BF Bulletin 020 / 2015

Bundesverband
Flachglas

Glass in Indoor Applications

Glass in Indoor Applications

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1.0 Aim

Our Bulletin “Glass in Indoor Applications” is intended to provide an overview of the various potential uses for glass in indoor building applications – the basics of the different products, processing methods and uses.
The guide describes the generally accepted rules of engineering pertaining to glass in interior finishing.

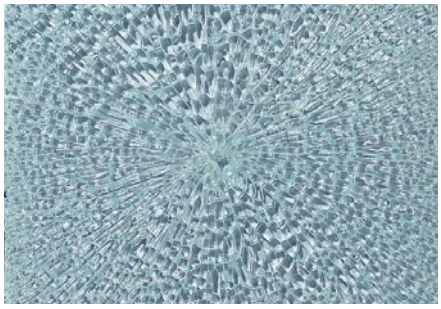
2.0 Target Group

This guide is intended for all users who would like to use glass in indoor applications, particularly (prospective) interior designers, architects and planners.

3.0 Products

Float glass
Float glass is a flat, transparent and clear soda-lime silicate glass with parallel and fire-polished surfaces, made by continuous casting and flowing over a metal bath. It is the base product for all further processing steps. It can be manufactured in different colours. The fragments are sharp-edged.

Toughened safety glass (TSG)
TSG is produced by heating glass above a defined temperature and then cooling it rapidly under controlled conditions. This creates a permanent distribution of stress in the glass which significantly increases its resistance to mechanical and thermal loads. The fracture pattern of TSG is characterized by crumbling. This reduces the risk of injury. All mechanical finishing (cutting, drilling, edge finishing, sandblasting, fluted bevel, surface lasering) must be performed before the thermal process.



Heat-soaked toughened safety glass (TSG-H)
TSG-H is a regulated building product which is normatively specified for certain applications (see BF Bulletin 010/2011 “TSG-H – a regulated and externally monitored building product of the highest safety”).

Heat-strengthened glass (HSG)
HSG is a thermally tempered glass which, due to its modified tempering process, has a coarse fragment pattern – similar to float glass - but can absorb higher mechanical and thermal stresses than float glass. HSG is generally processed further into laminated safety glass (LSG). Thanks to its large-sized fragments, LSG made from HSG exhibits a higher residual load-bearing capacity when it breaks.

All mechanical finishing (cutting, drilling, edge finishing, sandblasting, fluted bevel, surface lasering) must be performed before the thermal process.

Laminated glass (LG)

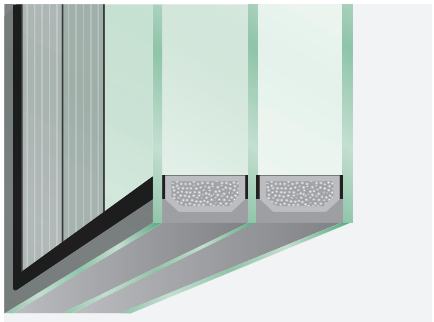
LG consists of at least two or more glass panes - usually of the same thickness – which are permanently bonded to each other in surface contact by intermediate layers of plastic. Further intermediate layers, for example fabric, can also be integrated into the plastic. In this case, LG only has safety properties, if it is separately verified by testing. In special cases, combinations of glass and other materials can be used.

Laminated safety glass (LSG)

LSG is a laminated glass where in the event of fracture the intermediate layer has the function of holding the glass fragments in place or limiting the size of the hole and retaining a residual load-bearing capacity, thereby reducing the risks of injury.

Multiple-pane insulation glass (MIG)

MIG is a mechanically stable and durable unit comprising at least two glass panes separated from each other by one or more spacers and hermetically sealed at the edges.



Coated glass

Coated glass is a glass substrate which has been given a coating of one or more thin, fixed layers of inorganic materials in order to effect specific functions, e.g. antibacterial, low-reflection, easy-to-clean or even scratch-resistant surfaces.

Colour-coated glass

Glass can be colour-coated over all or part of its surface. The coating can be ceramic or organic. The glass side is generally the view side.

The ceramic colour coating consists of inorganic substances which lend the glass its colour. It is permanently bonded to the glass surface by means of a thermal process. Ceramic colour coatings are temperature-resistant and as a rule UV-resistant. They are resistant to mechanical load and can be used in wet rooms.

Organic prints can be made both on base materials and on tempered or otherwise treated glass. They provide for greater colour brilliance and variety and print resolution than ceramic colour coatings.

Mirror

Mirror is a clear or tinted glass, the back of which is usually provided with a reflective metal layer.

Ornamental glass

Ornamental glass is a translucent, clear or tinted glass which is given a structured surface by means of continuous casting and rolling. It is also available with wire inserts.

Channel-shaped glass

Channel-shaped glass is a U-shaped cast glass which is manufactured in a machine rolling process. It is available as clear glass, white glass and coloured glass and also with finished surfaces.

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3.1 Glass products – different forms of finishing and processing

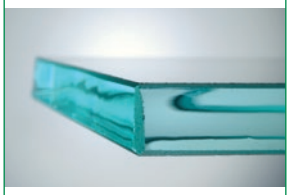
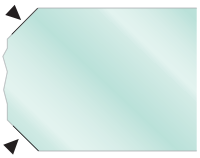
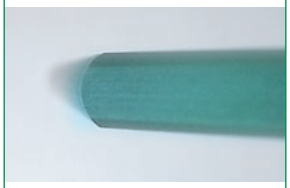
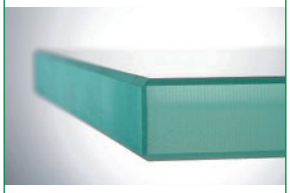
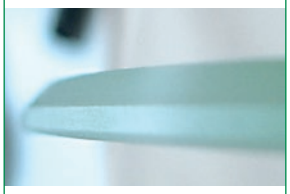
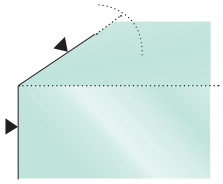
Basic glass	Properties	Cutting, sawing	Drilling	Edge finishing (arrissing, grinding, polishing, etc.)	Forms of processing/ finishing:
Basic glass (soda-lime silicate glass)					
Float glass: clear, low in iron oxide (white glass), coloured in the mass	■ Characteristic bending tensile strength: f_k = 45 (N/mm²) ■ Thicknesses*: d = 3 – 19 mm	x	x	x	■ MIG, TSG, HSG, LG and LSG ■ Coating, sandblasting, etching, printing, painting, forming, gluing, lasering, metal-coating
Ornamental glass	■ Light-scattering or -directing ■ Characteristic bending tensile strength: f_k = 25 (N/mm²) ■ Thicknesses*: d = 3 – 10 mm	x	x	x	■ MIG, TSG, HSG, LG and LSG ■ Coating, printing, metal-coating, painting, sandblasting and etching depending on the structure
Wired plate and wired ornamental glass	■ Protection against large clumps upon fracture ■ Characteristic bending tensile strength: f_k = 25 (N/mm²) ■ Thicknesses*: d = 6 – 9 mm	x	x	x	■ Printing, sandblasting, etching, painting depending on the structure
Channel-shaped glass	■ U-shaped ornamental glass ■ Increased load-bearing capacity thanks to U-shape	x	x	–	■ TSG with general building authority approval or individual approval ■ Coating, printing, sandblasting, painting
Processed basic glass					
TSG	■ Thermally tempered ■ Characteristic bending tensile strength: f_k = 120 (N/mm²)*** ■ Defined crumbling structure upon fracture ■ Can be used monolithically as safety glass ■ Cannot be subsequently mechanically processed (e.g. grinding, polishing, sandblasting, surface lasering)	–	–	–	■ MIG, LG and LSG ■ Coating, painting, printing
HSG	■ Thermally tempered ■ Characteristic bending tensile strength: f_k = 70 (N/mm²) ■ Radial incipient cracks from the fracture centre upon fracture ■ Cannot be used monolithically as safety glass ■ Cannot be subsequently mechanically processed	–	–	–	■ MIG, LG and LSG ■ Coating, painting, printing
LG	■ At least 2 panes of any glass types and thicknesses permanently bonded with intermediate layer	x**	x**	x**	■ Coating, painting, printing or diverse decorative inserts towards the intermediate layer possible (prints, textile, light guides, etc.)
LSG	■ At least 2 panes of any glass types and thicknesses bonded by PVB film with properties acc. to BRL (construction products list) or intermediate layer with general building authority approval (e.g. EVA or SentryGlas®)	x**	x**	x**	■ Coating, painting, printing, sandblasting, lasering
Curved glass	■ Gravity bending with general building authority approval or individual approval, curved LSG with individual approval	o	o	o	■ MIG, LG, LSG, or with individual approval, glass furniture
Fire protection glass	■ Fire resistance acc. to EN 357 (DIN 4102) E (G) 30 – 120 EW (–) 30 – 120 EI (F or T) 30 – 120 30 – 120 = fire resistance duration	–	–	–	■ Further processing of glass depending on the manufacturer
MIG	■ Comprising at least 2 basic glass panes with at least 1 cavity	–	–	–	■ Thermal insulation, solar control, sound insulation, safety and insulating
MIG (with systems in cavity)	■ MIG with integrated privacy screening/solar control system (film or blind)	–	–	–	■ Decorative printing of the film/blind
Switchable glass	■ Electrochromic glass: Modified energy transmittance by tinting (dimmable glass) ■ LCD method, alternation between transparency and translucence	–	–	–	■ MIG, solar control and privacy screening in indoor areas

* Standard thickness, further thicknesses on request, ** No subsequent finishing possible when tempered glass is used, *** Applies to float glass clear, tinted in the mass or coated

Table 1: Glass products and forms of processing

4.0 Finishing

4.1 Edge finishing

Example	Description	Schematic representation	Meaning
	***Cut edge (type KG)*** The glass is scored with a carbide wheel and then snapped apart. The break edges created in this way are unmachined and sharp.		Cut edges are only used if the edges are not accessible in the application. Cut edges can only be used in untempered glass. There is always a risk of injury during handling.
	***Arrissed edge (type KGS)*** The borders of the sharp cut edge are additionally arrissed (deburred). The machined areas become matt, the rest of the edge surface remains unmachined.		This finish is purely functional. The arris does not satisfy any specific optical and dimensional requirements. The cutting risk is reduced. It is the minimum requirement for tempered glass. These edges are generally installed inside the frame.
	***Ground edge (type KGN), C-grinding*** The edge is fashioned into a semicircular or flat-round shape by grinding with a diamond tool, thus acquiring a fine and matt appearance.		A technically important edge shape for break-proof ground glass. If is often used for glass in technical applications and up to glass thicknesses of 6 – 8 mm. Specially suitable for mass production.
	***Ground edge (type KGN) straight with arris*** The edge is fashioned into a trapezoidal shape by grinding with a diamond tool, acquiring a fine and matt appearance.		The straight edge with arris meets high standards with regard to edge strength. It is used for visible edges.
	***Ground edge with mitre or arris edge*** The edge is provided with large bevels by grinding with a diamond tool. As a rule, mitres are specified in angles and arris edges in widths.		Mitres are frequently useful for technical reasons; arris edges, particularly polished flat arris edges, are frequently found on furniture glass or mirrors.
	***Polished edge (type KPO), C-grinding*** As well as being ground, the edge is polished with a polishing tool and acquires a transparent appearance.		Polishing is desired essentially for visual or creative reasons. For technical reasons, fine longitudinal grooves are produced with the polished C-grinding finish.

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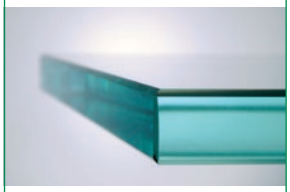
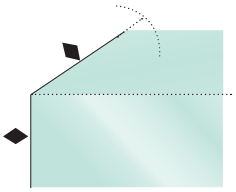
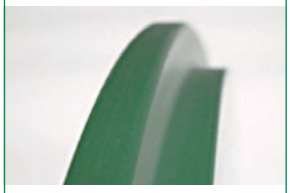
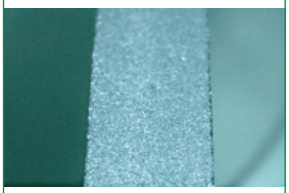
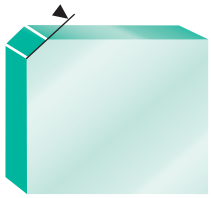
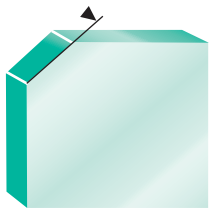
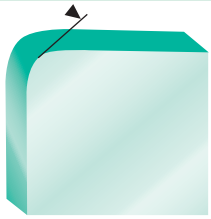
Example	*Description*	*Schematic representation*	*Meaning*
	***Polished edge (KPO), straight with arris*** As well as being ground, the edge is polished with a polishing tool and acquires a transparent appearance.		Polishing is desired essentially for visual or creative reasons. For technical reasons, fine longitudinal grooves are produced when polishing on panes.
	***Polished edge with mitre or arris edge*** As well as being ground, the edge is polished with a polishing tool and acquires a transparent appearance.		Polished arris edges are more common in furniture applications than ground arris edges.
	***Special shapes such as stepped grinding finishes*** Special edge shapes can also be created with special tools and processes.		Many variants are produced for technical applications: steps, bevels, shoulders or grooves.
	***Water-jet-cut edge*** The glass is cut with a water/ abrasive mixture and acquires a matt appearance.		Special finishes and special shapes with cutouts or openings can often only be produced with water jet technology. The edge is somewhat rougher than the ground edge. Subsequent machining such as arrissing or polishing can be performed if the geometry permits.
	***Ground-off corners*** The corners of a pane of glass are slightly chamfered or rounded.		Ground-off corners minimize the risk of injury and also ensure that the glass corner chips less easily during handling. The corners are of irregular size and ground to a matt finish.
	***Angled corners*** The corners of the glass are chamfered to size.		The angled corner is made to specifications. The size of the angled corner can vary from a few mm to a few cm. The surface finish is generally the same as the edge finish.
	***Round corners*** The round corners of the glass are generally produced in one edge finishing operation.		The round corner is made to specifications. The size of the radius can vary from a few mm to a few cm.

Table 2: Overview, edge finishing

4.2 Holes

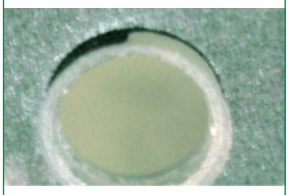
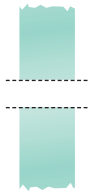
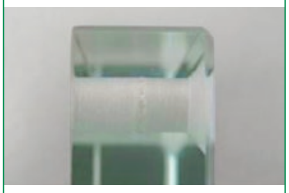
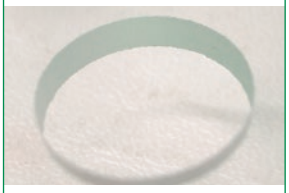
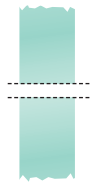
Example	*Description*	*Schematic representation*	*Meaning*
	***Hole*** In the flat glass industry holes are "drilled" from both sides with diamond hollow drill bits, or more precisely: ground open (approx. 2/3 of the glass thickness from the top and 1/3 of the glass thickness from the bottom). The situation may arise where the clear dimension is slightly smaller than the drill bit diameter.		Important machining step as it enables the glass to be connected to other materials (screws, hinges, etc.). Holes significantly weaken the glass. Glass/metal contacts and stresses in the hole area must be avoided and the rules for holes in tempered glass must be observed.
	***Hole with arris, one side or both sides*** The holes are "deburred" after drilling on one or both sides in order to reduce the fine shell defects created during drilling.		Serves to increase the structural strength of the glass in the hole area. It is generally permitted for production reasons to apply arrises even if these are not required.
	***Hole with countersink*** Countersinks are created in the hole with a countersink after through-drilling.		Required if for example countersunk-head screws have to disappear fully in the hole.
	***Stepped hole with and without countersink*** The stepped hole is larger in diameter and ends in the glass. The through hole has a small diameter.		Required if for example cheese-head screws have to disappear fully in the hole. Arrises or countersinks are possible, depending on the quality requirement.
	***Water-jet-cut hole*** An opening is "ground open" with a water/abrasive mixture under high pressure.		Water jet technology is used when complicated hole geometries or shapes are required. The shaping possibilities are virtually limitless. Smaller instances of flaking and matt backspray traces are possible. A slight taper of the opening cannot be avoided in this cutting process.
	Undercut hole The undercut hole is made using a special drill bit/milling cutter, i.e. the hole is channelled in the glass area to accommodate a hardware plug. The glass is not drilled through completely here.		Undercut holes are used in applications where the glass is not drilled through, i.e. one side of the glass is to remain undamaged while hardware is mounted on the drilled side.

Table 3: Overview, holes

4.3 Surface finishing / design techniques

Method	*Description*	*Features*
Satin frosting	Etching of the glass surface with hydrofluoric acid	■ Full or partial satin frosting ■ Decorative satin frosting (possible in different matt stages)
Sandblasting	Blasting with compressed air and special sand (different grains)	■ Surface becomes translucent ■ Design by templates (film or plate) ■ Individual motifs possible ■ Relief-type deep blasting or frostings of different thicknesses
Surface lasering	Surface finishing of the glass by laser	■ Fine, filigree motif design possible ■ Individual motifs possible
Deep lasering	Finishing of the glass by laser	■ Depth effect / 3D visualization ■ Glass surface remains unchanged ■ Can only be used on glass that is not thermally tempered
Painting	Application of an organic colour coating to glass	■ Spraying process ■ Casting process ■ Colour-homogenous glass surface ■ Partly suitable for wet rooms ■ Can be subjected to limited mechanical and thermal loads
Enamelling (TSG)	Application of inorganic / ceramic colour coatings to glass (over full / partial area)	■ Application of colour coating in a casting, spraying or rolling process ■ Permanently fused into the glass surface ■ High scratch resistance and colour fastness (UV-resistant) ■ Suitable for wet rooms ■ Can be subjected to mechanical and thermal loads
Screen printing	Application of organic and inorganic / ceramic colour coatings to glass	■ Application of colour coating through a screen (fine-meshed colour-transparent fabric) ■ One screen per colour, making it more suitable for mass / serial single-item production ■ Different possible applications to suit the use of colour (organic / inorganic) ■ Wider spectrum with organic colours
Digital printing	Application of organic and inorganic / ceramic colour coatings to glass	■ “Inkjet printing” on glass ■ Any digital pattern can be implemented ■ Also suitable for single-item production ■ Wider spectrum with organic colours
Film printing	Application of organic colour coatings to film (used predominantly in LSG / LG)	■ “Inkjet printing” on film ■ PVB film => safety glass ■ PET film => laminated glass ■ High colour brilliance ■ Widened spectrum ■ Any digital pattern can be implemented
Inserts in LSG / LG	Insert of different laminates	■ Suitable decorative intermediate layers, e.g.: veneers, fabrics, metals
Glass painting	Manual application of colour coatings using all painting techniques	■ Areas of application e.g. religious art, church windows
Airbrushing	Application of colour coatings in a spraying process	■ Design with colour gradients and by use of templates
Fusing	Fusing of different pieces of glass or materials onto a carrier pane	■ Only possible with special glass types suitable for fusing ■ Purely decorative applications
(Limited finishing possibilities apply for curved panes)		

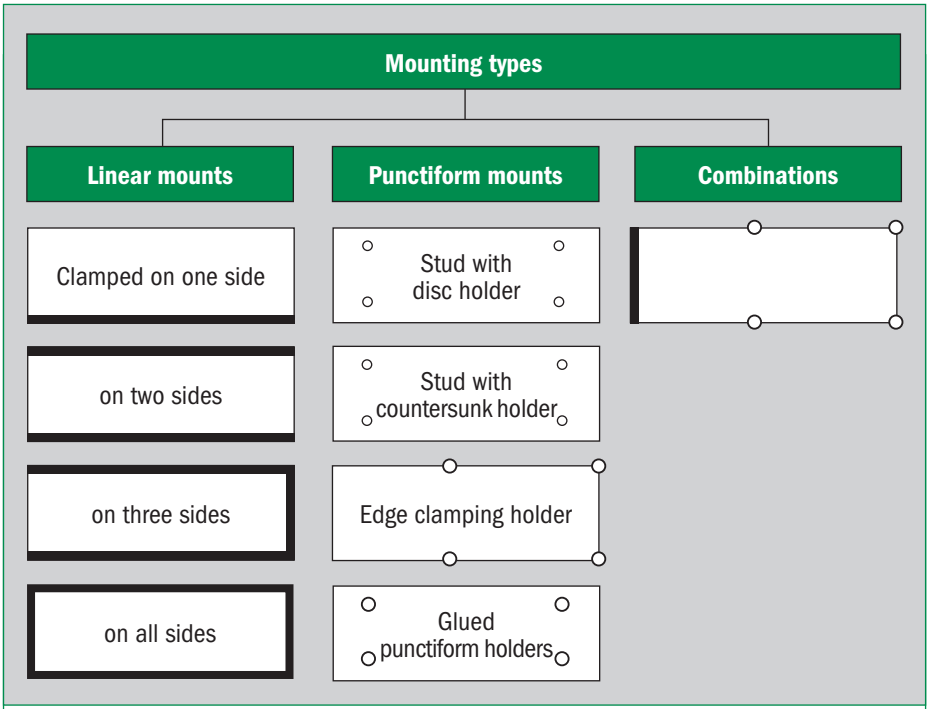
Table 4: Surface finishing / design techniques

5.0 Fastening and Connecting Technology

The fastening of glass for use in interior finishing must be meticulously planned and executed and must comply with the relevant applicable technical building regulations, the regulations of the accident insurance companies and the technical rules for workplaces.

Glass can be fastened in three different ways:

- With mechanical fastening systems. Glass can generally be fastened in the same way as glass in outdoor applications. These systems are shown in the adjacent diagram.
  Depending on the application, e.g. railings with a fall-prevention function, it is important to ensure that the glazing complies with the requirements of DIN 18008 or an appropriate general building inspection certificate or general building authority approval is provided.
- With chemical-based fasteners (adhesives and adhesive tapes).
- From a combination of mechanical and chemical fastening systems.



The appropriate mounting type must be chosen to suit the application, the building utilization and the loads that occur. Thus, for example, special considerations must be taken into account in the following applications:

- ***Use of glass or mirrors on ceilings***
  It is necessary to ensure here that the component cannot fall down in the event of glass fracture. A mechanical fastening element may be required in addition to the glued fastening.

- ***Fastening to walls***
  In the case of wall panels made of glass or mirrors, the relevant safety requirements with regard to use, e.g. schools, daycare centres, fitness studios or gymnasiumsti, must be observed. Where ceilings are panelled or in the case of very high wall panels, it may be necessary to involve the local building authorities in the planning stage with regard to the required safety regulations and structural verifications.

- ***Mounting on doors***
  Where glass and mirrors are mounted on doors, it is important to ensure that these are level and warp-free. The mechanical loads resulting from opening and closing and the expansion behaviour must be observed so that there is no risk of them coming loose. The edges must not be sharp. Above all when using float glass and mirrors it is important to ensure that these are not exposed in the area of cutouts and drilled holes to any load that in turn can cause the glass to fracture.

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- ***Mounting of mirrors in rooms with increased humidity***
  Especially when using mirrors it is important to ensure that the fastening system provides for adequate back-ventilation.

To satisfy safety requirements, it is necessary to use toughened safety glass (TSG) or laminated safety glass (LSG). Compliance with the safety requirements can be achieved if necessary by using film on the back of glass/mirrors or by full gluing to the base surface. Permissibility under building law must be checked in each case.

The following points among others must be considered during both planning and mounting:

- ***Condition of the base surface***
  Above all when using chemical fasteners it is necessary to check the condition of the base surface and the actual surface itself, i.e. whether it is solid, smooth, rough, porous, soft, coated, painted, made of plastic or anodized. Generally,-base surfaces must be dimensionally stable and above all, in the case of mechanical fasteners, enable mountings to be adequately fastened. They must also be sufficiently level and flat to avoid visible curvatures. If a base surface is porous, it must first be treated with a wall primer. To ensure a resistant bond between the glass and the base surface, all surfaces must be thoroughly cleaned and completely dry. They must also be free of dust, loose particles, oil, waxand other contaminants which may impair adhesion.

  Concrete must set sufficiently before it can be used as a base surface. Accordingly, it must be clarified whether general building authority approval is required for the type of fastening of the mountings, e.g. plugs. Above all when using -mechanical fasteners, it is necessary to fasten the holding structure to suit the base surface (wood, metal, plastic or different wall materials).

- ***Colour of the base surface***
  If a transparent jointing compound is used, the colour of the wall surface may be visible through the joints. To ensure that the colour of the joints is uniform, it is recommended to render the entire wall (or at least the areas behind the glass joints) in a colour similar to the printed or painted glass.

  Use of silicone: For some light colours (see identification (S-W) in the colour chart), it is recommended to paint the base surface uniformly white in order to obtain a uniform visual glass appearance after gluing. In this case, no additional wall primer is needed on the porous surface as the paint generally acts as a primer. If the joint areas are highlighted in colour (painted), the adhesive tapes should always be applied to the white part of the wall surface.

- ***Evenness of the base surface***
  Irrespective of the fastener, it is important to check the evenness of the base surface.

- ***Expansion joints***
  It is essential when mounting glass to take into account all the expansion and settlement joints in the building.

  If there is an expansion joint behind the glass construction, the glass structure must also have a joint with the same properties at the same point (expansion and contraction). The instructions of the respective manufacturers must be followed in the case of wall structures.

- ***Processing temperature and time***
  Particularly when it comes to chemical fasteners, it is important to observe the required processing temperature/time.

The properties of glass must be noted as well as the specified instructions and directions. Above all when using glass in the area of heat sources, it may be necessary to use TSG instead of float glass.

The procedure and the directions for using the different fasteners must match the manufacturers' specifications. It is recommended to use (if available) systems that are matched to each other and have been tested. This is the only way to ensure that the warranty on the product “glass” is maintained.

In view of the fact that fastening involves craftsmanship, reference is made to the Technical Information of the glaziers' trade. In particular, Technical Guideline No. 11 “Mirrors – Handling and Mounting” provides important information on fastening.

6.0 Special Glass Applications

6.1 Glass applications in wet areas

We categorize as sanitary areas those rooms in which certain climatic conditions, heightened standards with regard to ease of cleaning and special design standards come together.

Possible applications by way of example are:

- Wall panels
- Partition walls/WC partition walls
- Shower cubicles
- Shower trays
- Washstands
- Washbasins
- Mirrors (suitable for wet rooms)
- Shelves

Depending on the application, the glass is finished for decorative reasons. The special conditions (moisture, heat, wetness, cleaning agents, chlorinated atmosphere in swimming pool facilities) must be taken into account when the products to be used are chosen. In addition, functional glass is increasingly being used in sanitary areas; this glass includes for example:

Coated functional glass

Coated glass is often used, particularly in shower areas. These coatings can be applied during the glass manufacturing process or later on during glass finishing. A distinction is made between hydrophobic (LOTUS effect) and hydrophilic (uniform water film) coatings.

In both cases the ease of cleaning of the glass is supported.
There are also antibacterial surface coatings for rooms subject to the most rigorous hygiene requirements.

In the area of shower cubicles and wall panels with cutouts, TSG in accordance with DIN EN 12150 is generally used, where, with regard to the intended use, some points are replaced by content from DIN EN 14428.

Glass in Indoor Applications

6.2 Applications in kitchen areas

When using glass in kitchen areas, designers utilize the positive properties of glass with regard to hygiene, ease of cleaning and design flexibility, for example as “backsplashes” behind worktops, as worktop surfaces (also scratch-resistant), furniture fronts and storage spaces. Glass is being used with increasing frequency in kitchens. In addition to the established uses in cookers, ovens and microwaves, glass is also being used with increasing regularity as a “control element” in touchscreen applications.

- Worktop
- Backsplash
- Furniture front
- Household appliances
- Display

6.3 Switchable glass

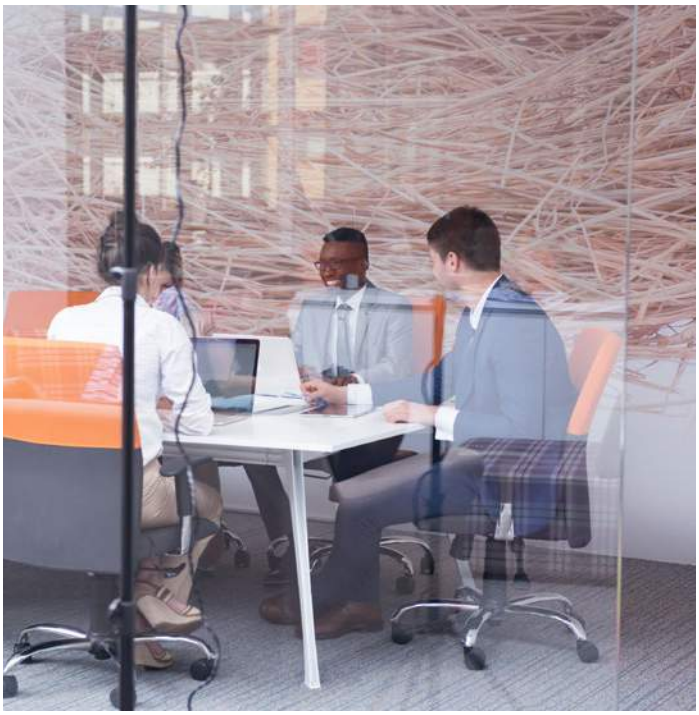
Switchable glass denotes glass which changes its transparency when a voltage is applied – either translucent privacy screening or transparent. This property is exhibited by laminated glass in which a special LC film (liquid crystal) is sandwiched between two or more glass panes.

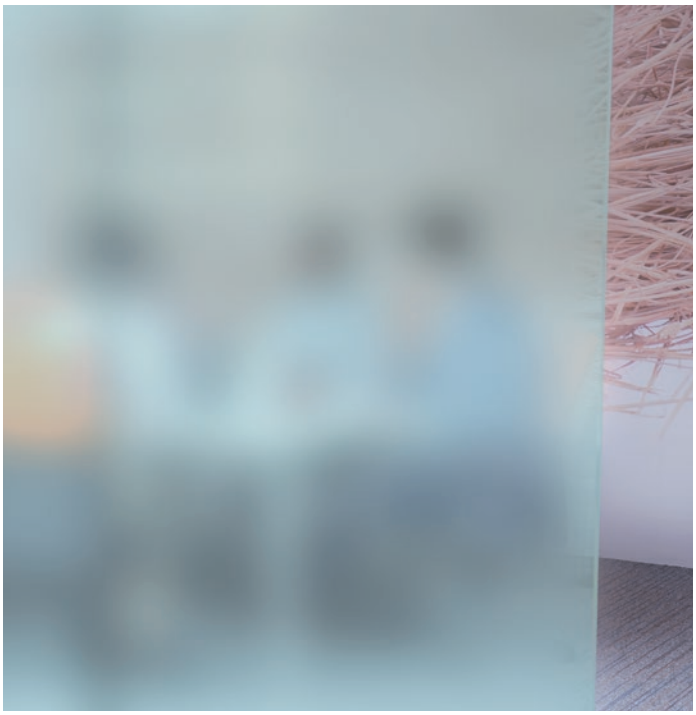
The liquid crystal molecules in the film change their orientation when a voltage is applied. When no current is supplied, they arrange themselves randomly with the result that the film appears white-translucent and they diffuse incident light. When a voltage is applied, the crystal molecules orient themselves systematically, causing the film to become transparent.
This makes it possible to switch between transparent and opaque (privacy) at the touch of a button.

The glass offers a huge range of possible uses: in indoor areas for example for partition walls in conference rooms or integrated into insulating glass in windows or façades.

The electrical connection can be made when used in framed constructions via the glass edge. Switchable glass is also available which can be used without a frame and is activated via current-carrying glass fittings. Revolving and swing doors and even accordion (folding) partitions can be provided with this fitting technology.

Glass with safety glass properties is primarily used.





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6.4 Walk-on glass

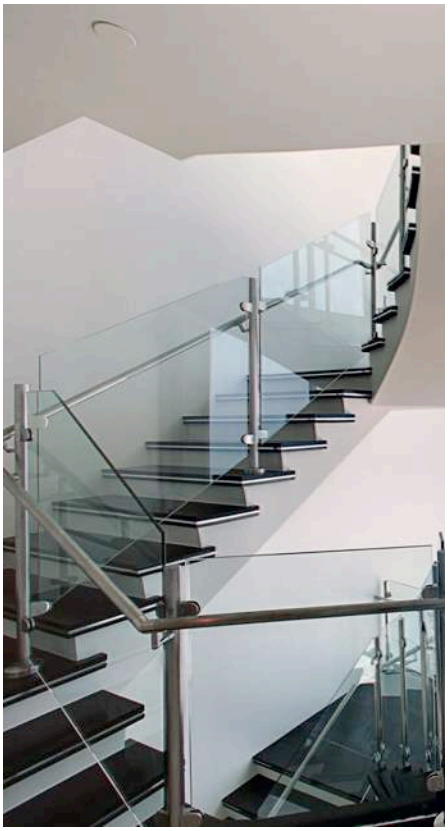
This is horizontal glazing which can generally be used by people.
It is regulated in DIN 18008 (TRLV) for a limited range of applications. It involves steps or landing elements with linear mounting on all sides and max. dimensions of 1400 x 2000 mm. Furthermore, they are regarded in terms of building law as an unregulated building element that requires general building authority approval or individual approval for the specific case in order to be used.

7.0 Building Law Classification of Interior Glazing

The planning of glazing in indoor applications should be preceded by a clarification as to how such glazing is to be classified in building law. This results in the further procedure, particularly if structural and other safety-related aspects have to be taken into consideration.

If the planned glazing is subject to building regulations (such as walk-on or fall-prevention glass), all the building law requirements must be observed; in particular structural requirements and those of building product legislation. Certain glass structures, such as display cases, glass tables, doors and shower partition walls, are not subject to any building law requirements. However, this does not mean that stability and safety aspects can be disregarded. Further non-building-specific product standards can come into effect here.

Regardless of whether the glazing is subject to building regulations or not and whether it is subject to structural requirements or not, further regulations must be observed if necessary, such as fire protection requirements or in the case of particular areas of application, for example glazing in sports facilities, schools and kindergartens or on trade fair stands. See FAMAB fact sheet “Glass and acrylic glass in stand construction inside exhibition halls” (available from the trade fair organizations) and regulations of the individual trade fair organizations.



8.0 Conclusion

Glass offers a huge range of possible applications in indoor areas of both a functional and a creative nature. All the information contained in this publication about the product and its uses do not constitute binding statements as to its condition.

Suitability for use in terms of condition, qualification and function is determined exclusively by the respective uses, manufacturing and processing methods of the product and the relevant national statutory and normative provisions and standards.

In each case, divergences customary in the industry are permitted, unless otherwise agreed in writing.

All statements represent the current state of the art and are to be understood merely as possible examples. Professional assessment of the project conditions and suitability for the intended purpose must be carried out in the individual case and must be adapted to the respective state of the art.

This Technical Guide ceases to be valid upon publication of a new edition.
It has been drawn up to the best of our knowledge, but does not claim to be exhaustive.

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