



WILLMOTT DIXON

SINCE 1852

Glass Policy

January 2020



Glass plays an important role in our projects. There has been a growing concern over recent years following an increase in defective glass across the industry generally, and on our projects.

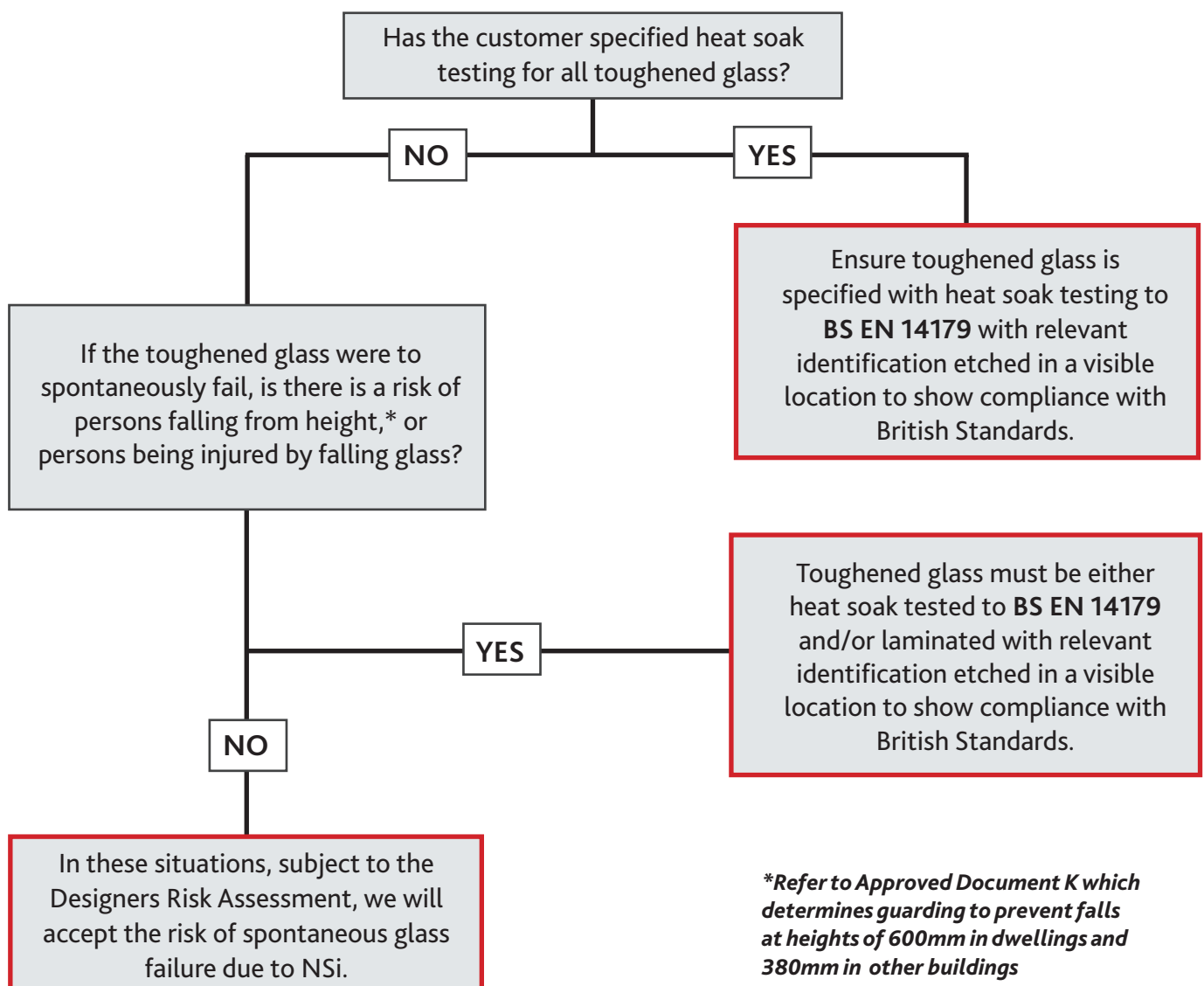
There is historically a lack of understanding as to the different types of glass, who is responsible for specifying which type is the most suitable, and how it should be marked and identified on our projects.

As a business, we have around 6-8 suspected instances of spontaneous glass failures on completed projects each year. The emotional impact on our Customers and end users is significant, and within our industry there have been some very high profile failures on projects which have resulted in large claims and extensive remedial works.

The glass industry knows of this natural phenomenon with toughened glass, where over time Nickle Sulphide Inclusions (NSi) can expand and causes spontaneous glass failures. Heat Soak Testing is a further process which heats up toughened glass to 200 degrees for several hours. This process adds time and cost and will cause the majority of NSi contaminated glass to fail in the oven, thus significantly reducing the residual risk of a NSi failure once installed.

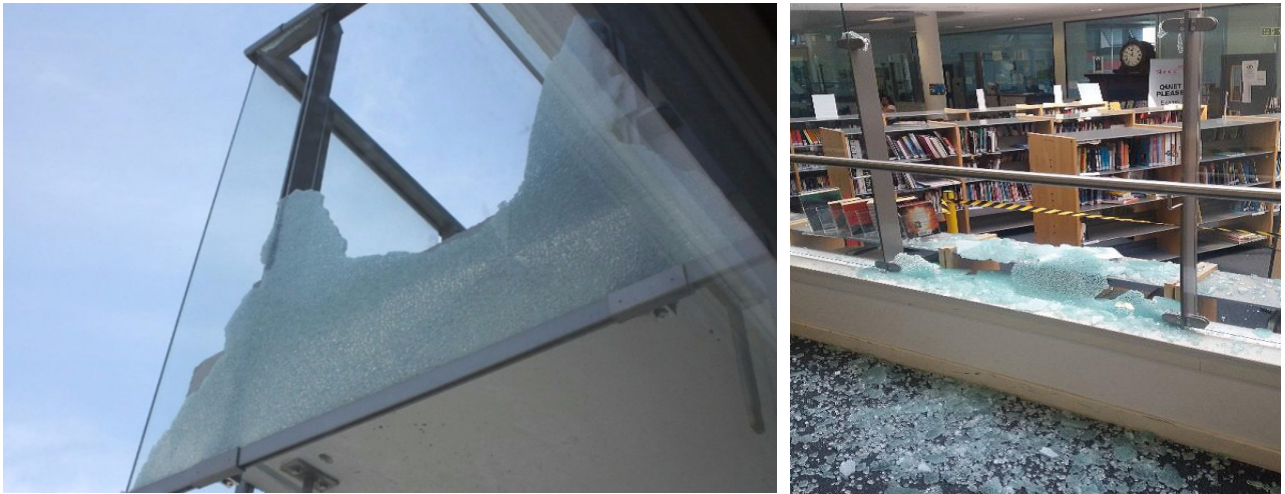
It is therefore important that we set our own standards in relation to the design and procurement of glass for all future and live projects.

- Willmott Dixon have a risk-based approach to the **heat soaking of toughened glass**. The flow chart below should be used to inform the need for heat soaking of toughened glass.



2. The specification for all areas of glass on a project (internal and external) must be justified through the Designers Risk Assessment, and subsequent design by the Architect and /or Façade Engineer, including the thermal fracture risk of glass referring to CWCT Technical Note No. 65.
3. All glass used where life safety is a risk (including barriers and balustrades) requiring a loading of 1.5Kn or more must be toughened, heat soaked tested and laminated. Where loading is 0.74kN glass and where life safety risk is minimal, must be toughened and heat soak tested or laminated (subject to the Designers Risk Assessment). Further design guidance on balustrade and barriers is available within **BS 6180:2011 - Barriers in and about Buildings – Code of Practice**, available through the IHS system.

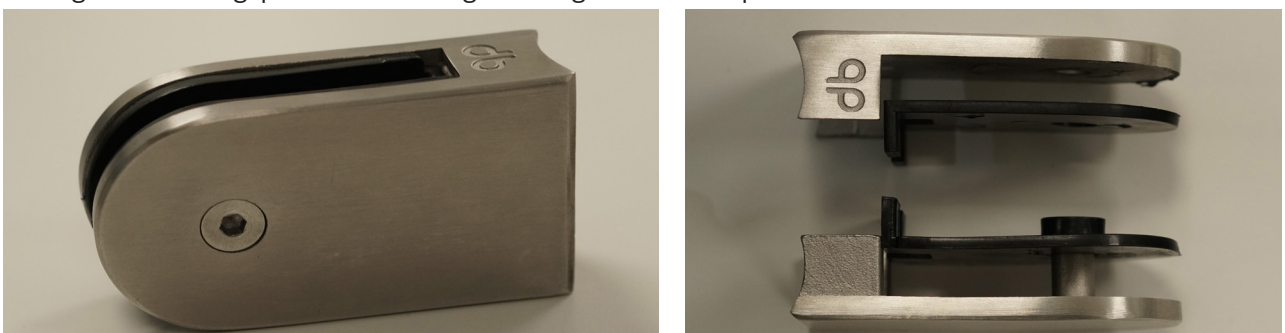
NOTE: Due to the fire classification of Laminated glass, its use on buildings with an upper floor greater than 18m above external ground level, other than in windows or doors, must be agreed with Building Control, our customer, any warranty provider such as NHBC and captured in the Fire Safety Strategy.



4. On balustrading systems, friction only glass clamps are prohibited unless the glass is fully supported at its base (and sides on sloping glass panels). Insufficient restraint to glass panels on balustrades can cause the panels to become dislodged or come loose, or in the worst case fall from their original position with obvious consequences.



5. Pin fixings are also prohibited as they are difficult to inspect.
6. Fixing clamps must be bolt through and be sleeved in order to isolate fixing bolts from the glass to prevent direct chafing with a clear gap between the edge of the glass and clamp to allow for thermal movement.



7. **Each pane of safety glass must have the relevant identification etched onto it** in a visible location to show compliance with British Standards.
8. Agree the location of the identification mark with the customer, all window/door type drawings provided by the Architect to the fabricator must have the safety mark position clearly identified.
9. To identify the grade of safety glass used, **every pane must be indelibly marked** so that the marking is visible after installation and can be checked against the glass specification. The markings must include:
 - a) The manufacturer's name or trade mark
 - b) The product number for the type of glass*
 - c) The impact performance classification e.g. Class 1, 2 or 3 to **BS EN 12600**; or Class A, B or C to **BS 6206****

- * **BS EN 12150** toughened glass
BS EN 14449 laminated glass
BS EN 14179 heat soaked thermally toughened glass
BS EN 1863-1 heat strengthened soda lime silicate glass
BS 476-22 Fire Glass

- ** Both **BS EN 12600** and the older **BS EN 6206** require a pendulum test for impact & classification for glass
- **BS EN 12600** has Class 1, 2 or 3 - with Class 1 being the highest performance grade
 - **BS EN 6206** has 3 classes A, B and C with 'A' being the highest performance grade

BS EN 12600 also grades the Mode of Breakage:

- **Type A** – numerous cracks appear forming separate fragments with sharp edges, some of which are large (typical of annealed glass)
- **Type B** – numerous cracks appear, but the fragments hold together and do not separate (typical of laminated glass)
- **Type C** – disintegration occurs, leading to a large number of small particles that are relatively harmless (typical of toughened glass).

Examples:

The manufacturer's name or trade mark:

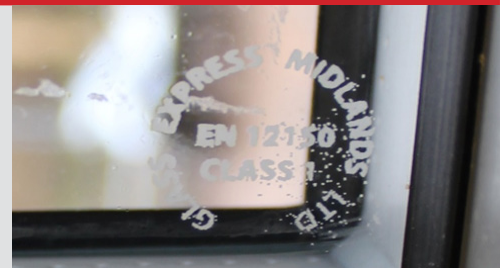
- Glass Express Midlands Ltd

The product number for the type of glass:

- EN 12150 = Toughened Glass

The impact performance classification:

- Class 1 = Drop test highest performance



The manufacturer's name or trade mark:

- MiGlass Ltd KM 658201

The product number for the type of glass:

- EN 12150 = Toughened Glass
- EN 14179 = Heat soaked thermally toughened glass

The impact performance classification:

- 1(C)1 = Class 1 drop test highest performance, type C is the mode of breakage which is typical of toughened glass



The manufacturer's name or trade mark:

- Tuffx Ltd

The product number for the type of glass:

- EN 12150 = Toughened Glass

The impact performance classification:

- C1 = Class 1 drop test, highest performance



The manufacturer's name or trade mark:

- Lamistar

The product number for the type of glass:

- EN 14449 = Laminated Glass

The impact performance classification:

- 1(B)1 = Class 1 drop test highest performance and type B is the mode of breakage which is typical of laminated glass



The manufacturer's name or trade mark:

- KM 592752 which can be checked on the BSI directory

The product number for the type of glass:

- EN 12150 = Toughened Glass

The impact performance classification:

- 1C2 = Class 1 drop test highest performance, type C is the mode of breakage which is typical of toughened glass



The manufacturer's name or trade mark:

- HolloSeal Glass

The product number for the type of glass:

- EN 12150 = Toughened Glass

The impact performance classification:

- 1C1 = Class 1 drop test highest performance, type C is the mode of breakage which is typical of toughened glass



The manufacturer's name or trade mark:

- KM 511207, which can be checked on the BSI directory ESG Group Ltd

The product number for the type of glass:

- EN 12150 = Toughened Glass

The impact performance classification:

- CL1 = Class 1 drop test highest performance, type C is the mode of breakage which is typical of toughened glass



Toughened
Glass

Toughened +
Heat Soaked Laminate

Toughened +
Heat Soaked

Toughened
Laminate



10. In the event that we have a suspected Nickle Sulphide Inclusion (NSI) glass failure, please keep all glass fragments and inform the National Product Team who will arrange for the necessary inspections to be undertaken in order to ensure we record, learn, inform and continuously improve.

NSI failures are not common and are a naturally occurring phenomenon. Heat soaking reduces the risk but does not eliminate the risk completely. The majority of suspected NSI failures are actually caused by another mechanism (physical impact damage, shelling on edges, lack of expansion allowances, thermal shock etc.).

They are characterised by a distinctive “butterfly” pattern in the glass at the point of failure and can only be positively identified by high resolution microscope analysis after the glass has failed.

