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Glass and Glazing Federation

ADVICE TO CONSUMERS  
REFERENCE 40.4  
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# Toughened Glass Safety and Strength

Can you afford not to use it?



## What is Toughened Glass?

Toughened glass is glass that has been modified by thermal treatment to give:

- Safety – up to EN 12600 Class 1
  - Strength and Flexibility in accordance with EN 12150
  - Improved resistance to heat
  - High strength to weight ratio
  - Light transmission equal to ordinary glass
- It is also:
- Safe to handle – sharp edges are removed
  - Can be produced in flat or curved form

## Flexible Solutions For Tough Jobs

The unique combination of performance characteristics listed above makes toughened glass fit a diversity of demanding applications:

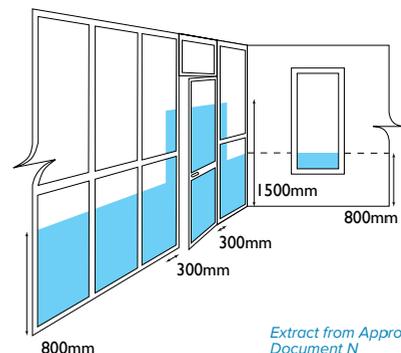
### Safety Glazing:

- Overhead, and low level glazing including partitions
- Glazed doors
- Bath and shower screens
- Tables and trolleys
- Furniture
- Transport – cars, trains, ships
- Street furniture
- Domestic appliances – ovens, microwaves, refrigerators



If toughened glass breaks, it shatters into relatively harmless small granules

## Mandatory Safety Glazing Areas



The above diagram shows the critical areas where safety glazing materials, such as toughened glass, must be used in new and replacement glazing applications in all buildings under the following laws and codes of practice.

- Approved Document K England
- Approved Document N Wales
- Technical Document 4.4 Scotland
- Technical Document 4.8 Scotland
- Building Regulations Section V Northern Ireland
- Workplace (Health, Safety and Welfare) Regulations 1992-second edition 2013 L24
- Enforced under the Consumer Protection Act 2008
- BS 6262-4 Glazing for Buildings- codes of practice for safety related human impact
- BS 6180 Code of Practice for Protective Barriers in and about Buildings

## Marking

Toughened Glass must be permanently marked to show compliance with the appropriate standard, for example:

- EN 12150 Thermally Toughened Soda Lime Silicate Safety Glass
- BS 857:1967 Safety Glazing for Land Transport, or
- UN Regulation R43-1981
- BS 3193:2008 Domestic Appliances

## Extensive Range

### Transparent

- Clear
- Tinted
- Surface coated, for insulation, solar control
- Fire protection

### Translucent

- Clear or tinted patterned

### Enamelled

- Enamelled, made from ordinary glass coated with a coloured ceramic, permanently fired in during the Toughening process.

### Decorative/Opaque

- Acid embossed
- Sand blasted
- Screen printed
- (Except for certain types of screen printing all the above must be done prior to Toughening)

### Photo Voltaics

- Solar panels for renewable energy

## Other Thermally Treated Glass

Toughened glass is the most widely used type of glass from the family generically known as 'Thermally treated' glasses. The other two most commonly used thermally treated glasses are:

### Heat strengthened glass

- This is produced the same way as toughened glass except it is cooled at a different rate to produce less internal stress. It gives some of the advantages of toughened glass, although the strength and heat resistance are less. It retains the fracture characteristics as ordinary glass and therefore is not a safety glass. (Covered by EN 1863)

### Heat Soaked

- A control process recommended for toughened glass used in specified areas. (Covered by EN 14179)

Note: These two products are primarily used in commercial applications.

## Processing restrictions

The characteristics of toughened and heat strengthened glass preclude any cutting or processing after manufacture. All holes and shapes must, therefore be completed before processing.

## References

The following standards refer to Thermally Treated Glass:

- BS 857:1967 Specification for safety glazing for land transport.
- BS 3193:2008 Specification for thermally toughened glass for the use in domestic appliances.
- BS 6180:1999 Code of practice for protective barriers in and about buildings.
- BS 6262-4:2005 Code of practice for glazing in buildings.
- BS EN 1863-1:2011. Glass in building – Heat strengthened soda lime silicate glass. Definition and description.
- BS EN 12150:2015 Glass in Building – Thermally treated soda lime silicate safety glass.
- BS EN 12600:2002 Glass in Building – Pendulum test, impact test for flat glass and performance requirements.
- BS EN 14179:2005 Glass in Building – Heat soaked thermally toughened soda lime silicate safety glass.
- BS ISO 11485-1:2011. Glass in building – Curved glass.
- BS ISO 11485-2:2011. Glass in building – Curved glass. Quality requirements.
- BS ISO 11485-3:2014. Glass in building – Curved glass. Requirements for curved tempered and curved laminated safety glass.
- Regulation 43.

# The Glass and Glazing Federation

The Glass and Glazing Federation (GGF) is the recognised leading authority for employers and companies within the flat glass, glazing, home improvement, plastics and window film industries. GGF Members can be found in over 1,500 business locations throughout the UK.

## Talk to the specialists

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Contact us for the list of Toughened Glass Group Members in your area.

# Further Information

More information on toughened glass can be found in the following GGF Publications:

- GGF Data Sheet 4.12.4 – Curved Glass Part 4: Laminated Glasses
- The Right Glazing in the Right Place
- GGF Data Sheet 4.4 – Quality of Thermally Toughened Soda Lime Silicate Safety Glass for Building
- GGF Data Sheet 4.4.1 – Thermally Treated Soda Lime Silicate Glass Products – General
- GGF Data Sheet 4.4.2 – Thermally Treated Soda Lime Silicate Glass Products – Spontaneous Breakage
- GGF Data Sheet 4.12.1 – Curved Glass Part 1: Generalities – Definitions, Terminology, Properties and Basis of Measurement and Test
- GGF Data Sheet 7.1 – Non-Vertical Overhead Glazing: Guide to the Selection of Glass from the Point of View of Safety
- GGF Data Sheet 7.2 – Guidelines for the Use of Glass in Protective Barriers
- Guide to the Selection of Glass and Plastics Glazing Sheet Materials for Overhead Glazing in Conservatories
- GGF Safety and Security Good Practice Guide

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