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LEADING IN EUROPE

SAFETY GLASS

GLASS CLASSIFICATION BASED ON USER SAFETY
ACCORDING TO EN-12600 STANDARD

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Glass classification based on user safety according to EN 12600 is performed by means of an impact method - pendulum test.

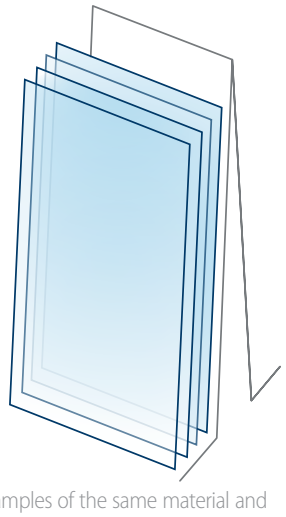
The objective is to classify glass products for the risk of injury and falling out of the window.

TEST PROCEDURE

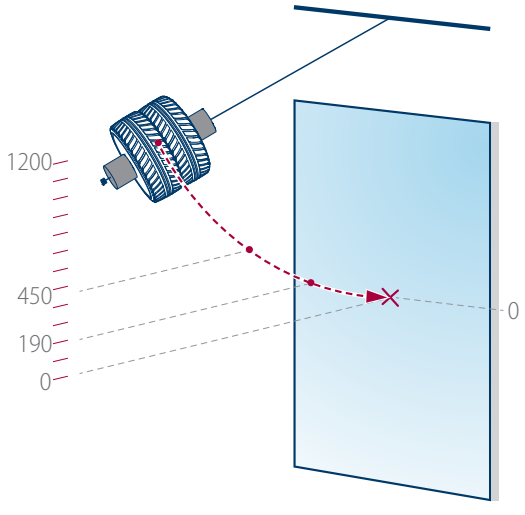
The test is performed on four samples of the same material, dimensions: 876 mm x 1938 mm. Each sample is placed in a fixing frame so that the edge is covered by rubber to the depth of 10 mm.

Test should begin from the lowest drop height and should be raised to the appropriate height class.

The pressure of the tyres used on the pendulum should be (0.35 +/- 0.02) MPa. The pressure should be checked when setting the height of the pendulum. Rope fixing the pendulum during the test should be tight all the time.



4 samples of the same material and dimensions: 876 x 1938 mm

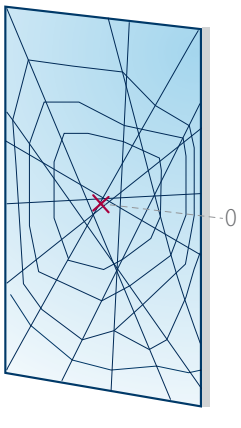


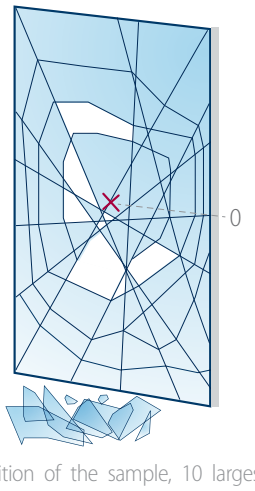
The pressure of the tyres: p - (0,35+/- 0,02) MPa

Total weight of the pendulum: 50 kg

When the tests are performed on asymmetrical materials intended to be fixed in places where there is a risk of hitting from both sides, the test should be performed on both sides

Following each test, the sample should be inspected and identified if it is not broken, or broken according to the requirements of sub-items a) and b) or broken in a way that does not meet the conditions specified in sub-items a) or b).





a) Numerous fractures inside the sample are acceptable, except for a chipping or a hole whose diameter is sufficient for a 76 mm ball to pass through, after applying the maximum force of 25 N. Moreover, if pieces come apart three minutes after the impact, their total weight should not be greater than the equivalent weight corresponding to 10 000 mm^2 of the original sample.

b) After decomposition of the sample, 10 largest pieces collected within 3 minutes after the impact and weighed together with other pieces collected within 5 minutes after the impact should not weigh more than the equivalent weight of 6 500 mm^2 of the original sample. The pieces should be collected only from the exposed part of the sample, from the test frame. When identifying the equivalent weight, only the exposed area with glass pieces left in the test frame should be taken into account.

GENERAL CONDITIONS

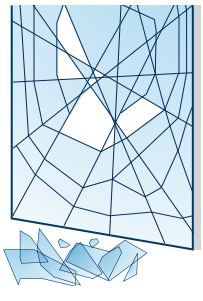
Glazing is classified according to the following criteria:
– drop height at which the glass broke,
– drop height at which the sample was tested according to sub-item a) or b),
– material fracture pattern if it was not broken after the impact test.

CLASSES DEPENDING ON THE DROP HEIGHT

Class 3	Class 2	Class 1
The material meets the requirements given in the sub-item a) or b) for the drop height of 190 mm relevant for strong pushing by an adult or a running child hitting a glass pane.	The material meets the requirements given in the sub-item a) or b) for the drop height from 190 mm to 450 mm - this class of glass is resistant to hitting by an adult but it may not resist an impact of a running adult.	The material meets the requirements given in the sub-item a) or b) for the drop height from 190 mm to 1200 mm - for critical applications.

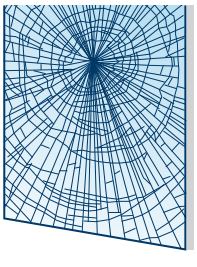
CLASSES DEPENDING ON FRACTURE PATTERN

Type A	Type B	Type C
Fracture pattern typical of annealed glass. Numerous fractures in a form of separated pieces with sharp edges, some of which were large and could hurt people staying within the reach of their falling; the effect is characteristic of standard float glass (annealed), heat strengthened glass and chemically strengthened glass.	Fracture pattern typical of laminated glass. Numerous fractures but with chips keeping together and not separated (it is highly unlikely that people standing nearby will be hurt; the effect is characteristic of laminated glass of the float type with applied top foil and for reinforced glass (with embedded metal mesh).	Fracture pattern typical of tempered glass. Numerous minor chips which are relatively harmless are formed as a result of breaking (the risk of getting hurt is eliminated; the effect is characteristic of heat tempered glass).

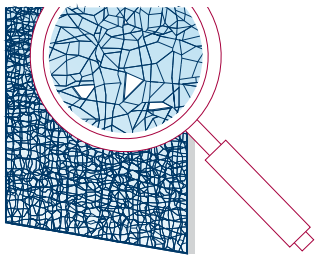


Fracture pattern of float glass

Fracture pattern of heat strengthened glass TVG



Fracture pattern of laminated glass VSG



Fracture pattern of toughened glass ESG

CLASSIFICATION PRESENTATION

Product classification is identified by the following symbol: α /β/ φ

α – is the greatest drop height for the class, at which the product was either not broken or broken according to the requirements of sub-item a) or b),

β – is the fracture pattern,

φ – is the greatest drop height for the class at which the product was either not broken or broken according to the requirements of sub-item a).

EXAMPLE:

The 1/C/3 characteristics was obtained in the tests, which stands for the following:
– for the height of 190 mm none of the 4 samples was broken,
– for the height of 450 mm all 4 samples were broken and they meet the requirement of sub-item b),
– for the height of 1200 mm, all samples were broken and they meet the requirement of sub-item b).
Tested samples were broken into small and relatively harmless pieces.

Class 1/B/1	Class 2/B/2	Class 1/C/1
Laminated glass is classified as 1/B/1, if it demonstrates resistance to impact from the height of 1200 mm, with no possibility of the hitting object penetration.	Laminated glass is classified as 2/B/2, if it demonstrates resistance to impact from the height of 450 mm, with no possibility of the hitting object penetration.	Heat tempered glass is classified as 1/C/1, if it demonstrates resistance to impact from the height of 1200 mm without breaking.

We constantly modify our manufacturing processes and change habits to limit the negative effect on the environment. In order to facilitate the changes, we have adopted ISO 14001, the worldwide management system for environmental protection.

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X/2024/EN

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