

Laminated glass benefits from toughening

Scott Sinden*, Managing Director of ESG, looks at the toughened laminated glass production procedure and how the process enhances the glass and its safety benefits, increasing its popularity and use in various public environments.

Laminated glass has now been in existence for a century, although its uses today are far removed from its accidental discovery in the laboratory of French scientist Eduoard Benedictus in 1903. By inadvertently coating a glass flask with plastic cellulose nitrate, Mr Benedictus demonstrated how a glass and plastic combination resulted in a product that might break but would not separate into dangerous shards on impact. Instead, the plastic film would hold the pieces together in what is now known as the classic spider web pattern. The practical uses for this rapidly became apparent.

First widely used in the eyepieces of gas masks during the First World War, laminates of two sheets of annealed glass with a plastic interlayer were soon in demand for their safety and security credentials in the home, motor industry and particularly, in construction.

However, as architects continue to push the boundaries of design in the built environment, laminated glass made from ordinary sheets of annealed glass simply cannot meet all the challenges of structural applications in cutting edge construction. Light and airy designs prevail, which means finding a glass that can be made into walls, floors and roofs. It must be clear, transparent and beautiful but it must also be load bearing – a characteristic which modern processes can now provide.

Get tough

The answer, in many cases, is toughened laminated glass. The laminated principle is the same here



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but the use of toughened, rather than annealed glass, gives this product huge advantages over its predecessor. Toughened glass is up to four or five times stronger than annealed glass and laminates made from it are exceptionally strong. This has freed the glass processor to provide glass panels which, when installed with the right supportive fixings, can help to preserve the integrity of a building – even when struck with huge force and even when actually damaged.

In buildings with curtain walling, atriums and glass roofs, vast panes of glass are needed to create an open, inviting appearance but they must be able to withstand great stresses. Typical

settings for this are retail outlets, showrooms and highly prestigious public and commercial buildings, all of which are also settings in which health, safety, and public liability are king.

The versatility of glass is now unquestionable; glass processor and architect together finding countless new applications for it. Toughened laminated glass can be used for stair treads, flooring, balustrades, table tops and partitions, in some cases, more than two layers being laminated for added strength. Glass is often installed floor to ceiling, or at eye level,

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so that people will be very close to glass products. Glass used in this way also has to be as free of flaws as possible; stunningly beautiful, as well as sturdy; resistant to changes in temperature; and practical. Fortunately, the exacting standards under which toughened laminated glass is produced result in a material with all these properties.

Requirements

Most toughened laminated glass is available in a wide range of interlayers and thicknesses and can be used to satisfy safety glazing requirements. Subject to calculation, it can be used to form full height barriers, infill panel barriers and freestanding barriers (structural balustrades) in compliance with building regulations.

Toughened laminated glass usually has two panels of glass and a tough, clear PolyVinyl Butyral (PVB) or Ethylene and Vinyl Acetate copolymer (EVA) interlayer. Bonded together under heat and pressure, and, once sealed, the layers effectively become a single unit with the appearance of regular glass.

Innovative new encapsulation techniques have ensured that toughened laminated glass is not just strong; it can be beautiful too. By inserting elements such as colour, printed films and a variety of materials such as wood or fabric between the layers, an almost infinite portfolio of design is now available. What the architects once chose solely for its safety and strength, they can now also use to add impact, colour and style.

The inherent characteristics of toughened laminated glass make it a natural choice for applications such as shower screens and bath panels where glass is used in close proximity to the unprotected human form. Toughened glass shatters into tiny pieces, rather than shards, and when used in a laminate, is held in place by the plastic interlayer, making it one of the safest options, as well as the most glamorous in appearance.

Small wonder then, that it is also the material of choice for balustrades, kitchen splash backs, shelving and wall cladding – in fact any aspect of a building where strength and

durability must be combined with aesthetics.

The standard interlayers used in laminating toughened glass also result in noise reduction, particularly filtering high frequencies which cause annoyance. Special high performance interlayers can be used to accentuate sound attenuation. The PVB in laminated glass also helps to reduce solar gain so that air conditioning does not need to work quite so hard. The ultraviolet (UV) filtering performance of the plastic interlayer also helps to protect valuable furnishings, displays or merchandise from the fading effects of UV radiation.

While the architect continues to design buildings which incorporate glass in key structural elements, the glass processor is now able to keep pace; making concepts into realities with toughened laminated glass products which blend beauty with practicality and safety with strength. ■

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