

Glass Flooring Cost Design Factors

Glass Thickness

The thickness of glass used in a glass floor has a major bearing on the cost of the installation, and where cost determines the size and/or viability of a project it is always wise to look carefully at the factors determining the thickness of the glass in the flooring before drawing up the finished design. Thickness has two major effects on cost. Firstly raw material costs are affected and this relationship is not linear. For example a PVB bonded triple laminate 46mm thick is typically 2.2 to 2.6 times more expensive than a 24mm triple laminate. Secondly, the large increase in weight of the glass – 115Kg/M² compared to 55Kg/M² means that transportation and installation costs will also rise.

For a given laminate system, there are four main factors which affect the thickness of the glass to be used in any glass flooring installation.

Specified Loadings

The higher the loading the glass floor is required to take, the thicker and more robust the glass floor will need to be. For installations in the UK, a guideline to minimum loading specification can be found in BS 6399: Part 1: 1984. However, this must be treated with caution and designers must take into account the specific need of the end user. For example, it may well be that for a typical supermarket floor one might expect the requirement of 4.0 KN/ M² distributed loading and a concentrated load of 3.6 KN as stated in Table 9 of the British Standard for shop floors to be sufficient. Perhaps to be on the safe side one might think to specify to 5.0 KN/M² and 4.5KN to cover “corridors, hallways etc subject to loads greater than from crowds, such as wheeled vehicles and the like.” But, what actually is the concentrated load imposed by the little wheels of those big shelf restocking cages when fully loaded with cases of wine, or the point load of a 1.5litre bottle of wine hitting the floor corner on?

Support

The amount of support given to the glass-flooring panel also has an effect on the thickness of glass required. For example, to support a distributed loading of 5KN/M² a typical PVB bonded triple laminated square panel measuring 1000mm x 1000mm supported by a ledge 25mm wide would need to be 32mm thick if supported on all four sides. However, it would need to be 46mm thick if only supported by two sides.

Type of Glass used

As a rule of thumb heat strengthened glass is approximately twice as “strong” as annealed or ordinary float glass, and fully toughened glass is roughly four to five times as strong.

It would seem to follow that using fully toughened glass would dramatically reduce the thickness of the glass to be used in glass flooring laminates and should be used throughout. In some cases it may be that this option is the best, but in general this is not the solution adapted.

Toughened and heat-strengthened glass does have an on-cost over float glass but in the case of fully toughened glass this is not the reason why it is not always used as standard in glass flooring.

The problem is that the tensile stresses inside toughened glass not only give the glass added strength, but also give an increased vulnerability to short sharp shocks particularly at exposed edges. This can result in an explosive release of stress producing the fracture characteristics of small, relatively harmless fragments sometimes referred to as dice. In a laminated system, having glass shatter into these less harmful fragments has little extra safety benefit over the larger sharper fragments resulting from the breakage of float or heat strengthened glass since all the fragments are held safely in place by the lamination.

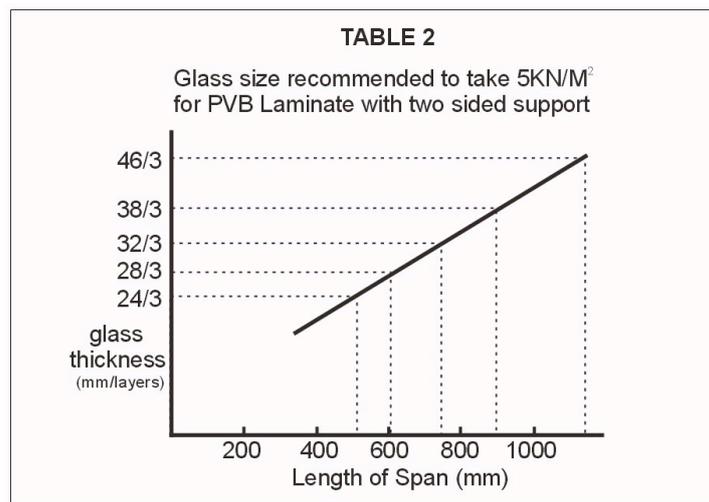
Glass flooring is very expensive to replace once installed, and so the added strength benefit from using fully toughened glass is counterbalanced by its increased vulnerability.

In general, heat-strengthened and ordinary float glass is preferred in the laminate make up of glass flooring. The use of heat-strengthened rather than float glass is particularly appropriate for installations involving large panes of glass. In these cases reducing the thickness of the laminate by using heat-strengthened glass, whilst not necessarily reducing overall glass cost, reduces the weight of the glass, and this can reduce the installation and transport costs.

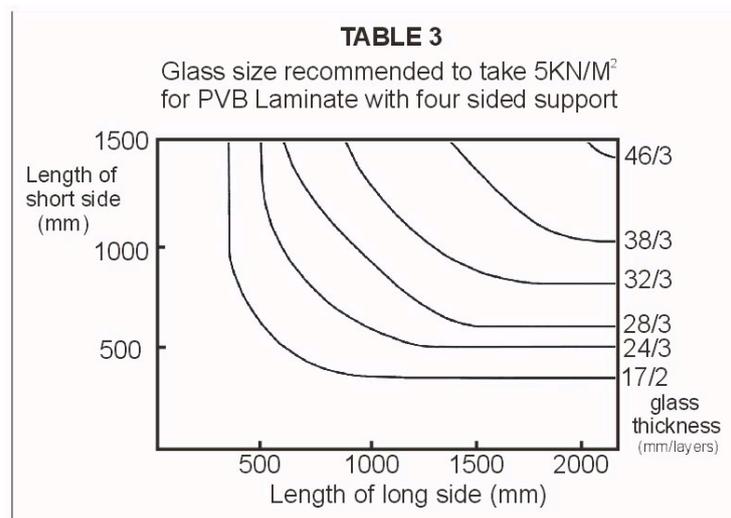
Glass Spans

For a given loading and laminate type, the most critical factor in the determination of glass floor thickness is the maximum widths that the glass has to span.

For example, given four-sided support, a 1.0M² triple laminated glass flooring panel of dimensions 1000mm x 1000mm would need to be over 50% thicker than a similar panel of dimensions 2000mm x 500mm.



Tables 2 and 3 show the relationship between spans and laminate thickness required for an imposed loading of 5.0KN/M² for panes supported on two-sides (Table 2) and four sides (Table3) for a system comprising a heats strengthened 6mm Top-sheet and two lower layers of float glass.



Other factors affecting cost

As with any other glass installation the use of non rectangular glass also has a significant affect on costing - for example a circle of glass will cost approximately twice as much as a square of the same size.

There is also a minimum size price for glass flooring and any panel smaller than 0.5 M² will still be charged as 0.5M² no matter what the area actually is.

All of the above factors must be taken into consideration when designing a glass floor, but one must also bear in mind that having smaller panes of glass whilst reducing the cost of the glass might increase the cost of the supporting structure. As a general rule, for a given area, four side supported long rectangles of LITEFLOOR are likely to be more cost-effective than large square panels. This, however, may go against the aesthetics that the designer is trying to achieve and of course most things are possible at a price – including the installation of Litefloor onto glass beams.