tufflam™

toughened laminated safety glass

ESG

esg tufflam™

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toughened laminated safety glass – esg tufflam

Although toughened glass is four to five times stronger than annealed glass of the same thickness, and is ideally suited to most safety critical purposes, for some applications, toughened laminated glass is safer and more practical.
ESG Tufflam comprises sheets of toughened safety glass bonded together with a clear PVB (PolyVinyl Butyral) interlayer, which enhances safety and security. Unlike toughened glass, which can shatter into small particles and fall from its fixing, toughened laminated glass will almost entirely stay in place, even if damaged.
It is also thermally safe and will resist high temperatures without breakage. ESG Tufflam usually consists of two glass panes and one interlayer, but can use multiple panes and interlayers as required.

ESG Tufflam can be manufactured using a wide selection of thicknesses of glass, so it can be used to satisfy all the safety glazing requirements of both Approved Document N of the Building Regulations, and BS 6262 part 4.
Subject to calculation it can be used in compliance with Approved Document K of the Building Regulations and BS 6180 to form full height barriers, infill panel barriers and structural balustrades.

design applications

Special interlayers include sound control, privacy and decorative effects. Patterned and tinted glasses can be laminated and decorative materials, like metal or fabric can be bonded between the panes for a unique product.
We use multiple panes and interlayers to create more structural elements such as floor panels and stair treads. The number of panes and interlayers will depend on the project. Structural fixings, such as bolts, can be encapsulated between the glass panes, and either hidden beneath an opaque decorative finish, or left prominently exposed, to accentuate the design scheme. Glass stair treads, for example, will appear to float.

roof glazing

ESG Tufflam toughened laminated glass is ideal for roof glazing, particularly where there is a need for maintenance access. All roof glazing must be subject to professional calculation on the basis of accurate snow and wind loads.
Full four edge support is strongly recommended. Testing usually involves the application of a concentrated load to the top surface of the glass. Loading is increased until a pre-determined factor of safety is reached or failure occurs.

It is normal for the load to be set by the specifier and loads of 0.9 or 1.5kN have both been used on major projects. A load of 1kN is broadly that of a 15-stone man. Some specifications include drop-bag tests similar to that of BS 6206.

canopies

All canopy glazing must be subject to professional calculation on the basis of accurate snow and wind loads. Laminated toughened glass. Special hard nylon fixings should be employed to prevent compression of the laminating interlayer and excessive localised stress around the fixings.

toughened / heat-strengthened laminated glass

The toughened glass is designed to withstand the imposed loads and has, laminated to it, a 6 mm thick heat strengthened “carrier glass”, intended to maintain integrity in the event of breakage. Such systems require specially designed fixings that fully clamp only on the toughened glass. Centre fixings. All types of glass panes that have centre fixings must be subject to finite element analysis based on the provision of accurate wind and snow loads. This is due to the high local stress induced by the effects of hogging and sagging. Glass subject to such effects is specially toughened to 120 N/mm2 whereas the normal design stress limit is 59 N/mm2.

balustrades (where regulations permit)

ESG Tufflam can be used in two and four edge supported infill panel barriers. It provides the highest level of safety for structural balustrades (free standing barriers) where the glass is clamped only by its bottom edge. Specifications for different sizes and design loads are given below – Infill panel barriers, glass supported by two vertical edges, panel height 1000 mm.

toughened laminated specification overview & benefits

available for a wide range of applications

benefits

The principal benefits of toughened laminated glass are its strength and performance under impact, withstanding very large loads, and, providing it is properly glazed, with fragments being retained by the interlayer if the pane is damaged. ESG Tufflam is ideal for use as balustrades and barriers, canopies, floors, fins and for bomb blast resistance. Standard interlayers reduce sound transmission, particularly at higher frequencies. Specialist interlayers can provide enhanced sound control, added security and even switchable privacy.

balustrades

Infill panel barriers, glass supported by two vertical edges, panel height 1000 mm.

Thickness	Loads	Max Span
9.5mm	1.0 kN/m2 and 0.5 kN	700mm
11.5mm	1.0 kN/m2 and 0.5 kN	1400mm
13.5mm	1.0 kN/m2 and 0.5 kN	1900mm
13.5mm	1.5 kN/m2 and 1.5 kN	400mm

free standing barriers

Fully clamped as per BS 6180 with handrail continuously attached to the top edge of the glass, maximum height 1100 mm above FF.

Thickness PVB Interlayer	Thickness SGP Interlayer	ESG Tufflam Thickness DG41 Interlayer	Load
17.5 mm	13.5 mm	13.5mm	0.36 kN/m
21.5 mm	17.5/16.89 mm	21.5mm	0.74 kN/m
25.5 mm	21.5/20.89 mm	13.5mm	1.5 kN/m
31.5 mm	25.5/24.89 mm	13.5mm	3.0 kN/m

full height barriers

Top and bottom edges supported, minimum panel width 1000 mm.

Thickness	Loads	Max Span
11.5 mm	0.36 kN/m	2400 mm
11.5 mm	0.74 kN/m	1700 mm
13.5 mm	0.36 kN/m	3200 mm
13.5 mm	0.74 kN/m	2100 mm
17.5 mm	0.36 kN/m	4000 mm
17.5 mm	0.74 kN/m	3400 mm
17.5 mm	1.5 kN/m	1800 mm
17.5 mm	3.0 kN/m	1700 mm
21.5 mm	0.74 kN/m	4000 mm
21.5 mm	1.5 kN/m	2500 mm
21.5 mm	3.0 kN/m	2100 mm

products, applications and capabilities

products

4 mm to 19 mm float and toughened glass in clear, various tints and satin etched. A wide range of patterned and coloured glass is also available.

applications

- Balustrades
- Fins & beams
- Doors
- Splashbacks
- Canopies
- Lift Shafts & Flooring
- Screens
- Furniture
- Stair treads
- Partitioning
- Worktops
- Lighting

capabilities

Max toughening size: 4800 mm x 2800 mm

Max size ESG Tufflam: 2440 mm x 4800 mm

Common thicknesses of ESG TuffLam for partitions, balustrades and canopies are two x 6, 8, 10 or 12 mm panes incorporating either 0.76 mm or 1.5 mm PVB, SGP or DG41 interlayer subject to application.

free standing barriers

Fully clamped as per BS 6180, with handrail continuously attached to the top edge of the glass, maximum height 1100 mm above FF. The method of supporting the base of the glass has been designed to be in line with the recommendations contained within BS6180. If only single toughened glass is applied, using a free-standing barrier without a handrail, or one that is only decorative, not only fails to comply with the British Standard, but is also fraught with danger. Whilst compliance with a British Standard may not be mandatory, it is understood that ignoring it may have serious consequences in law. Building Regulations are mandatory (a legal requirement) and demand containment. It is becoming common to see this type of barrier installed without a handrail, but using laminated glass to provide security. It is advisable for each element of a toughened laminated design to be capable of withstanding the design loads, with deflection being controlled by the full thickness. Such applications should be subject to professional calculation with appropriate technical data for Building Control approval.

full height barriers

Top and bottom edges supported, minimum panel width 1000 mm.

esg decolam

The Decolam range of laminated glass enables clients the freedom to create bespoke designs which incorporate a vast array of colours, patterns and materials. Using glass as a substrate, we employ techniques to introduce paints or laquers. We can encapsulate a selection of materials such as films, fabrics, some plastics and acrylics, and even wood or metal. Interlayers reduce colour fading and the inks used are UV stable. The glass protects the surface from wear and tear to make a beautiful product with great longevity. The potential applications are almost endless, including: screens, doors, furniture, splashbacks, worktops, signage, wall cladding, lighting, corporate art, exhibition and retail displays, partitioning and flooring. ESG Decolam is available in a broad range of thicknesses, in float or toughened glass, (subject to application and relevant regulations). It can be used internally or externally, depending on final composition. We recommend using 'ESG Crystal' Low iron glass for decorative projects, as this has less green hue than standard float glass, allowing the designer's colour scheme to shine through. Low iron glass is available in 4mm to 19mm thicknesses, and all can be laminated.

digital printing

Digital printing involves the encapsulation of high-resolution graphic images printed onto the glass or interlayer. This technique is used to create unique pieces of corporate art, as well as stunning partitions and screens.

magnetic backing

Glass can now provide a magnetic surface, attractive in every sense. By applying a magnetic sheet to the reverse or encapsulating it between two panes, we can turn a glass panel or entire glass wall into the ultimate magnetic white board, map or notice board.

back painted

This method is suited to creating arresting blocks of solid colour, in geometric or free-flowing designs, or for entire panels. This is good for adding strategic pops of colour, we then laminate it to encapsulate it into a durable and beautiful work of art. Numerous colours can be used to back paint glass. We recommend using the RAL colour selector, a pantone colour, or the ranges provided by Dulux or Farrow and Ball. When viewed through glass, the colour can appear slightly different, so we advise having a sample piece to ensure that you are happy with the colour match. We also recommend that low iron glass is used for back painted glass, as standard glass has a natural green hue which can affect the look of the colour. Low iron glass is colourless, so does not affect the back-painted colour. For splashbacks and upstands in kitchens and bathrooms, back painted glass provides a hygienic and easy to clean surface. For white boards it gives a modern finish to any office or meeting room. Other applications include wall cladding, worktops, lifts, lobbies and receptions.

vanceva

The secret, and the colour, is in the interlayer. Allowing light to flood through, the range of translucent Vanceva coloured interlayers allow you to add see-through colour without sacrificing natural light. By placing a number of differing coloured interlayers in neighbouring individual glass panes, you can enjoy a kaleidoscope of changing colours as the sun rises and sets. If you have seven glass panes available, you can create a complete rainbow. We recommend that you visit the Vanceva™ website (www.vanceva.com) to view their selector. This explains the vast array of colours that can be created. We strongly advise that prior to placing a final order with us, you obtain a completed glass sample of your colour choice. This is because the finished colour may vary due to the natural green hue of clear glass. It is recommended that low iron glass is used when incorporating Vanceva™ colour into your design, in order to reduce the variance in the colour chosen. We wish you to be happy with the finished result, so please feel free to ask us for advice before ordering.

screen printing

We screen print your chosen design, being simple or intricate lettering, logos or patterns onto single or within tufflam glass. More durable than back painting and offering a translucent finish providing a balance between transparency and privacy.

sandblasting

By blasting grit directly at the surface of a clear piece of glass, we can provide a treated surface which allows light through the panel, but which obscures the view and provides privacy. This is ideal for screening applications. Our automotive sandblasting machine evenly applies a high-pressure grit spray across the glass panel, creating a translucent finish – basically roughening up the surface. Following this process, because it has been disturbed, the surface of the glass is more susceptible to contamination through handling and general contact. We therefore recommend that for any sandblasted panels, an additional process of clear-shielding the product is applied. This involves applying a fine spray to the glass, after it has been sandblasted, creating a protective coating on the glass, which guards against dirt and general contamination.



quality standards

All ESG Tufflam products are manufactured in accordance with relevant British Standards and are manufactured in a clean environment to a quality management system approved to BS EN ISO 9001 : 2015.

Toughened Glass: manufactured in accordance with the latest standard 'Glass in building – thermal toughened soda lime silicate safety glass BS EN 12150 : (Parts 1 & 2) : 2000, incorporating 'Glass in building – impact test BS EN 12600 : 2002' and 'Glass in building – four point bending test BS EN 1288-3 : 2000'.

Heat-soak testing: Conducted in accordance with 'Glass in building – Heat-soaked thermally toughened soda lime silicate safety glass – BS EN 14179 (pts 1&2) : 2005. Testing to the German DIN standard 18516 is available on request. A copy of the heating profile graph can be provided as supporting evidence that the Heat-soak test has been conducted correctly.

Heat-strengthened glass is sometimes confused with Heat-soak tested glass. This is annealed glass that is heat treated by raising its temperature to 700° C and then cooling it more slowly than toughened glass. It is not a safety glass and breaks in a similar way to ordinary annealed glass. The process adds strength (twice that of annealed glass) and thermal safety. Maximum thickness is 12 mm.

Laminating: conducted in accordance with 'Glass in building – Laminated glass and laminated safety glass – BS EN 12543 (Parts 1-6 : 1998 and BS EN 14449 : 2005).

Safety: ESG Tufflam satisfies all safety glazing requirements of BS 6262 : Part 4 : 'Safety related to human impact', Regulation 14 of the Health and Safety at Work Act as well as Approved Document N of the Building Regulations. It is particularly suited to areas where enhanced performance is required.

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