

NSG

GROUP

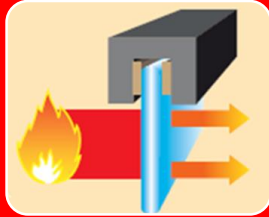


Fire protection glass Pilkington

Piotr Mazurkiewicz

Three product lines

Three strong performers



Pilkington Pyroclear®



Pilkington Pyrodur®



Pilkington Pyrostop®

Location of Production Sites



Pilkington Pyrostop® and
Pilkington Pyrodur®
are manufactured in Gelsenkirchen
centrally and shipped to markets all over
the World



Location of Production Sites

Pilkington **Pyroclear**[®] is being manufactured at production sites in Japan and Poland






Requirements for Fire-resistant Glass

Definition of Fire Resistance Classes (acc. to EN)

- Integrity (**E-class**)
 - → Prevents fire movement
(The ability of the system to keep back flames, smoke and hot gases)
- Insulation and Reduced heat radiation (**EW-class**)
 - → Prevents fire spread (E-class) and
 - → Reduces heat transfer
 - (< 15 kW/m² in 1.0 m distance of the specimen)
- Insulation and Integrity (**EI-class**)
 - → Prevents fire spread (E-class) and
 - → Limits heat transfer
 - Max. allowable rise of surface temperature on the non-fire side/unexposed side:
 - - max. 140 ° C on average above ambient temperature
 - - less than 180 ° C at any point above ambient temperature

Requirements for Fire-resistant Glass

Fire resistance Classification acc. to EN 13501-2

| | Requirements | Classification (reg. EN 13501-2) | Product line |
|---|---|-------------------------------------|-----------------------|
|  | Basic integrity (barrier against smoke, flames and fumes) | E.. | Pilkington Pyroclear® |
|  | Enhanced integrity (basic integrity + reduced heat radiation) | EW.. | Pilkington Pyrodur® |
|  | Full thermal insulation (basic integrity + thermal insulation) | EI.. | Pilkington Pyrostop® |

Pilkington Pyroclear®



- **Product:** Pilkington **Pyroclear®**
- **Class:** E 30, E 60
- Modified super toughened clear glass with round shaped edge
- Basic Integrity (barrier against smoke, flames and fumes)

Super toughened and unique edge system.

Pilkington Pyrodur®



- **Product:** Pilkington **Pyrodur®**
- **Class:** E/EW 30 i 60
- Multi-layer intumescent laminate glass comprising float glass
- Enhanced Integrity (Basic Integrity + Reduced Heat Radiation)

Premium brand with international recognition

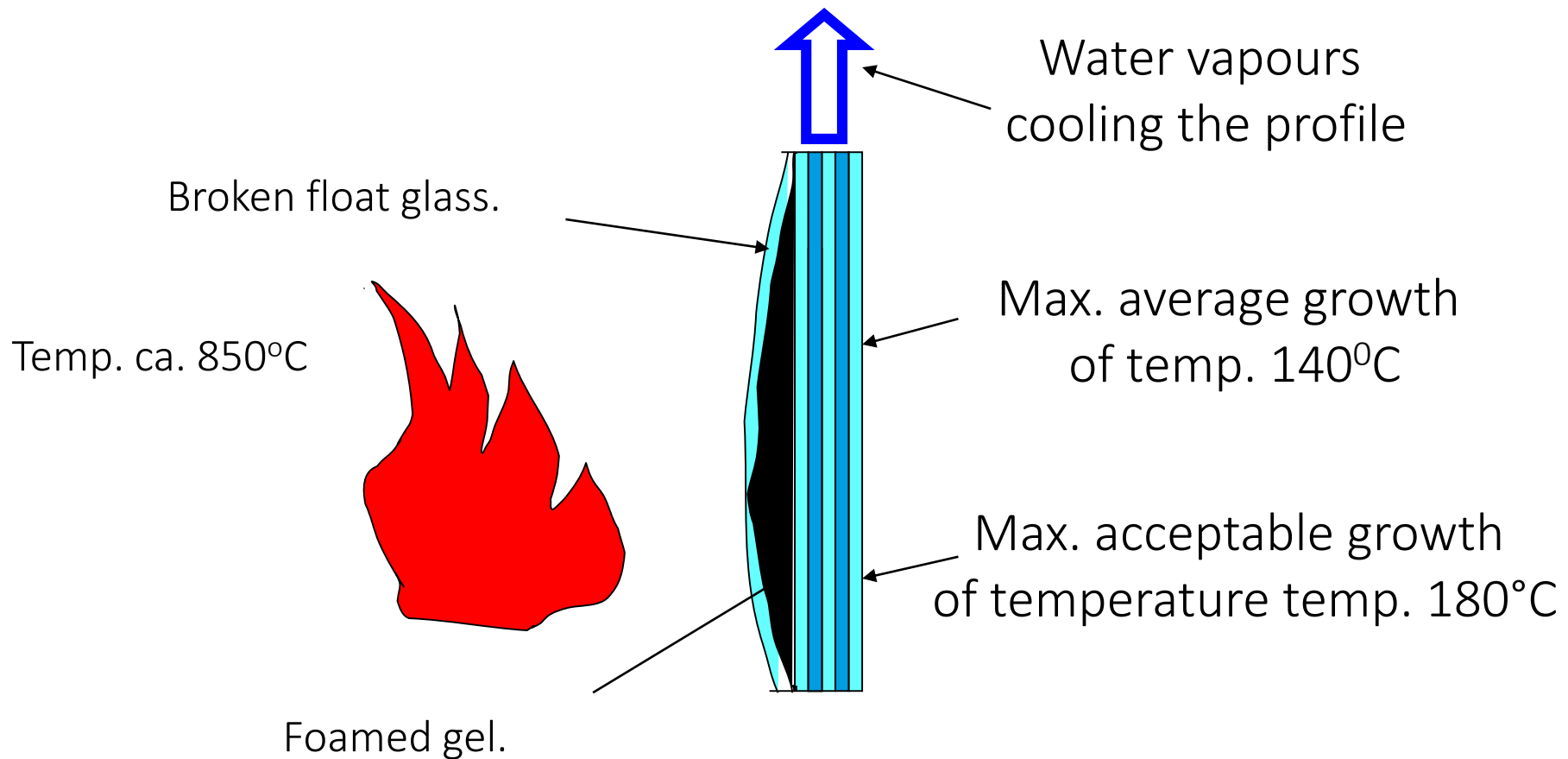
Pilkington Pyrostop®



- **Product:** Pilkington Pyrostop®
-
- **Class:** EI 30, 60, 90, 120 i 180
- (Multi-layer intumescent laminate glass comprising float glass
- Full thermal Insulation (Basic Integrity + Thermal Insulation)

Premium brand with international recognition

Behaviour at fire – class EI



Pilkington Pyrostop® - EI class (Integrity and Insulation)

Internal applications

- 15 mm Pilkington Pyrostop® 30-10
- 23 mm Pilkington Pyrostop® 60-101
- 56 mm Pilkington Pyrostop® 120-10

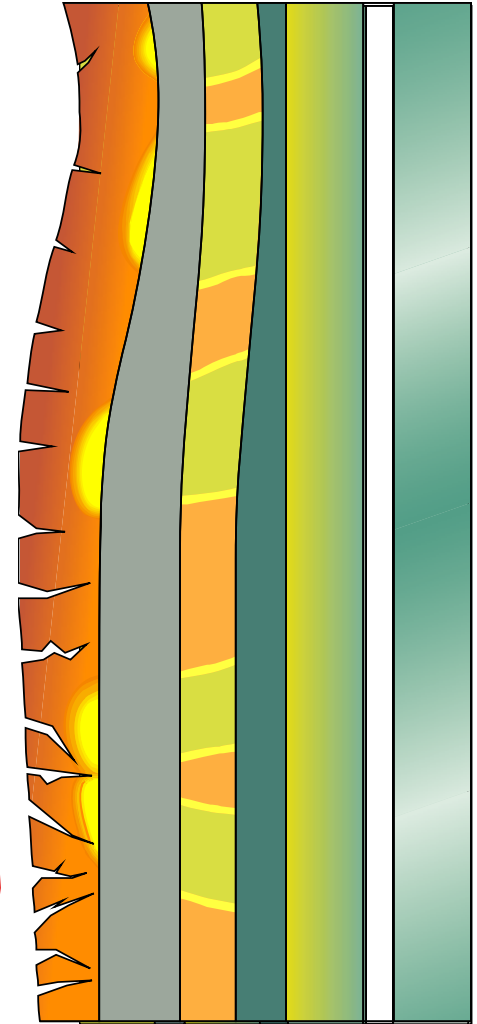
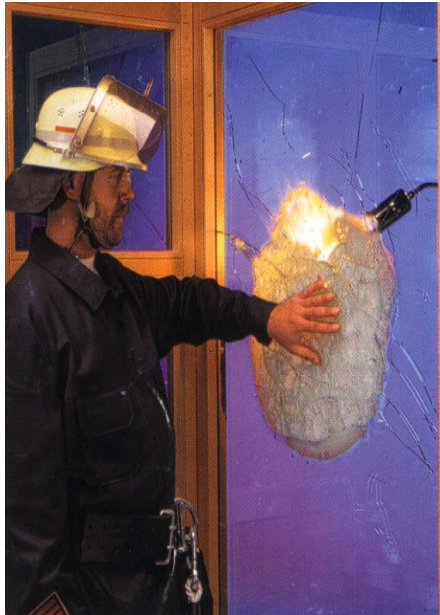
External applications

- 18 mm Pilkington Pyrostop® 30-20
- 27 mm Pilkington Pyrostop® 60-20
- 64 mm Pilkington Pyrostop® 120-380

Foaming process – The Way it Works

- Multi-layer Intumescent Laminate with special fire-resistant interlayer

- Pilkington Pyrostop®
- Pilkington Pyrodur®



Multi-layer Intumescent – Laminate Technology in Action

Time zero

Time ~2-3mins

After intumescence



Start of test



Reaction of the interlayer at 110
°C



Intumescent Fire-Resistant glass
turns opaque & reduces heat

Requirements for Fire-resistant Glass

Fully tested and approved Fire-resistant Glazing
= Fire-resistant glass + frame + materials



to be installed in: concrete, brick or fire rated plaster board wall

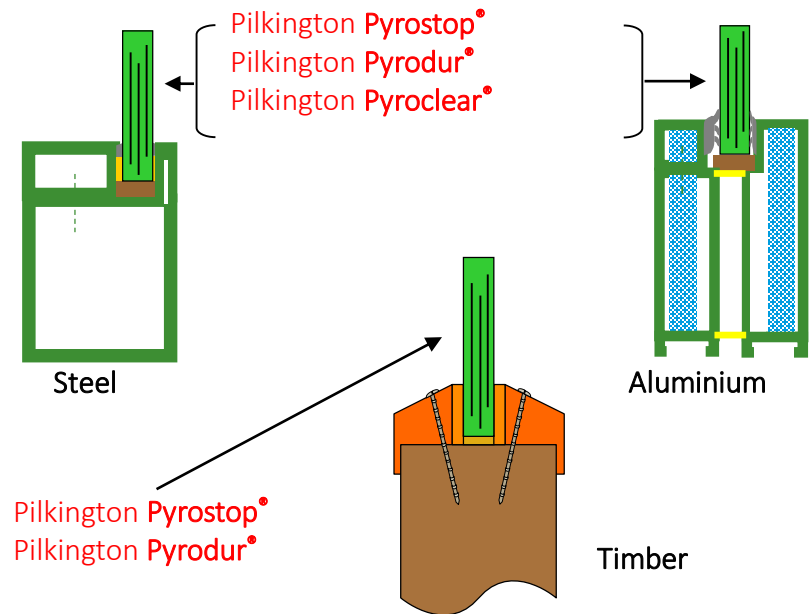
Fire-resistant Glazing must be approved and classified as a system!

Approvals and classifications are based on

- fire tests to the relevant standards
- approvals/assessments issued by accredited third parties

To sell Fire-resistant Glass in any market, valid test evidence is required. Options are:

- International test evidence will be accepted
- Assessments to local standards based on existing test evidence to international standards are needed
- Glass components can be easily changed in tested systems without having to test
- Fire Tests have to be done in your market



Always consult us for
fire test evidence

Pilkington Pyrostop® – Benefits

- Max. level of protection – integrity and insulation – comparable to a concrete wall
- “A must” for use in escape routes and emergency exits to protect from the dangerous levels of heat radiation
- Max. reliability in fire tests and consistent performance of the multi-layer intumescent function
- Glass compositions with maximised light transmittance and clarity using low iron glass (Pilkington **Optiwhite™**) where appropriate (thicknesses in excess of 20 mm)
- Withstands hose stream test
- Reliably preventing flashover (*)
-

(*) flashover = near simultaneous ignition of all combustible material in an enclosed area

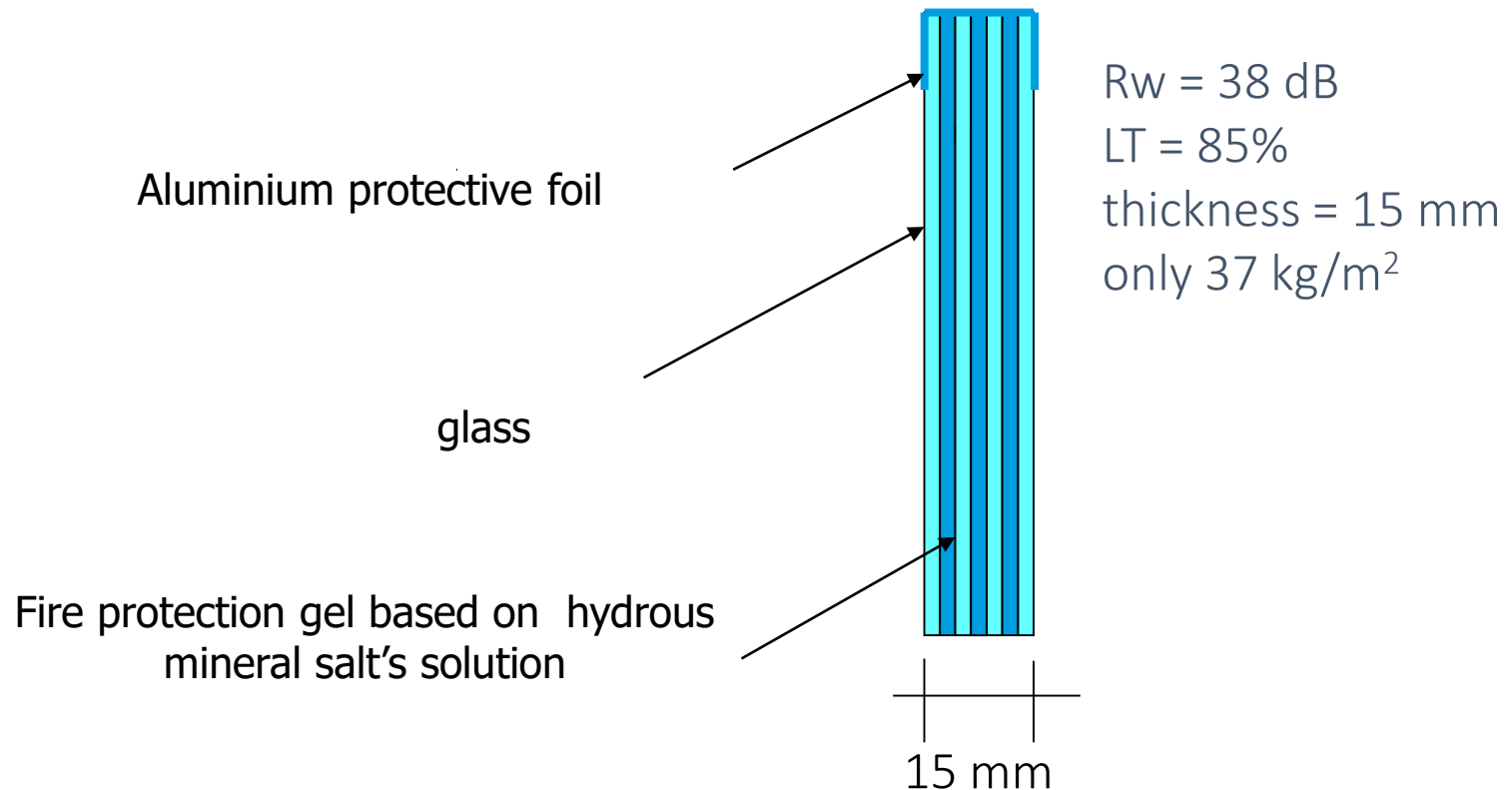
Class EI – Pilkington Pyrostop® - Benefits

- Reliability – designed with 25% reserve.
- Ideal sound insulation.
- Save structure – laminated glass.
- Best Optics – none toughening distortions.
- High light transmission – 56 mm Pilkington Pyrostop®'s transmission close to DGU 4-16-4.
- Wide range working temperature from -40°C to +50°C.
- Assembling advantage – 2 mm less thickness of glass makes the plate with dim. 2000 x 1500 mm is ca. 15 kg lighter.

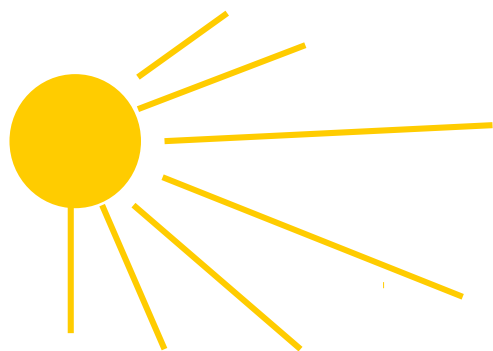


Fire Protection Glass for internal applications - class EI

- Pilkington Pyrostop® 30-10

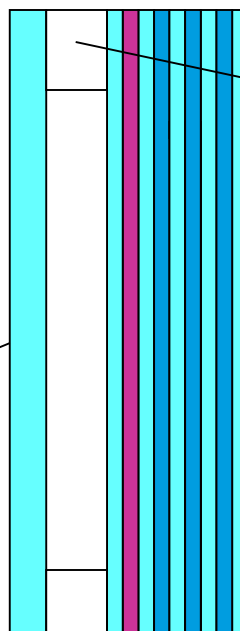


Fire Protection DGU



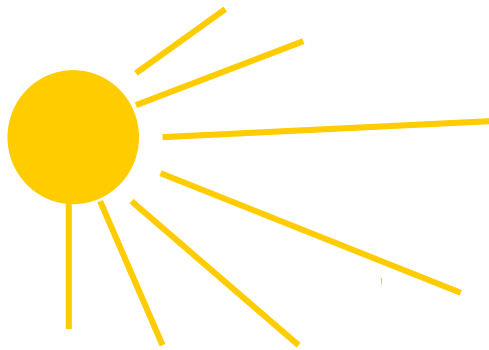
Outside functional pane.
Energy absorption < 50%

UV filter – PVA foil



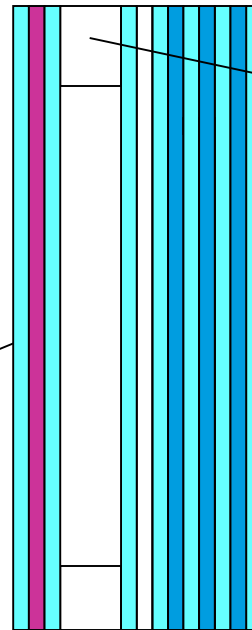
Spacer made of steel
or aluminium
max .16 mm
(for external applications)

$U_{max} = 1,1$



Outside pane min. 44.2
Energy absorption < 50%

UV filter - PVA foil



Spacer made of steel
or aluminium
max .16 mm
(for external applications)

U max = 1,1

Glass dedicated for glazing with Fire Protection Glass

Solar control:

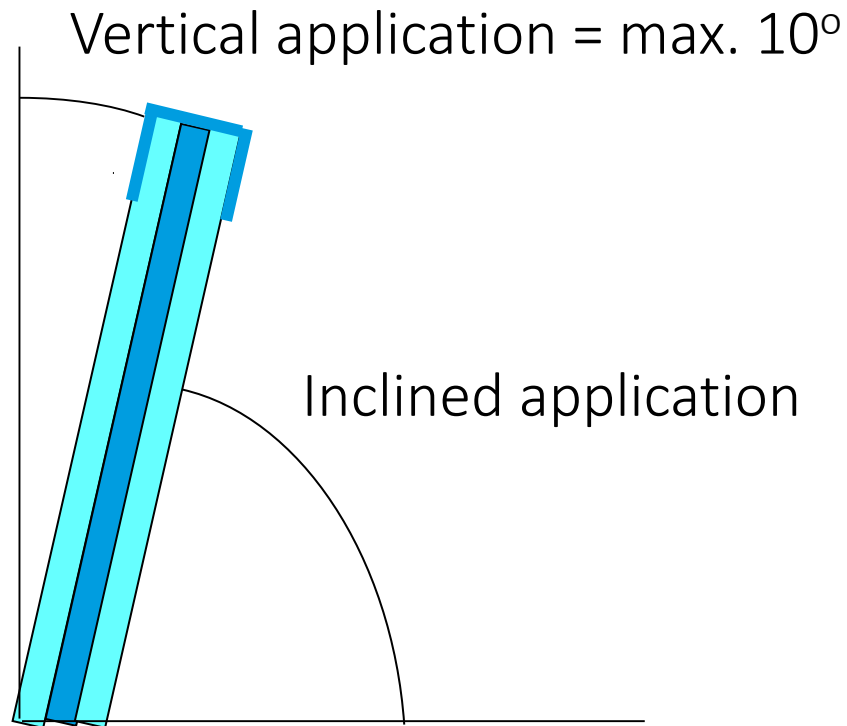
- Pilkington Suncool™ 70/40
- Pilkington Suncool™ 66/33
- Pilkington Suncool™ 50/25
- Pilkington Suncool™ Blue 50/27
- Pilkington Suncool™ Silver 50/30
- Pilkington Suncool™ 30/17
- max. 6 mm Pilkington Optifloat™ Green
- max. 6 mm Pilkington Solar-E™
- max. 6 mm Pilkington Eclipse Advantage™ Clear

Low-e:

- 6 mm Pilkington K Glass™

Maximum inclination

Pilkington Pyrodur[®] and Pilkington Pyrodur[®]

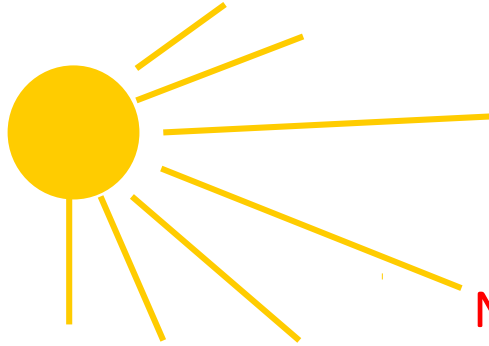


Applications



Railway station in Frankfurt
15 mm Pilkington **Pyrostop®** 30-10

Inclined Applications' Glass



44 mm Pilkington **Pyrostop®** 30-401

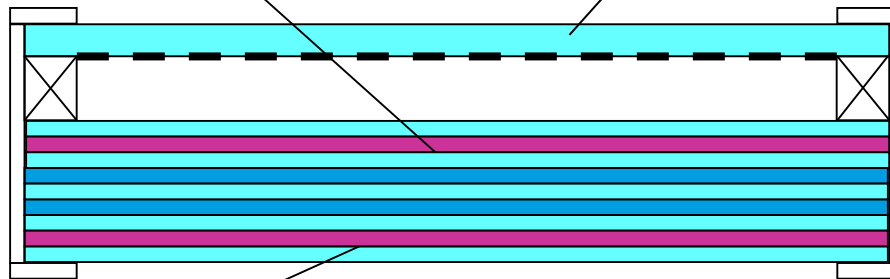
max dimensions **2000**mm x **1050**mm

Non of the dimensions can be exceeded !!!!

8 mm Toughened glass with Low-E or HP coating.

UV filter – PVA foil

Spacer max .12 mm



Protection foil - PVA

Applications



Railway station in Frankfurt
44 mm Pilkington **Pyrostop®** 30-401

Applications



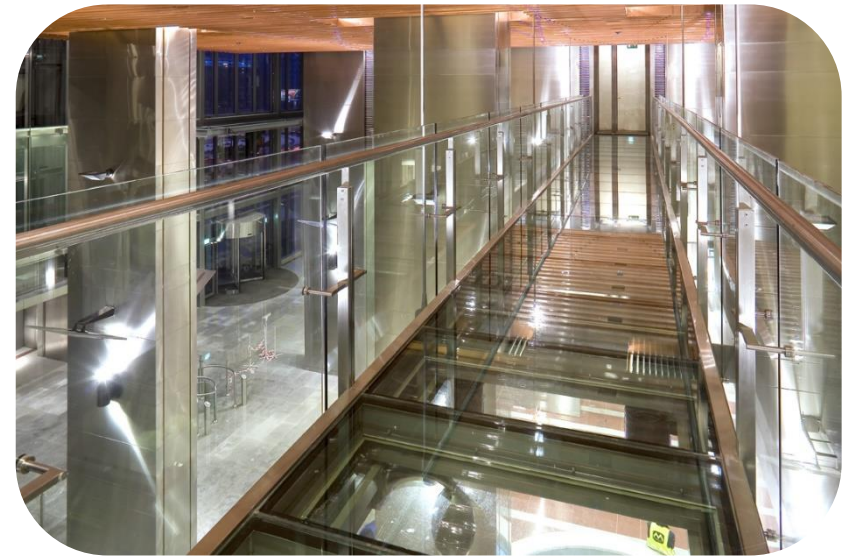
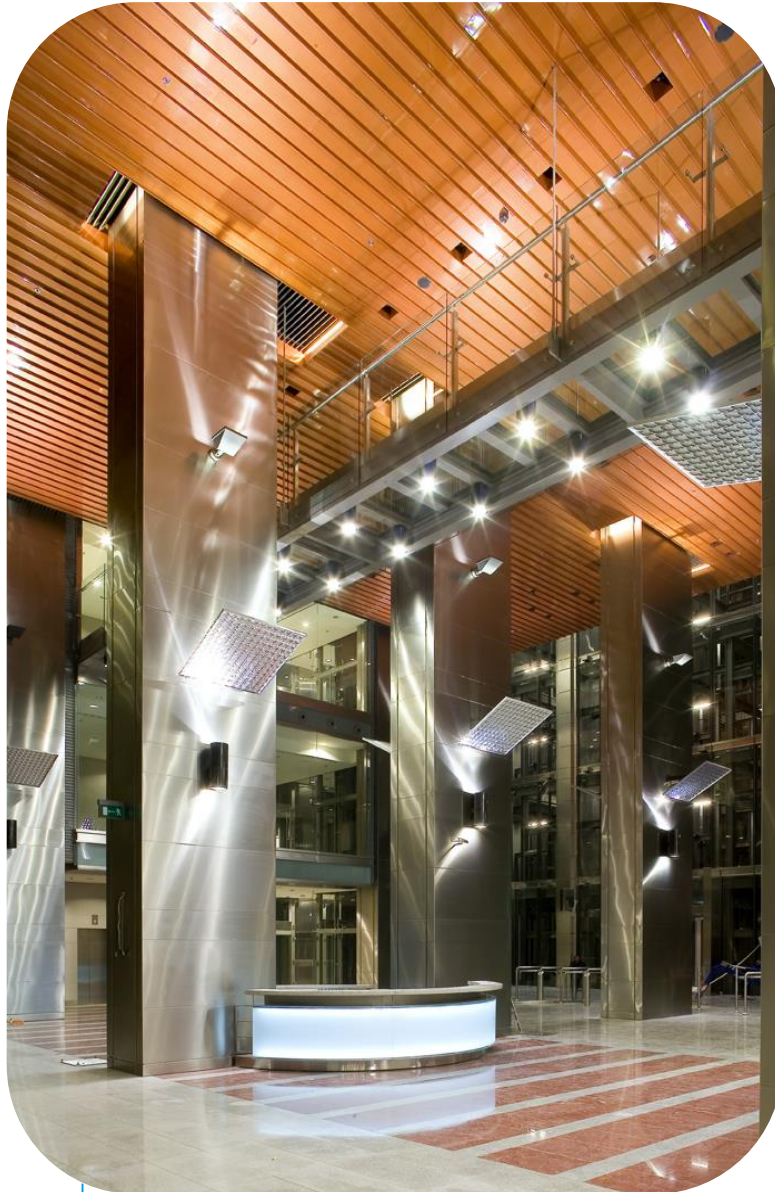
Skylight, Złote Tarasy, Warsaw,
Pilkington **Pyrostop**® 30-401
klasa EI 30

Applications



Shopping center Rzeszów
Pilkington **Pyroclear**®

Applications

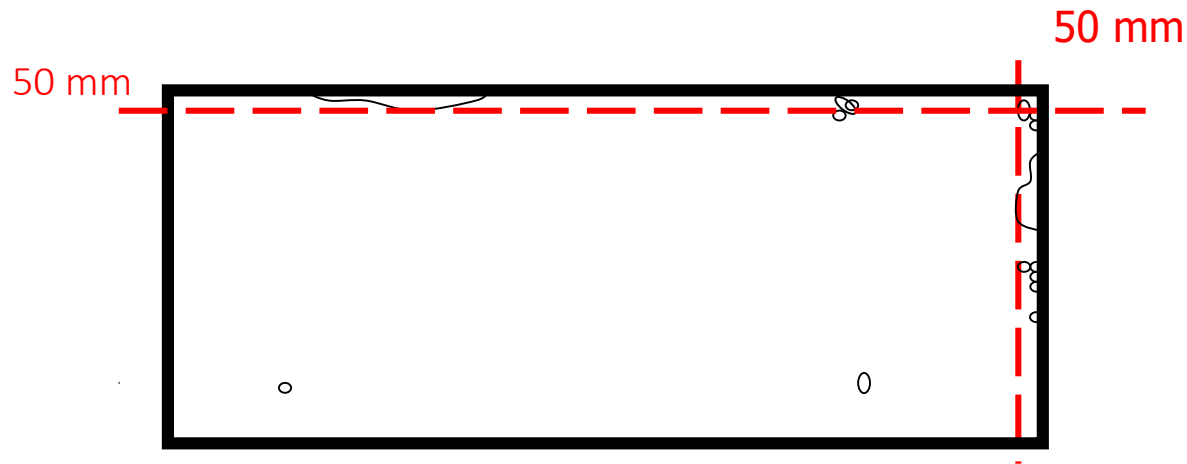


Footbridge, Rondo ONZ, Warsaw,
33 mm Pilkington **Pyrostop**® 60-50
Klasa EI 60

Dimensions of base plates of Pilkington Pyrostop® and Pilkington Pyrodur®



- Dimensions:
- - 3130 mm x 2040 mm
- - 3130 mm x 2320 mm – only EI 30, EI 60 internal



Colour foils



Project references



...all over the Europe



Applications



Separation of lift zone and offices
15 mm Pilkington **Pyrostop®** 30-10

Applications



Tube station, Warsaw
15 mm Pilkington **Pyrostop**® 30-10

Applications



Facade, Złote Tarasy, Warsaw,
Pilkington **Pyrostop®**
Klasa EI 60

Applications



Taurus, Warsaw
Pilkington **Pyrostop®**



Office GlaxoSmithKline, Warsaw
Pilkington **Pyrostop®**

Applications



University of Ecology and Management, Warsaw, Pilkington
Pyroclear®

Applications



Hotel SPA Warszawa, Augustów
Pilkington **Pyrostop**®

Applications



10 mm Pilkington **Pyrodur**® 30-201
/12mm/
18 mm Pilkington **Pyrostop**® 30-20

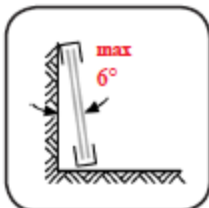
Fire resistant curtain wall
200 m x 16 m
● Reichstag, Berlin

Glass storage

- Fire resistance glass should be stored dry; not exposed to rain, direct sunlight or other sources of heat, afore mentioned also applies to panes on racks or packed in wooden boxes.
- Panes should be stored in an upright position, with a vertical deviation of not more than 6 °. The weight of the glass should rest on two rigid supports, however, direct contact of the glass with any metal parts is forbidden.
- To prevent possible displacement of fire-resistant glass layers, a 90° angle between the glass surface and the support plane of the lower glass edges of the must be maintained.
- Distance pads and protecting elements should not damage the glass and the tape.



Chronić przed wodą i słońcem
Avoid the influence of weather



Transport i magazynowanie
w pozycji pionowej
Vertical Stocking



Chronić przed uszkodzeniem
krawędzi. Nie odklejać taśmy
Do not damage/modify edges



W trakcie montażu chronić
przed dużym naciskiem
No pressure glazing



Obchodzić się ostrożnie
Handle properly

Pilkington Pyrostop® Pilkington Pyrodur®

Szkła ognioochronne muszą być właściwie zainstalowane w przebadanych i certyfikowanych systemach oszkleń, zgodnych z krajowymi wymaganiami i przepisami prawnymi.

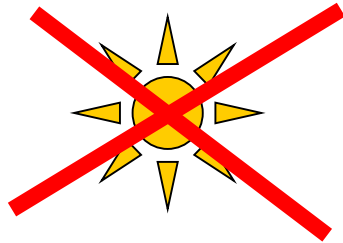
Fire-resistant glass must be installed correctly in an appropriately tested and certified glazing system acc. to the national requirements and regulations.

Szkląć tą stroną do wnętrza budynku!

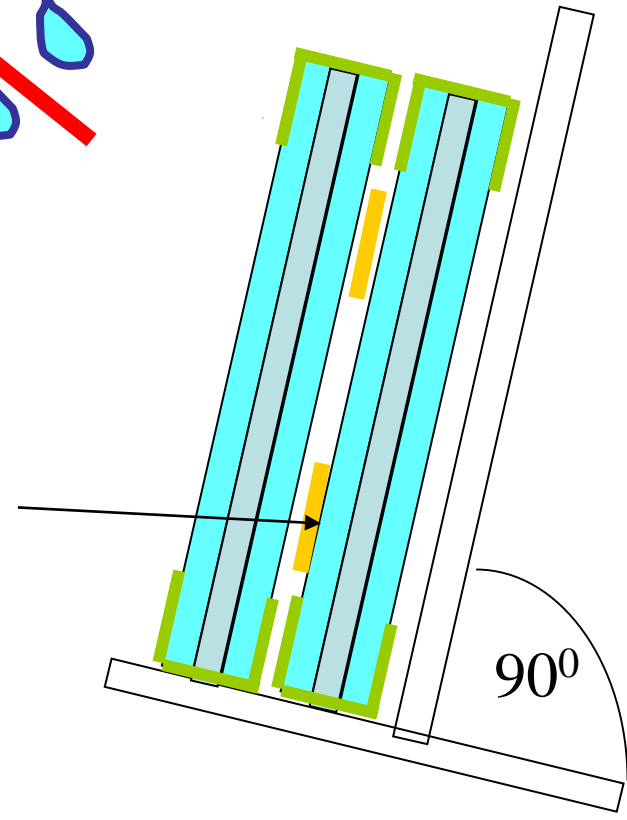
This side to be turned inside!



Glass storage



Distance Pads



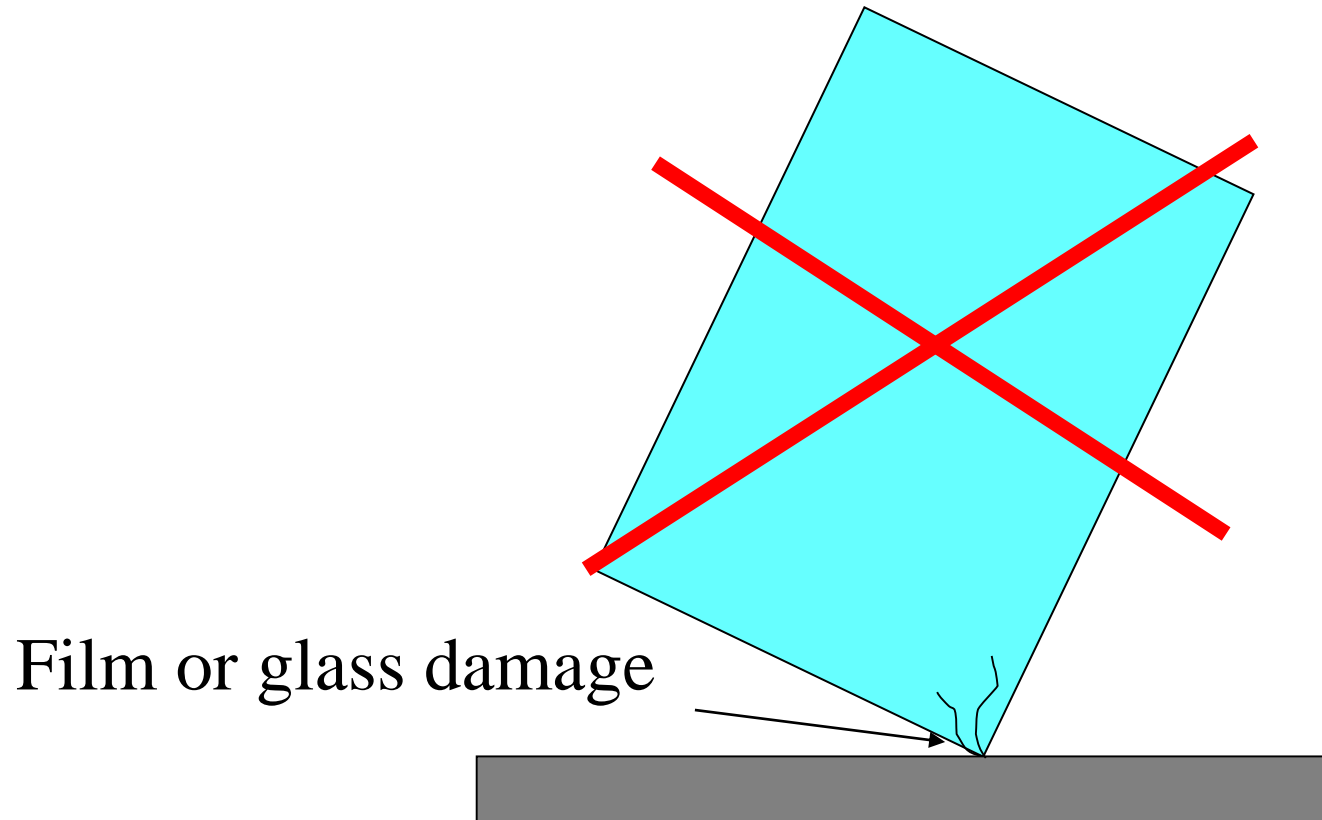
Storage and transport

- The working possibility in a wide temperature range from -40°C to $+50^{\circ}\text{C}$
- Best Optics - lack of toughening distortions.
- Easy assembly: 2 mm smaller thickness means that a 2000 x 1500 mm sheet weighs approx. 15 kg less.

Glass installation

- Before installation, each pane should be examined carefully, paying special attention to possible breakage, scratches on the glass and damage, cut, tear of adhesive tape.
- Glass panes with such defects must be reported immediately, further installation leads to the loss of the possibility complaint to be submitted.
- It is forbidden to remove or tear as it can lead to irreversible loss of glass insulation.
- When reloading or installing glass panes, it is unacceptable to lean them on one of the corners while turning the glass.

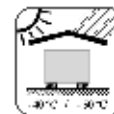
Glass installation





Glass installation

- The basic element that requires attention during the installation of glass is the correct recognition which side should be turned outside the building and which inside.
- In case of glass panes installed in external walls (windows, doors, roofs), always check the position of the sticker.
- **Pane should be installed in such a way that the sticker is inside the building !!!**



Chronić przed wodą i słońcem
Avoid the influence of weather



Transport i magazynowanie
w pozycji pionowej
Vertical Stocking



Chronić przed uszkodzeniem
krawędzi. Nie odklejać taśmy
Do not damage/modify edges



W trakcie montażu chronić
przed nadmiernym naciskiem
No pressure glazing



Obchodzić się ostrożnie
Handle properly

Pilkington Pyrostop®
Pilkington Pyrodur®

Szkła ognioochronne muszą być właściwie zainstalowane w przebadanych i certyfikowanych systemach oszklenia, zgodnych z krajowymi wymaganiami i przepisami prawnymi.

Fire-resistant glass must be installed correctly in an appropriately tested and certified glazing system acc. to the national requirements and regulations.

Szklę tą stroną do wnętrza budynku!

This side to be turned inside!

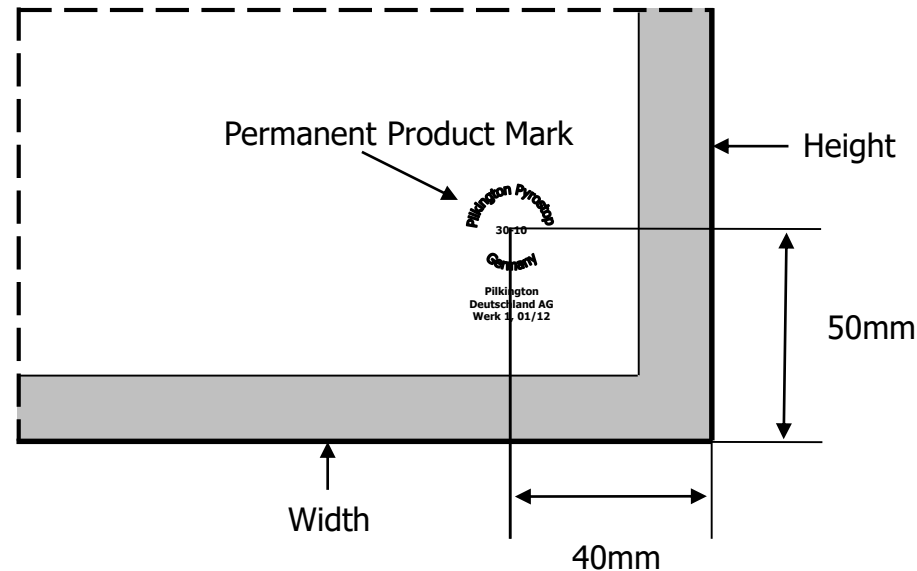




29/03/2004

Pilkington **Pyrostop**® and **Pyrodur**® Glass Marking Guideline

Pilkington **Pyrostop**® and Pilkington **Pyrodur**® must carry a product mark and must be positioned as described in the following drawing.



Glass marking

Pilkington Pyrostop
30-10

Germany

**Pilkington
Deutschland
AG
Werk 1, 01/12**

Glass installation

- An important element of the installation is ensuring even pressure on the edges of the glass.

The pressure on the edges of the glass should not be high and perimeter of the glass should not exceed 20 N/cm.

Cleaning at the construction site

- Cleaning water as well as cleaning cloths or sponges must not contain sand and other foreign matter. Cement dust and other abrasive residues must not be removed dry! If the panes are heavily soiled, use more water accordingly.
- Water contaminated with fresh concrete has corrosive properties, so it must be kept away from the glass surface. Immediately remove traces of cement sludge and building materials from the glass. Longer periods of such deposits on the glass cause permanent damage (tarnishing).

Proceeding at the construction site

- Radiators or hot air blowers must not act directly on fireproof glass. Radiators located close to the glass should have covers and distance should not be less than 30 cm.
- Indoors asphalt paving creates a high thermal load against which fireproof glass must be protected. For this reason, we generally recommend installing glass after asphalt paving. If it is not possible, the glass should be protected against heat radiation by covering the entire surface of the glass. If there is a risk of solar radiation, covering is necessary from the outside. The aforementioned applies especially to panes with coatings.

Proceeding at the construction site

- Grinding / welding works close to glass pane require effective direct protection of the glass surface against welding spatters, sparks, etc.
- Pitting, damages to the glass surfaces can occur as a result of chemicals contained in building materials and cleaning agents, e.g. water glass additives. Such chemicals cause pitting, especially when they applied on the glass for a long time.
- Due to the variety of reasons, general precautionary measures cannot be determined. They should be defined and implemented on the basis of conditions existing in a given situation.

Proceeding at the construction site

- Shading and heat accumulation that may occur as a result of special installation conditions, e.g. in niches, with blinds, awnings, radiators etc. can cause glass cracking due to temperature differences.
- Additionally, paint cover, foil sticking or applying other materials may, with simultaneous solar radiation, cause thermal overload of the glass and fireproof layers between the panes.
- The same applies to all fire-resistant glazing used outdoors, installed tightly, without sufficient ventilation, as a cladding or laminate on building components (e.g. covering a non-transparent strip or roof cornice).

Glass installation

Before installation, each pane should be examined carefully, paying special attention to possible breakage, scratches on the glass and **damage, cut, tear of adhesive tape.**











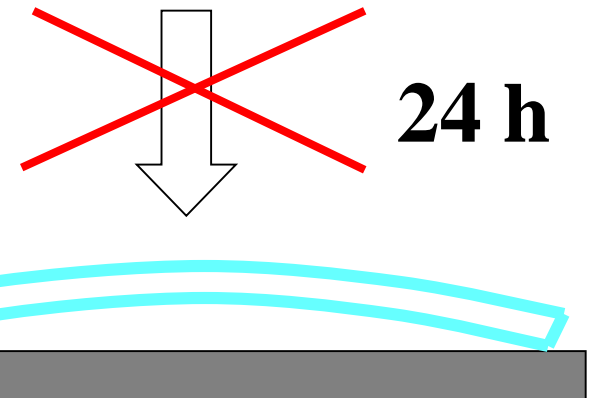
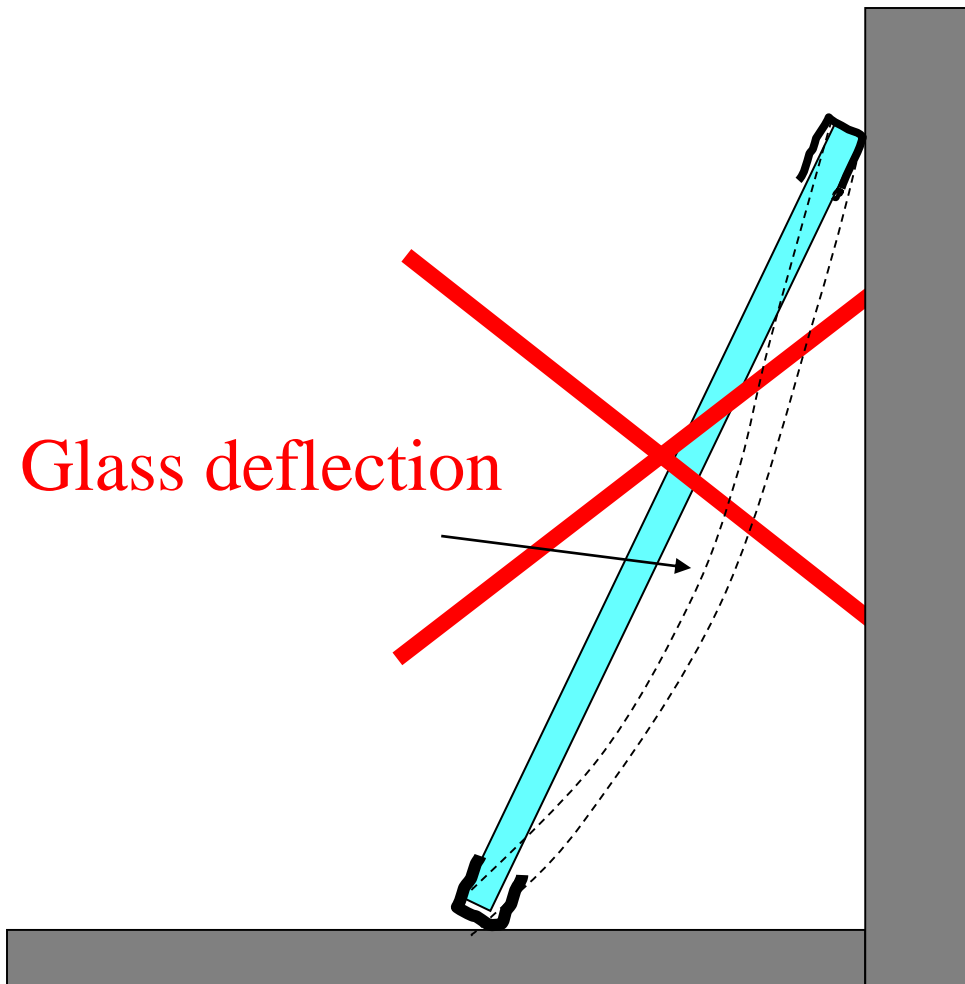






Storage and transport

Glass deflection



Solution



Thank you for your attention



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