L angles. Concealed by external finishes
- Glass: To manufacturer recommendation
- Glass to glass jointing: Silicone sealant as clause 740 (for non-structural sealing)
Silicone sealant as clause 750 (for structural sealing)
Nominal joint width: 12 mm.

GENERAL REQUIREMENTS

- **211 DESIGN:**
 - Complete the detailed design of the structural glass assembly in accordance with the general arrangement drawings and this specification.
 - Coordinate detailed design with that for all related works.
- **221 INFORMATION TO BE PROVIDED WITH TENDER:** Submit to the CA the following structural glass assembly particulars:
 - Typical plan, section, and elevation drawings at suitable scales.
 - Outline reports and calculations demonstrating compliance with this specification.
 - Proposals for connections to and support from the building structure and building components.
 - Proposals for any secondary supporting structure additional to that shown on general arrangement drawings.
 - Areas of non-compliance with this specification.
- **231 INFORMATION TO BE PROVIDED BEFORE COMMENCEMENT OF STRUCTURAL GLAZING:** Submit to the CA the following structural glass assembly particulars:
 - Detailed drawings to fully describe fabrication and installation.
 - Detailed reports and calculations to prove compliance with all design/performance requirements. Reports and calculations must be based on approved laboratory testing or computer modelling.
 - Project specific fabrication, handling and installation method statements.
 - A detailed fabrication and installation programme in compliance with the Main Contract master programme.
 - Full details of any structural sealant glazing design.
 - Recommendations for safe dismantling and recycling or disposal of all products.
- **241 PRODUCT SAMPLES:** Before commencing detailed design provide the CA with identified samples of:
 - []
 - Obtain approval of appearance before proceeding.
- **251 SAMPLES OF FIXINGS:** When submitting detailed design, provide the CA with identified samples of each type of assembly fixing, with details of methods of adjustment and tolerances.
- **261 MOCK-UP:** At an agreed stage during detailed design work construct in an approved location a mock-up of:
 - []
 - Purposes of mock-up:
 - []
 - Arrange for inspection to be carried out jointly with the CA. Obtain approval of appearance before proceeding. Retain mock-up in undisturbed condition until completion of structural glazing.

DESIGN/PERFORMANCE REQUIREMENTS

- **311 GENERALLY:** Requirements specified in this section apply to the entire structural glass assembly, including flashings and junctions with adjacent parts of the building. Full allowance must be made for deflections and other movements.

- **322 INTEGRITY:** Determine size(s) and thickness(es) of glass panes, types and locations of assembly fixings and supports and other structural requirements in accordance with BS 6262 to ensure that the structural glass assembly will resist all dead loads and design live loads, and accommodate all deflections and thermal movements without damage.
- Calculate wind loads in accordance with BS 6399:Part 2, Standard Method (making due allowance for any internal pressure):
 - Basic wind speed (Vb): [] m/s.
 - Altitude factor (Sa): []
 - Directional factor (Sd): Determine from BS 6399: Part 2, Table 3.
 - Seasonal factor (Ss): 1.
 - Probability factor (Sp): 1.
 - Terrain and building factor (Sb): Determine from BS 6399: Part 2, Table 4.
 - Size effect factor: Determine from BS 6399: Part 2, Figure 4.
 - Snow load: Determine from BS 6399: Part 3.
 - Permanent imposed loads: []
 - Temporary imposed loads: []
- **325 INTEGRITY:** Determine size(s) and thickness(es) of glass panes, types and locations of assembly fixings and supports and other structural requirements to ensure that the structural glass assembly will resist all dead loads and design live loads, and accommodate all deflections and thermal movements without damage.
- Temporary imposed loads: []
- **331 GENERAL MOVEMENT:** The structural glass assembly must accommodate anticipated building movement as follows: +/- 5mm
- **341 WEATHER RESISTANCE:** There must be no leakage of air through sealed glass to glass joints and no leakage of water through any part of the structural glass assembly under site exposure conditions.
- **351 AIR PERMEABILITY:** There must be no leakage of air through sealed glass to glass joints and not more than 2.0 cu m/hr/lin. m leakage of air through opening lights and perimeter junctions when the structural glass assembly is tested in accordance with Centre for Window and Cladding Technology 'Test methods for curtain walling', section 4, to a peak positive pressure of 600 Pascals.
- **355 WATER PENETRATION:** There must be no leakage of water through any part of the structural glass assembly when it is tested in accordance with Centre for Window and Cladding Technology 'Test methods for curtain walling', section 5, to a peak positive pressure of 600 Pascals.
- **361 HEAT CONSERVATION:** The average thermal transmittance (U-value) of the structural glass assembly must be not more than 1.3 W/sq mK.
- **371 CONDENSATION** must not form on the internal surfaces of glass panes or units in the following conditions:
 - External air temperature: -5 degC
 - Internal air temperature: +20 degC
 - Internal relative humidity up to: [] %.

- **381 SOLAR CONTROL:** Glass panes or units must have:
 - A shading coefficient of not more than 0.43
 - Total light transmission of not less than 68 %.
- **391 THERMAL SAFETY:** Glass panes or units must resist thermal stress generated by orientation, shading, solar control and construction.
- **401 SOUND REDUCTION** of the structural glass assembly must be not less than [____] dB for noise at a frequency of [____] Hz.
- **411 ACCURACY OF ERECTION:** Allowing for manufacturing and installation tolerances, the maximum permitted deviation in glass joint width is +/- [____] mm.
- **421 SECURITY:** All threaded assembly fixings and assembly support fixings must be locked or pinned at the completion of structural glazing to prevent rotation due to building movement or unauthorised adjustment.

TESTING

- **510 PROJECT TESTING (LABORATORY):**
 - At an agreed stage in the detailed design work arrange for testing of a specimen of the structural glass assembly at an approved laboratory for:
 - [____]
 - Structural glass assembly fabrication and installation must not commence until test results and reports showing compliance with this specification have been submitted to the CA.
- **520 PROJECT TESTING (SITE):**
 - At an agreed stage during the preliminary installation on site arrange for testing of a section of the structural glass assembly by an approved authority for:
 - [____]
 - Protect building structure, components and finishes from any damage consequent upon testing.
 - Installation of general areas of the structural glass assembly must not continue until site test results and reports showing compliance with this specification have been submitted to the CA.
- **530 TEST SPECIMEN:**
 - Drawing reference(s): [____]
 - Overall dimensions: [____] m high x [____] m wide.
 - Features: [____]

PRODUCTS

- **610 GLASS GENERALLY:**
 - To BS 952 and the relevant parts of BS EN 572, free from scratches, bubbles, cracks, rippling, dimples and other defects.
 - Edges must be free from vents, shelling, and severe feathering. They must be flat ground with a small arris, suitable for sealant jointing.
 - Dimensional tolerances measured before any heat toughening/heat strengthening are:
 - Pane size: +/- 1 mm of dimension required.

- Pane squareness: Not more than 3 mm difference in diagonal measurement when the diagonal is less than 4 m.
- Not more than 4 mm difference in diagonal measurement when the diagonal is more than 4 m.
- Pane thickness: ± 0.2 mm for 6 mm glass.
- ± 0.3 mm for 10/12 mm glass.
- ± 0.5 mm for 15 mm glass.
- ± 1.0 mm for 19 mm glass.
- Hole positional tolerance: ± 1.0 mm from single datum point.
- Hole diameter tolerance: ± 1.0 mm
- Dimensional tolerances measured after any heat toughening/heat strengthening are:
 - Maximum bow: 0.2% of pane dimension.
 - Mean roller wave: 0.05 mm peak to trough variation.
 - 0.25 mm edge dip.
- **620 HEAT TOUGHENED GLASS:**
 - To BS 6206, Class A.
 - All edgework and holes must be completed before toughening.
 - The toughening process must be horizontal to eliminate tong marks and minimise dimensional inaccuracies.
 - All toughened glass must be subjected to a heat soaking test to DIN 18516 (1990) Section 2.5.1, designed to remove 90% of nickel sulfide inclusions which may otherwise cause spontaneous breakage in situ.
- **630 LAMINATED GLASS:**
 - Glass leaves must be heat toughened as clause 620, heat strengthened or annealed, combined to retain integrity of the laminated pane in case of breakage.
 - Interlayers to glass leaves must be polyvinyl butyral (pvb) or cast in place resin. They must be sealed at the perimeter to prevent deterioration due to water or glass joint sealant.
- **640 INSULATING DOUBLE GLAZED UNITS:**
 - To BS 5713.
 - Colour of aluminium perimeter spacers: [_____]
 - Unit perimeter seals must be compatible with glass joint sealant.
 - Assembly fixings must be hermetically sealed through units.
 - Fabricate units to transfer loads safely from both glass panes to assembly fixings.
 - Any perimeter taping must be transparent to permit inspection of unit edge condition.
- **650 STAINLESS STEEL ASSEMBLY FIXINGS:**
 - Castings and machined fittings: To BS EN 10088-1, grade 1.4401 (BS 1449:Part 2, grade 316)
 - Plate and strip: To BS EN 10088-2, grade 1.4401 (BS 1449: Part 2, grade 316).
 - Bars, rods and sections: To BS EN 10088-3, grade 1.4401 (BS 1449: Part 2, grade 316).
 - Fasteners: Austenitic stainless steel to BS 6105, grade A4.
- **660 ALUMINIUM ALLOY ASSEMBLY FIXINGS/SUPPORTS:**
 - Extrusions: To BS 1474, grade 6063.
 - Plate and strip: To BS EN 485, BS EN 515 and BS EN 573.

- **670 BRASS ASSEMBLY FIXINGS:** Castings, extrusions, stampings, plate, and strip to be brass of nominally 60% copper: 40% zinc content.
- **FABRICATION AND INSTALLATION**
- **710 WORKMANSHIP GENERALLY:**
 - Fabricate and install structural glass assemblies in accordance with specified requirements.
 - Fabricators and installers must employ competent structural glass assembly operatives. Provide records of their experience to the CA on request.
 - Machine cut and drill all glass, assembly fixings and assembly supports in the workshop.
 - Site drill or cut into structure only in approved locations.
- **720 SUITABILITY OF STRUCTURE:** Not less than [____] weeks before commencement of structural glazing, survey the supporting building structure and any assembly supports erected by others, checking line, level and fixing points. Report immediately to the CA if the structure is unsuitable for structural glazing.
- **730 STRUCTURAL GLAZING:**
 - Set out glazing straight, parallel, and truly aligned in level and plane. Orientate glass panes or units to ensure uniformity of appearance.
 - Protect all installation tools to reduce risk of damage to glass.
 - Isolate metal surfaces of assembly fixings from direct contact with glass.
 - Tighten all assembly fixings/assembly support fixings to manufacturer's recommended torque figures.
 - Isolate dissimilar metal surfaces of assembly fixings/assembly supports to prevent electrolytic corrosion.
- **740 SEALED GLASS TO GLASS JOINTS:**
 - Sealant: Silicone to BS 5889, type A or B, neutral curing where in contact or close proximity to other products and finishes which may be adversely affected by acetoxy curing.
 - Manufacturer and reference: Dow Corning 797 or other equal and approved.
 - Colour: White / Limestone / Grey / Brown / Bronze / Stone / Black
 - Application: As section Z22, unless specified otherwise in this section.
- **750 STRUCTURALLY SEALED GLASS TO GLASS JOINTS [_____]**
 - Structural sealant: Silicone, one or two part, neutral curing.
 - Manufacturer and reference: Dow Corning 797 or other equal and approved.
 - Colour: White / Limestone / Grey / Brown / Bronze / Stone / Black
 - Compatible with all contact and close proximity products and finishes.
 - Application: As section Z22, unless specified otherwise in this section.
- **760 DOORS:**
 - Set out and install with head, jamb and bottom clearances required by the fittings/ironmongery manufacturer.
 - Carefully assemble and fix fittings/ironmongery using matching fastenings supplied by the manufacturer.
 - At Practical Completion check, adjust and lubricate as necessary to ensure correct functioning.

- **770 PROTECTION AND FINAL CLEANING:**
- Remove any cement and plaster based spillage whilst wet.
- Prevent staining, scratching and other disfigurement during installation and by following trades.
- At Practical Completion or when otherwise agreed with the CA, remove any protective coverings and thoroughly clean glass and fixings/supports with mild detergent solutions approved by the system manufacturer.