



Fire-resistant glass
in specialised rail transportation

Pilkington Deutschland AG - part of the global NSG Group

The NSG Group is one of the world's largest manufacturers of glass and glazing products for Architectural, Automotive, and Established Creative Technology to support NSG Group's future growth. NSG Group acquired the glass supplier Pilkington in 2006. Today, with around 25,000 permanent employees, NSG Group has principal operations around the world and sales in over 100 countries.

The Architectural division produces and supplies glass for Buildings as well as Solar Energy applications. Automotive serves the Original Equipment (OE), Aftermarket Replacement (AGR) and Specialised Transportation glazing markets. The Creative Technology SBU was established to support NSG Group's focus on future growth.

Pilkington Deutschland AG is a leader in the development, manufacturing, and testing of fire protection glazing with 45 years of experience. From its site in Gelsenkirchen, Germany, it supplies its global network of licensed processors and customers with fire-resistant glass.

Today, sophisticated architecture seamlessly integrates large-scale fire safety systems with Pilkington fire-resistant Glass. More than 1,000 different systems of steel, aluminum, steel-aluminum and timber framing, as well as butt-jointed and flush installations of fire-resistant glazings in bespoke fire protection systems, have been used in a variety of applications to create brighter environments flooded with natural light.

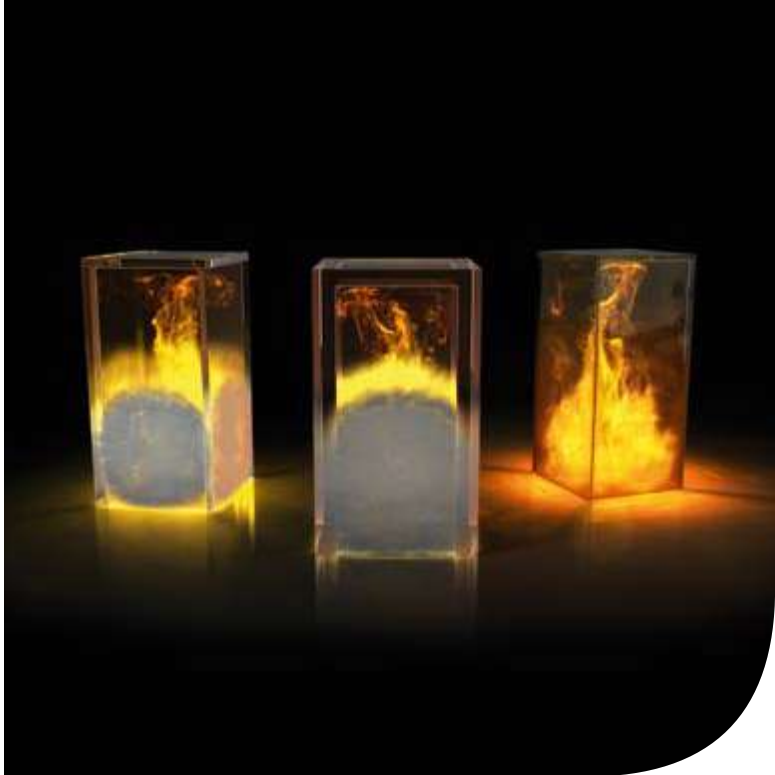


Fire protection in specialised transportation glazing

Over 30 years of expertise in transparent passive fire protection qualify us as a reliable provider of fire-resistant glass solutions for rail transportation. As pioneers in this area of application, we have continuously developed innovative products that meet the required safety standards as well as setting the standard for visual quality. Our extensive experience and close collaboration with companies and authorities in the rail industry have enabled us to offer tailor-made solutions that meet the specific requirements and challenges of public transportation. From state-of-the-art high-speed trains to traditional trams and underground trains, you can rely on the quality and reliability of Pilkington fire-resistant Glass to provide fire safety and protect the passengers.

Weight plays an increasingly significant role in rail transportation, as lighter materials can help reduce energy consumption and increase efficiency. It is therefore essential that fire-resistant glasses are light in weight without compromising on safety. The challenge is to develop even lighter and thinner structures all the time.

Fire tests to the relevant standards are performed in our in-house testing facility. The certified fire test furnace with an opening of 4 m by 4 m in size, as well as external testing facilities worldwide, help to verify the highest level of application safety, functionality, and design versatility in fire protection systems.



Certifications for fire-resistant glass in railway applications - rolling stock equipment

Safety in rail transportation is of utmost importance, particularly when it comes to fire protection. It is crucial that the fire-resistant glass used in rolling stock equipment and other rail vehicles meets the specific certifications and standards. Below you will find an introduction to the relevant standards according to which Pilkington fire-resistant Glass products have been tested, depending on requirements:

BN 918 511:

This market-specific qualification certificate relates to German regulations and standards for the safety glass properties as well as the optical properties of laminated safety glass and monolithic toughened safety glass in rail vehicles for public transportation. The standard specifies which requirements have to be met by materials as well as design.

AFNOR NF F 31-129:2013:

This French standard for railway rolling stock – ensures that the monolithic toughened safety glass used meets the specific requirements regarding safety and optical quality applicable for use in trains and other rail vehicles.

Regulation ECE (Economic Commission for Europe)-R 43 – Uniform provisions concerning the approval of safety glazing materials:

This regulation applies to safety glazing materials and their installation on vehicles.

DIN EN 61373 Railway applications rolling stock equipment – Shock and vibration tests:

This International Standard specifies the requirements for testing to gain assurance that the quality of the item is acceptable. Each item has to demonstrate in a test, which simulates the service conditions throughout its expected life, its fitness for purpose.

Three product lines - three strong performers

The Pilkington range of fire-resistant glass consists of three product lines tailored to meet the different performance criteria set out in the classification standards. Within each of the product lines, products can be especially engineered to meet the specific requirements:

- Pilkington **Pyrostop**® - for applications requiring protection against flames, fumes, smoke and radiant heat (fire resistance classification EI).
- Pilkington **Pyroduer**® - for applications requiring protection against flames, fumes and smoke combined with reduced heat radiation (fire resistance classification EW).
- Pilkington **Pyroclear**® - for applications requiring a barrier against flames, fumes and smoke (fire resistance classification E).

For further details, please refer to the classification standard for, EN 45545-3.

Fire resistance requirements for fire barriers: EN 45545-3

The fire resistance requirements for fire barriers in railway vehicles can be specified according to EN 45545, Part 3. Engineers and designers are to select the appropriate fire-resistant glass based on the specific requirements of a railway vehicle.

On page 7 of this document, you will find a table with the technical data for Pilkington's range of products for the various fire resistance classes, along with a listing of the relevant standards and certifications.



Hazard test - a pass with outstanding results

The so-called Hazard Test is a testing procedure defined in EN 45545-2:2016-02, developed for assessing the reaction of materials and components to exposure to various fire hazards. The Hazard level classification is based on test results and assigns materials and components to different categories depending on their reaction to fire hazards, such as fire spread rate, smoke release, and toxic gas emission. Materials used in the rail transportation sector need to demonstrate compliance with these stringent safety standards.

Hazard levels range from HL-1 to HL-3, depending on the operating and construction categories defined in EN 45545-1, with HL-3 representing the highest hazard level. Pilkington fire-resistant Glass is classified according to the Standard meet requirement set R1 for the highest hazard level HL-3 and can thus be used in any railway vehicle construction category.

Permanent product marking

The marking of fire-resistant glass is important, whether it's for traceability, compliance with regulations, or simply for product identification. At Pilkington Deutschland AG, we offer the option to customise individual stamps to be applied to fire-resistant glass according to customers' specific requirements.

We are able to apply customer-specific logos, including company or product data, to the fire-resistant glass. Whether it's serial numbers, certification stamps, other identification marks, or even operational qualification (OQ) codes. We ensure that the labelling precisely matches the needs and requirements.



Examples of applications

We have focused on a few examples of applications to demonstrate the versatility and flexibility of our fire-resistant glass in railway applications:

Driver cabin back wall doors:

In the event of a fire, the driver must bring the train to a halt immediately and still have sufficient time to evacuate to safety. Fire-resistant glass is a must to ensure a safe and controlled evacuation of both the driver and the passengers.

End carriage doors with or without side panels:

End carriage doors separate potential hazard areas, enabling a controlled evacuation of passengers. Fire-resistant glass is a must to protect passengers during evacuation.

Fire-resistant secondary transparent screens for monitors:

Additional screens are installed in front of monitors to prevent a fire spreading from a defective monitor. In the event of a monitor catching fire, the protective screen should help contain the fire. Due to the fact that they are more robust than monitor glass, they help to protect the monitor from vandalism.



Luggage racks comprising fire-resistant glass:

Fire-resistant glass can also be used for the shelves as well as the side and back walls of luggage racks on trains. These covers serve to contain flames, thus facilitating a safe and controlled evacuation of the train. Several design options are available to decorate the train interior.

Fire-resistant glass with design print or decorative film:

In addition to its fire resistance and reaction to fire properties, fire-resistant glass leaves room for creative and safety-relevant design. It can be printed on, or a design film can be applied. Performance enhancing films are also available for added features such as providing superior security and scratch resistance. Please contact our Technical Advisory Team for further details.



Added benefits

Preliminary testing of proprietary systems at the in-house Fire Test Centre in Gelsenkirchen:

As one of the world's leading manufacturers of fire-resistant glass, Pilkington Deutschland AG offers the opportunity to pre-test at our in-house fire test laboratory in Gelsenkirchen. This facility is specifically designed to test and evaluate the performance of fire-resistant glass systems when tested to the relevant fire test standards.

Quality control:

Pilkington Deutschland AG continuously tests samples taken from production to ensure consistent performance to the relevant fire test standards. Pilkington Deutschland AG is certified according to ISO 9001 (Quality Management System), ISO 14001 (Environmental Management System), and ISO 50001 (Energy Management System) and has implemented a comprehensive Quality Management System.

Project-specific testing to international standards:

For project-specific requirements in accordance with various international standards, customers should contact the team of fire protection glass experts. They are available to discuss and arrange special fire tests to empower the fire-resistant systems to meet the requirements specific to each individual project.



© Polarteknik

Support and expertise:

The fire protection glass team of Technical Advisory Service and International Sales provides customers with comprehensive support and expertise to tailor the glasses to their specific requirements and preferences. They also offer advice and support throughout the entire pre-testing process, from planning to performing and evaluating the fire tests.



Technical data

| Product Code | Sketch (outside > inside) | Nominal Thickness [mm] | Weight [kg/m ²] | Light Transmittance [%] | Sound Reduction R _w -value [dB] | Fire resistance Class [13501-1] | Hazard-Level [DIN EN 45545-2:2016-02] | Pendulum Body Impact ²⁾ [EN 12600] | Certification Standards |
|--|------------------------------|---------------------------|--------------------------------|----------------------------|--|------------------------------------|--|--|----------------------------|
| Pilkington Pyrostop®¹⁾ | | | | | | | | | |
| R 30-10 | | 15 ± 1,0 | 35 | 87 | 38 | EI 30 | R1 HL3 | 2(B)2 | ECE R43*; DIN EN 61373 |
| R 30-16 | | 29 ± 2,0 | 51 | 77 | 38 | EI 30 | on request | 1(C)2/2(B)2 | on request |
| R 30-20 | | 18 ± 1,0 | 42 | 87 | 38 | EI 30 | R1 HL3 | 1(B)1 | on request |
| Pilkington Pyrodur®¹⁾ | | | | | | | | | |
| Plus R 30-105 | | 7 ± 1,0 | 17 | 90 | 34 | EW 30 | on request | 3(B)3 | on request |
| Plus R 30-106 | | 10 ± 1,0 | 24 | 89 | 35 | EW 30 | R1 HL3 | 2(B)2 | on request |
| R 30-203 | | 11 ± 1,5 | 27 | 88 | 37 | EI 20/EW 30 | R1 HL3 | 1(B)1 | ECE R43* |
| R 30-200 | | 14 ± 1,0 | 32 | 88 | 38 | EI 20/EW 30 | R1 HL3 | 1(B)1 | DIN EN 61373 |
| TR 30-20 | | 14 ± 1,0 | 31 | 87 | 37 | EI 15/EW 30 | R1 HL3 | 1(B)1 | on request |
| Pilkington Pyroclear® | | | | | | | | | |
| R 30-001 | | 6 ± 0,2 | 15 | 90 | 32 | E 30 | on request | 1(C)1 | BN 918 511; NF F 31-129 |
| R 30-002 | | 8 ± 0,3 | 20 | 89 | 33 | E 30 | on request | 1(C)1 | BN 918 511 |
| R 30-002 Grey | | 8 ± 0,3 | 20 | 35 | 33 | E 30 | on request | 1(C)1 | on request |
| R 30-003 | | 10 ± 0,3 | 25 | 88 | 34 | E 30 | on request | 1(C)1 | BN 918 511 |
| R 30-007 | | 13 ± 1,0 | 31 | 88 | 39 | E 30 | on request | 1(B)1 | on request |
| R 30-008 | | 13 ± 1,0 | 31 | 88 | 37 | E 30 | on request | 1(B)1 | BN 918 511 |

¹⁾ Fire-resistant glass must be protected from direct UV radiation (depending on application).

²⁾ Pendulum impact test with 50 kg twin tyres:

B = Laminated safety glass, C = Monolithic toughened safety glass

1 = 1200 mm drop height (highest category), 2 = 450 mm drop height, 3 = 190 mm drop height

* in combination with 3M S70 film

All technical values are subject to application-related and production-related tolerances.

The dimensional tolerances in height and width for all types of glass are ±2.0 mm up to 200 cm edge length or ±3.0 mm over 200 cm edge length.

The maximum aspect ratio, i.e. width to height or height to width, of the pane, is 1:10.

Further compositions on request.

**Do you have any questions about your project?
We're here to help you.**

André Stein

International Sales Manager, Maritime
& Rail Fire Protection Glass
T: +49 (0)209 1 68 21 40
M: +49 (0)172 6 72 13 93
E: andre.stein@nsg.com



Christian Seibt

Head of TAS Fire Protection Glass
T: +49 (0)209 1 68 21 93
M: +49 (0)151 54 42 61 09
E: christian.seibt@nsg.com

This publication provides only a general description of the products. Further, more detailed, information may be obtained from your local supplier of Pilkington products. It is the responsibility of the user to ensure that the use of these products is appropriate for any particular application and that such use complies with all relevant legislation, standards, codes of practice and other requirements. To the fullest extent permitted by applicable laws, Nippon Sheet Glass Co. Ltd. and its subsidiary companies disclaim all liability for any error in or omission from this publication and for all consequences of relying on it. Pilkington, "Pyrostop", "Pyrodur" and "Pyroclear" are trademarks owned by Nippon Sheet Glass Co. Ltd, or a subsidiary thereof.



CE Marking confirms that a product meets the requirements of its relevant harmonised European Norm and can be placed on the market in the EU. The CE Marking Declaration of Performance for each product can be found at www.pilkington.com/ce



Pilkington Deutschland AG

Haydnstraße 19 45884 Gelsenkirchen
Telefon: +49 (0) 209 1 68 0 Telefax: +49 (0) 209 1 68 20 56
E-Mail: brandschutz@nsg.com
www.pilkington.com/fireprotection