Custom-designed aluminium portal frames to support wide span glazed roof structures for commercial or residential premises

Wide span roof glazing
Imagine the art of the possible...

Combine a SkySpace portal frame with Synseal’s market-leading glazed roof system to create the ultimate wide span solution.

Creative designs for wide span portal frames are almost limitless, for both residential and commercial applications. From sizeable conservatories with traditional styling to more contemporary roof glazing solutions for buildings, such as offices, sports halls, restaurant facilities, hotels and conference centres, SkySpace portal frames are custom-made to meet project requirements and deliver versatile architectural spaces.
SkySpace portal frames… defining the art of the possible

Flexible, lightweight, convenient to transport and speedy to construct, SkySpace aluminium portal frames offer reduced cost and labour time on site, when compared to conventional building methods.

SkySpace aluminium portal frames are an ideal specification for swimming pool enclosures, with exposure to chlorine and constant high humidity levels.

Global roof – fully accredited and proven in use

In addition to bespoke portal framing, the SkySpace team offer Synseal’s market-leading Global roof which accounts for 1 in 4 of every conservatory installed in the UK today.

Accredited by the BBA and exhaustively tested by both the BBA and Wintech Engineering to ensure that it can stand up to the most extreme weather conditions, with snow loading capabilities >2.7mpm² and wind speed resistance >250 kph,

Global roof is available as a fully-manufactured external aluminium system or alternatively with a combination of aluminium rafter top-caps and PVC-U cappings and claddings.

Global roof is specially designed for quick and easy installation, a key feature is the precision-engineered security bolt which eradicates movement between the bolt and rafter, with no drilling of the roof rafter required as the fixing bolt locates and locks into a special purpose-designed channel. This design leaves rafter drainage channels unhindered to work effectively and eliminates leaks, whilst providing a rafter to eaves beam connection that is strong, reliable and secure.
Discreet portal framing is the key to designing bespoke wide span or super-sized glazed roof structures. Portal frame legs locate into purpose-designed base plates. The sleeved aluminium profiles are bolted together in ‘Meccano-fashion’ and include purlins and welded angled trusses, as required, to provide a support structure for the roof glazing above.

This approach suits projects sized from 30 to 2000 square metres and unsupported clear spans of up to 35 metres can be achieved.

Aluminium components are polyester powder coated to any RAL colour, according to specification.

Fully engineered drawings and structural calculations are all provided by the SkySpace team as part of a complete portal frame design and manufacturing solution.
Project design and manufacture

**CAD drawings are prepared for each SkySpace project, together with itemised quotations. Complex designs can actually baffle computer software, so test-fitting of roofing elements onto the portal frame sub-structure is carried out in the factory as an essential discipline.**

SkySpace portal frames are exported throughout the world, so factory pre-assembly to check manufacturing precision is carried out prior to despatch to minimise on-site issues.

Compared to welded steel alternatives, SkySpace aluminium portal frame profiles are more aesthetically pleasing and provide cleaner and more precise joints.

Polyester powder coating according to BS 6496 to a specified RAL or BS colour is the proven and recommended method of finishing SkySpace aluminium componentry and, as portal frames are internally installed and not directly exposed to weather conditions, this specified finish should provide maintenance freedom for many years.

Portal frame componentry is delivered to site and installed as a first-fix stage, often with protective wrappings still applied, prior to installation of window and roof glazing.
Whether the building project is for a residential, commercial or recreational application, the creative architectural design may require a visually striking roofing solution - something truly imaginative, which seeks to define the art of the possible.

SkySpace portal frames enable super-sized glazed roof structures to be constructed, where the designed internal building spaces quite literally seem to reach up to the sky. Roof glazing delivers flexible solutions that offer many different forms, from eye-catching domes featuring circular or square on-plan base formats, to triangulated 'pyramid-style' roofs.
Residential complex recreational facility

Hotel leisure centre

Wide span swimming pool enclosure

Supersized conservatory with lantern roof

Artist’s rooftop studio

Presidential palace reception buildings

Pre-school nursery

Wide span swimming pool enclosure
SkySpace extruded aluminium portal frame profiles are available in three standard heights: 150mm, 180mm and 250mm, all with a common width of 50mm.

Complete portal frame assemblies include 40mm thick splice plates which neatly sleeve into the outer profiles, prior to being mechanically fixed.
Portal leg and base plate assemblies are typically attached at foundation level. Four rawlbolts or chemical fixings are used to anchor each base plate.

The portal legs present a sleek appearance when fitted, neatly aligned with window-walling frames and brickwork. Eaves beam details are designed to complement standard Global roofing componentry.

Depending on the construction, mid-span and ridge purlins are suitably deployed to brace the overall structure.

For certain project situations, an engineered base sub-structure can be designed in lieu of concrete foundations to provide a free-standing solution.
Sealed IGU products, custom-made to specification

The need to control solar glare in summer and minimise heat loss in winter calls for the selection of high performance toughened and annealed roof glass.

A range of colour-tinted glasses can be specified, in combination with low emissivity, gas-filled and low maintenance coated options.

24mm double glazing is a typical roof glass specification, comprised of either 4:16:4 or 6:12:6 units, as the weight of these units is easily handled by the roof structure.

Global Glass can supply insulated double glazed units in a range of tinted colours and coatings to suit each project, including clear, patterned, solar coated, Low-E and low maintenance glass and Argon or Krypton gas-filled options.

Sealed unit options include aluminium spacer bar, warm-edge spacer bar and warm-edge super spacer bar (which is ideal for non-rectangular roof glass), with either polyurethane or butyl hot-melt secondary seals depending on specification.

Polycarbonate – the lightweight alternative

Polycarbonate is an opaque, lightweight yet inherently strong glazing material. Polycarbonate provides both economy and practicality - as a result around 45% of residential conservatory roofs are fitted with polycarbonate which is 25mm or more typically 35mm in thickness. However, end-user clients are increasingly demanding the specification of high-performance glass for quality and visual clarity.
Ventilation is a key element to providing a pleasant interior temperature and counteracting the effects of solar gain, especially during summer months.

**Automatic roof vents**

Thermostatically controlled vents can be specified complete with a rain sensor override function, to ensure that a series of up to five roof window units will all open and close automatically according to prevailing weather conditions.

**Insulated panels**

Composite aluminium tray and rebated foam insulated panels can be optionally installed in lieu of high performance glass for optimum thermal performance.

28mm thick foam insulated panels will typically deliver a U-value of 0.8W/m²K and similar panels with a rebated edge design can provide even lower U-values if required.
Botleys Mansion

This 18th century palladian-style building is a luxury wedding venue near Chertsey, Surrey. The project called for the renovation of a 3-sided courtyard to provide a banqueting atrium for 40 to 300 guests, designed around a 1st floor entrance with a sweeping staircase leading down to ground level.
Case study - Botleys Mansion

The all-important pre-assembly stage was carried out on the factory floor to check precision-fitting of the bespoke portal frame design, prior to despatch.

Careful consideration was given to provide adequate removal of water from both the glazed and adjoining roofs. A stylish entrance detail was included for easy access to the grounds. Ball finials and discreet crestings were also included to decorate the roofline and help the design of the portal frame blend in with the character of the stately home.

The whole scheme gives a classical building a very modern twist, and provides an effective reception area linked to adjacent catering service areas.

Custom-engineered joints were manufactured to fit perimeter details. A severe 45° angled pitch was also specified, to provide a grand and spacious dining interior.

High level opening vents were included to ensure effective ventilation without exposing guests to draughts.
At Synseal an experienced and skilled customer care team is always on hand to provide technical advice, answer any portal frame or roof glazing-related questions and assist with project enquiries.

Quality
SkySpace portal frames carry a 10 year guarantee, with manufacture and supply carried out under certificated BS EN ISO9001:2000 quality management systems.

Technical compliance – worldwide
In the USA, SkySpace portal frames are supported by a professional engineer (PE) registered in 50 states.

For all other countries, the UK-based SkySpace structural engineer will provide full design calculations for each specific project, to be verified by a local engineer.

The SkySpace team has successfully completed projects in the USA, Germany, Italy, Spain, Denmark, Slovakia, Africa and Australia.

Technical compliance - UK specification
Building Regulations Part A1 concerning loading of buildings is a key reference document when designing roof glazed structures. All weather parameters for specific site postcode, including an assessment of the local terrain and topography, prevailing wind speeds and pressures, are taken into account to determine how the roof will be constructed.

SkySpace portal frame and Global roof assemblies are designed to meet the requirements of:

- BS 8118-1:1991
  (Code Of Practice For Structural Use Of Aluminium)
- BS 6399-2:1997
  (Code Of Practice For Wind Loads)
- BS 6399-3:1998
  (Code Of Practice For Imposed Wind Loads)

Building Regulations Part K4 should be consulted if glazed building elements are sited adjacent to busy pedestrian areas. In such situations, windows projecting internally or externally beyond 100mm should be sited 2 metres above floor or ground level, or barriers fitted to protect the public from collision.

Building Regulations Part L refer to different building types and itemise thermal U-value performance. Standards for refurbishment of existing buildings are more exacting and provide options for using WER ‘whole unit’ calculations in place of the established U-values. BRE 443 is a U-value reference document for non-vertical glazed surfaces.

Note: A-rated WER solutions for the whole window, frames and glass, can deliver insulation U-values as low as 0.8 W/m²K. A-rated DSER (Door Set Energy Rating) solutions are now also available, enabling specification of thermally-efficient glazed wall envelopes encompassing both windows and doors.

Building Regulations Part M highlights the need for doors to be fitted with low thresholds to ensure easy access for all, including wheelchair users.

Building Regulations Part N specifies rules for visual manifestation of glazed elements, such as entrance doors, and deals with provision of access for cleaning.

RIBA-approved CPD presentation
A 1-hour CPD presentation approved by RIBA entitled ‘Roof glazing - the art of the possible’ can be delivered at specifier premises, on request.
SkySpace portal frames

Synseal’s main site and manufacturing centre
Banqueting atrium
Part of Synseal’s fleet of 39 delivery vehicles
Caravan park swimming pool enclosure
Glazed colonnade walkway
Synseal is a leading UK manufacturer of conservatory roof, window and door systems

SkySpace is a specialist portal frame division of Synseal Extrusions Ltd. Established over 30 years ago, Synseal now employs over 500 people and has a turnover in excess of £75 million. Main operations are located at a UK-based 35 acre site with 70,000 square metres of production, warehousing and office facilities.

The corporate objective at Synseal is to deliver thermally efficient products of consistently excellent quality and design to markets worldwide, at competitive prices.

Synseal constantly seeks to develop environmentally friendly new products which will support sustainable development and reduce carbon consumption.

New ranges are designed with 100% recyclability, improved performance and cost-effectiveness in mind.

Synseal is ISO14001 accredited which ensures that all company environmental management systems comply with and even exceed government mandates.

All quality management systems are ISO9001 accredited which ensures that all processes are constantly checked and improved upon, to reduce waste and increase efficiency.

Synseal products are independently tested and accredited by the British Standards Institute (BSI) and the British Board of Agrément (BBA).