



40 years Pilkington **Pyrostop**®

BRANDSCHUTZ
transparent

Pilkington **Pyrostop**® | Pilkington **Pyrodur**® | Pilkington **Pyroclear**®

NSG
GROUP

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Second international edition: 40th Anniversary of Pilkington **Pyrostop**®

Fire-resistant glass across the globe

40 years after the product launch of Pilkington **Pyrostop**®, selected project reports from 3 continents show that transparent fire protection has been truly established globally.

What started in the mid- 1970s as an idea to protect lives and assets in buildings from fire and smoke without depriving them of natural daylight and unobstructed vision, has become a global success story in safety-related aspects and aesthetical perception for today's spacious, light-flooded and uncompromisingly open space architecture.

Pilkington **Pyrostop**® was the pioneer product combining the requirements of providing integrity and thermal insulation performance in a multi-layered and transparent laminated safety glass. Since its first major implementation on site at the Aachen Clinic (3,000 m² Pilkington **Pyrostop**®) in 1979, the developments in technology and applications have been progressing. The compositions of the fire-resistant glass continued to perform better, the optical quality was improved, the nominal thickness reduced while keeping safety standards at the highest possible level. An impressive range of functional combinations have been tested and officially approved until now.

Today, Pilkington fire protection products can be fitted in a vast number of door and wall partitioning systems, in sloped roofs, in floors and in façades supplied by various profile manufacturers.

We have placed a selection of the major steps of the product history for you to follow on a graphical timeline throughout this jubilee edition.

Enjoy reading the second international edition of BRANDSCHUTZ transparent!

40 years Pilkington fire-resistant glass

Quality and sustainability:

10-year guarantee worldwide

Two years ago, Pilkington Deutschland AG was the first company in its industry to introduce a 10-year guarantee for its fire-resistant glass. This guarantee concerning the sustainability of the sustainable visual quality of fire-resistant glass belonging to the product lines Pilkington **Pyrostop**® and Pilkington **Pyrodur**® also applies worldwide with immediate effect for all cut to size fire-resistant glass types that have been sold and supplied by Pilkington Deutschland AG or its international licensed partners.

As part of the 10-year guarantee, Pilkington Deutschland AG has assumed the guarantee in respect to its end customers worldwide for all deliveries since 1st August 2018 that the fire-resistant glass of the product lines Pilkington **Pyrostop**® and Pilkington **Pyrodur**® will not be impaired by significant development of haze of its intumescent interlayer.

Needless to mention, precise compliance with the glazing guidelines and correct and proper handling of the products are musts. Thus, for instance, no further processing of or other modifications to the fire-resistant glass may be carried out and, in particular, the edge protection tape, which forms an integral part of the product, must never be removed or damaged.

What does the guarantee cover?

The guarantee covers significant visual defects which are generally referred to as "partial or complete clouds of haze". Other occurrences such as micro-bubbles or visual distortions which may appear in rare cases in fire-resistant glass due to variations during production, are excluded.

Which glass types and installation situations does the guarantee cover?

The guarantee covers all fully framed glass types Pilkington **Pyrostop**® and Pilkington **Pyrodur**®, both monolithic as well as insulating glass units, regardless of the glazing and of the framing system into which it was installed. This includes all fire-resistant glass in doors, partitions, facades, roof and horizontal/sloped glazings.

Free replacement to accepted guarantee

If a guarantee claim is successful, Pilkington Deutschland AG or its licensed partner will supply a product replacement free of charge at the time of the complaint in accordance with the current state of the art for the defective fire-resistant glass units. Other claims are excluded. The new version of the guarantee document extending to international markets is available in full legally-binding form. Pilkington and its licensed partner will also provide the glazing guidelines for fire-resistant glass Pilkington **Pyrostop**® and Pilkington **Pyrodur**® to all interested parties. ■

Pilkington **Pyrostop**®
Pilkington **Pyrodur**®

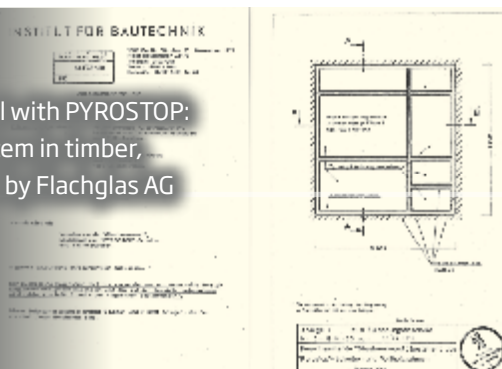


Tried-Tested-Trusted - since 1978
10-year haze-free guarantee

1978

- First system approval with PYROSTOP: "Schörghuber" door system in timber, own systems developed by Flachglas AG

- Extensive R&D research completed: PYROSTOP EI 30, 15 mm thick and EI 90 as a three-glass-unit composition introduced to market



Pilkington **Pyrostop**® Line:

Glass in Line for all classes

EI 30 to EI 120 without vertical framing: The new monolithic Pilkington **Pyrostop**® Line glass type for fire resistance class EI 30 completes the product portfolio for butt-jointed fire-resistant glazing. In addition to fire safety, the choice of corresponding glass type is an important aspect for the relevant application, especially when it comes to increased requirements for the static load capacity of partition walls or prevention from falling from height.

Butt-jointed fire-resistant glazing, where the glass is generally only held by profiles on the top and bottom edges, requires a special calculation in regard to its impact loads based on the actual system. In contrast to panes mounted on all sides with

circumferential frames, the same load requirements with the glass mounted on both sides cause much higher tensions and deflections. Irrespective of the fire resistance class, the choice of glass composition is therefore a question of the required mechanical safety. In any case, national, partially object-related requirements must always be checked in prior to the individual project. In Germany, DIN 18008-4, which is derived from the previous "TRAV", is to be regarded as the definitive standard for prevention from falling from height.

Static requirements are key

Pilkington distinguishes between two static requirement categories in its wide range of Pilkington **Pyrostop**® Line glass types. If there are no special requirements regarding impact loads or



Pilkington **Pyrostop**® Line
30-604 OW (22 mm) –
C&P Immobilien AG, Austria

1979/80

● PYROSTOP system approved for timber frame systems for EI 30 class

● Aachen Clinical Centre with 3,000 m² PYROSTOP equipped



PRODUCTS

prevention from falling on account of the installation situation, glazing with butt-jointed fire-resistant glass can be fitted with Pilkington **Pyrostop**® Line 30-600 (18 mm) glass type. Suitable mechanical safety devices such as railings/handrails can also support such fire-resistant glazing if required. Increased static loads and special requirements for buildings require a glass thickness of min. 28 mm. To comply with the loading requirements for guarding with the glass acting as a barrier Pilkington Deutschland AG had its monolithic Pilkington **Pyrostop**® Line 30-605 glass types, 32 mm thick undergo extensive pendulum impact tests in a timber framing system for fire resistance class EI 30. Prior to this, the accredited test body conducting the tests had negotiated the set-up and scope of the tests in detail with the DIBt, based in Berlin, responsible for product certification in Germany.

Proven Prevention from falling from height

The 32 mm thick monolithic Pilkington **Pyrostop**® Line 30-605 for fire resistance class EI 30 was able to pass all necessary tests carried out in the pendulum impact testing when installed as butt-jointed glazing and is thus to be regarded reliably as "prevention from falling from height" for glazing of the highest category A. At the editorial deadline, the final approval by DIBt has yet to be issued. The test results now provide Pilkington's

system partners with the technical basis to include this new glass type to extend their steel or aluminium systems. The fire safety specialists at Pilkington Deutschland AG are pleased to support planners in their application-specific selection of the best suited Pilkington **Pyrostop**® Line glass type for bespoke applications. ■

Pilkington **Pyrostop**® Line in detail

- Fire resistance classes EI 30 up to EI 120 available
- Corner solutions EI 30 and EI 60
- Pilkington **Pyrostop**® Line 30-605 has been successfully tested as "prevention from falling from height"
- offers maximum transparency and brilliant colour rendering based on the basic glass types selected
- Additional product combinations with improved thermal insulation properties or integrated blinds in the cavity between the panes are possible
- must always be glazed according to the special glazing guidelines for Pilkington **Pyrostop**® Line which is available on request

Technical data Pilkington **Pyrostop**® Line

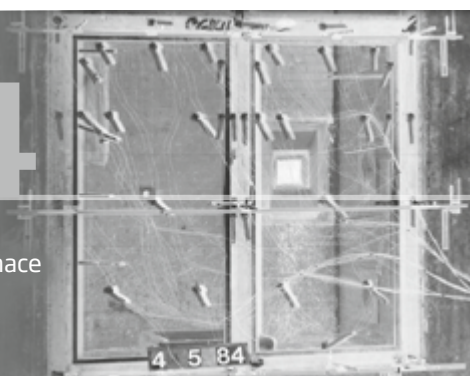
| Type | Fire resistant class | Supply form | Thickness [mm] | Thickness tolerance [mm] | Total weight [kg/m²] | Light transmittance T _L [%] | R _w [dB] | U _g -value [W/m²K] |
|------------|----------------------|-------------|----------------|--------------------------|----------------------|--|---------------------|-------------------------------|
| 30-600 | EI 30 | monolithic | 18 | ± 1 | 42 | 87 | 38 | 5.0 |
| 30-604 OW* | EI 30 | | 22 | ± 1.5 | 51 | 87 | 40 | 4.8 |
| 30-605 | EI 30 | | ≥ 28 | ± 2 | ≥ 67 | ≤ 86 | ≥ 41 | ≤ 4.6 |
| 60-603 OW* | EI 60 | | 27 | ± 2 | 60 | 86 | 41 | 4.7 |
| 90-600 OW* | EI 90 | | 37 | ± 2 | 84 | 84 | 44 | 4.2 |
| 120-60 OW* | EI 120 | | 47 | ± 3 | 107 | 81 | 44 | 3.8 |

* OW = Pilkington **Optiwhite**™

Further technical information is available on request.

1984

● A new in-house fire-test furnace is commissioned at Flachglas AG



● New system developments for multi-panel screen application, e. g. EI 30 in frames

Pilkington **Pyrodur**® TM:

Fire safety on board!

Transparent fire safety even in high winds and waves: Pilkington is extending its product line of special fire-resistant glass for maritime applications by Pilkington **Pyrodur**® TM.

The strong demand for ever newer, larger and more luxurious cruise ships remains in full swing. Transparency and use of natural light incidence are an important design topic: Up to 6,000 square metres of glass may be required for each newly built ship, a large percentage of this is fire-resistant glass!

Floating luxury hotel complexes

It is a common fallacy among non-experts that fire safety should not be regarded as such an important issue when surrounded by so much water. In reality a cruise ship needs to provide from all aspects of active and passive (fire) safety for thousands of people. It is basically a gigantic hotel complex on water, often filled to the last cabin, with various catering facilities and other places of assembly, increased fire loads due to machinery rooms and fuel tanks as well as complex evacuation scenarios. Just like in a hotel – this consequently involves alarm and extinguishing systems, fire and smoke compartments, protection from flashover and safe escape routes.

Special requirements arising from wind and waves

Although many fire safety applications inside the ship (e.g. doors and partition walls) can be fulfilled with conventional fire protection systems, everything is becoming more complex when it comes to the ship's outer shell and hull. Potentially high wind and wave loads must be incorporated in the static calculation



Testing of a ship bulkhead with Pilkington **Pyrodur**® TM: Besides fire safety, there are increased requirements for the system glazing.

1985/86

- Focus of development on EI 90 fixed glass partitions for transparent fire protection

- Further reduction in thickness and weight for EI 90 glazing: New DGU type of EI 90 glass now only 50 mm thick

- PYROSTOP for use in façades: First system approval for a façade system

of the light openings. Each form of glazing is designed as a pressure glazing system to withstand the forces of nature as experienced when out on sea. This special form of glazing and the increased static load capacity represent special challenges for the types of glass to be used.

Unique features in the pane structure and edge unit

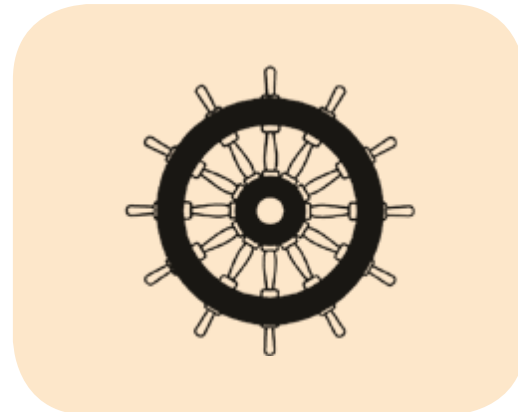
Pilkington **Pyrodur**® TM – the "T" stands for "Toughened" and the "M" for "Maritime" – fulfils the requirements in shipbuilding, above all thanks to its special composition in which the fire-resistant layer is protected and strengthened by glass panes made from safety glass on the weather side. This make-up of the fire-resistant glass is suitable for pressure glazing. Its design makes Pilkington **Pyrodur**® TM an especially robust fire-resistant glass, which can be used as insulating glass too. It also enables large light sections to be realised with fire-resistant glass in the ship's walls and hulls, in accordance with the high performance requirements. Thanks to the latest addition to the product line, ship glazing solutions are now available for the hull in resistance classes A0 and A15 as well. A primary application involves light openings in the outer walls of the cabins, which are subject to stricter fire safety requirements, in order to protect the adjoining rescue routes and prevent flashover to the next level up. But other light openings in ship bulkheads can also be provided with such special glass.

From dry land to water

Use in the maritime sector is associated with relevant application-specific fire tests. A successfully implemented MED certification (Marine Equipment Directive) enables the use of



Pilkington **Pyrodur**® TM for this special application field. Based on this certification, the corresponding fire-resistant glass may now also be marked with the so-called "Wheelmark". ■



The applications for fire-resistant glass in maritime environments are subjected to special regulations. The MED mark (Marine Equipment Directive) confirms the use on ships of EU member states and states that apply the Marine Equipment Directive 2014/90/EU.

1987/88

● Further system approvals
for façade applications for PYROSTOP

● PYRODUR is added to the range,
the first glass for EW performance
effectively blocking smoke and flames
whilst reducing levels of radiation:
First system approval with PYRODUR

ÖAMTC Head Office, Vienna (A)

Symbol of mobility

As the automobile association for Austria with more than two million members, the Österreichische Automobil-, Motor- und Touringclub (ÖAMTC in short) is responsible for various services concerning mobility. In March 2017 the new corporate headquarter was officially opened in the predominantly industrial Erdberg quarter of Vienna. The spectacularly dynamic architecture of the Viennese architectural office Pichler & Traupmann called for unique solutions when it came to fire safety, too – solutions that could be achieved effectively with Pilkington **Pyrostop®** for various fire resistance classes and in a number of glass compositions.

In addition to latest traffic updates, the ÖAMTC above all offers its members roadside assistance in the event of a breakdown and deploys rescue missions to accident sites – just as diverse as the scope of services offered are the functional and layout require-

ments for the new administration and organisation centre. Service workshops for repairs in the lower part of the building as well as a helicopter landing platform on the roof, the new building complex houses all required service functions under one roof.

Corporate identity

The concepts of service and support are equally important in terms of the ÖAMTC organisation as they are to the building itself. The social component embodies the impressive structure with a gross floor space of almost 30,000 square metres to the outside in colour, form and layout. When it comes to form and choice of material, it deliberately stands out from the monotonous block structures of its surroundings. At night, the diagonal supporting structures of the curtained, point-screened-printed glass façade are lit discretely in the corporate colour yellow. The circular and star-like shape impressively conveys the message that everything at the ÖAMTC is centered around mobility and the associated services. At the same time, the dynamical and lively form seeks to symbolise the efficiency, speed and responsiveness of the organisation.



The architecture of the new ÖAMTC headquarter in Vienna expresses innovative, dynamical design, mobility and openness through form, colour and choice of materials.

1990

● Innovative fire-resistant project specific combinations developed and tested

● Part 13 of DIN 4102: A test standard dedicated to fire-resistant glass

● Development of PYROSTOP and PYRODUR glass types for horizontal applications



From the service workshops to the heliport, all topical elements are extended along a single vertical axis, in other words from the counter to the reception and the event areas through to the large atrium, so as to arrange the offices in a curved shape. The concept of short distances enabling highly efficient logistics, as it should be key to any such office building, has been transformed into architecture.

Open communication shapes the layout

On the counter, you will be facing an oversized glass pulpit, in the middle of the workshop, where the technicians have driven the vehicles to accessing the basement via a ramp. Customers have a panoramic view of all ongoing activities, which they can enjoy comfortably from a bird's eye perspective. From the counter, an airy and spacious area opens upwards, through which stairs lead into the lobby. On this lobby level, you can also enter the building in just a few steps coming from the metro line U3-Erdberg. The building and hence the ÖAMTC are open to all visitors and spectators in every direction.

All parts of the building communicate with each other – yet the message conveyed to the outside world is important, too. This is realised in the public / semi-public area: the entrance level comprises the event hall, conference rooms, TV studio, while the floor above accommodates the vitally important call centre, which is continuously connected to the outside world, this clearly and functionally forms the central space. All these areas are arranged around a two-storey foyer. At the same time, this is also the first floor of the large office atrium, from which the routes and sightlines lead upwards. This in turn encapsulates the internal communication flow.

Save escape routes and easy evacuation

The fire safety concept for the ÖAMTC building has been developed by the Graz-based engineering office Norbert Rabl and coordinated with the authority in charge, the Building Inspectorate of the City of Vienna/MA37. The building was subject to spe-



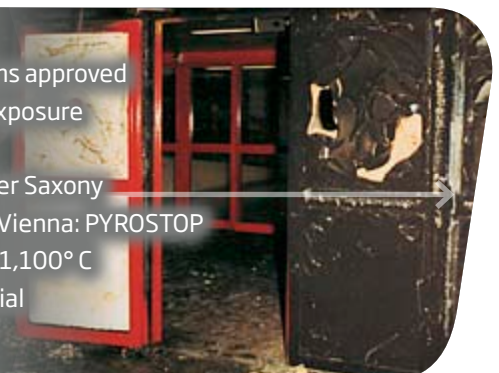
The inner façade in the core of the ÖAMTC building is designed for full protection against vertical flashover as a fire protection façade comprising Pilkington **Pyrostop**® insulating glass.

cial measures regarding fire and smoke protection, as specified for building constructions with integrated assembly points and office units in Austria. An essential feature of the concept is the escape stairwell located externally and connecting all storeys, which facilitates everyone to escape to the outside into the open rings of the main façade in the event of a fire.



1991 /92

- First EI 30/EW 30 roof glazing systems approved
- Long-term continuous temperature exposure load limit increased to +45° C
- Fire in the State Central Bank of Lower Saxony in Hannover and in the Donau Centre in Vienna: PYROSTOP withstands fire temperature exceeding 1,100° C
- Introduction of PYROSTOP with special low iron glass composition





Faceted, sloping glass façade crown the roof. Pilkington **Pyrostop**® 60-181 was used in the sloped glazing roof at the sides.

The large atrium is kept free from smoke in the event of a fire by a pressurised ventilation system, as well as a smoke and heat extraction facility in the roof. The pressurised ventilation system comprises a ventilation system that prevents the penetration of smoke into the protected escape areas of the building by means of pressure differences and air flows. Further special measures for containing a potentially destructive fire are fire-proof sliding

doors, as well as comprehensive sprinkler protection for the office areas.

Ample supply of daylight through extensive transparent walls of fire-resistant glass

The continuous ingress of light via the outer façade and atrium into all important areas inside is an essential feature of the open space architecture. This feature could also be implemented in the functional areas, where special fire safety measures are required. Fire and smoke compartments as well as escape route access points are permanently protected by passive fire protection systems. An attractive feature of the transparent fire protection is the inner façade of the large atrium in the core of the building. It was fully equipped with Pilkington **Pyrostop**® of fire resistance class EI 30, in order to provide protection against a potential vertical flashover from one floor to the next. In addition, a partial area of the faceted roof was glazed with Pilkington **Pyrostop**® insulating glass complying to fire resistance class EI 60 in combination with anti-glare coated outer panes comprising laminated safety glass. The appearance was perfectly matched to the adjoining, non-fire-resistant glazing in terms of visual appearance and light transmittance for this unique installation situation.



The façade system with Pilkington **Pyrostop**® protects from a flashover to the escape and rescue routes located above.

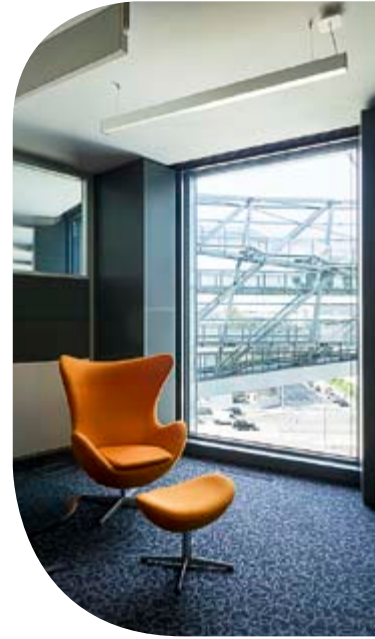
1995/96

- Long-term continuous temperature exposure load limit for PYROSTOP® and PYRODUR® applications increased to +50° C
- Initial fire tests to win tender for the "Reichstag" building in Berlin

- New light-weight PYROSTOP® EI 90 glazing for internal application: now only 37 mm thick!
- Market launch of PYRODUR® for EW 60 glazing



PROJECTS



Large-sized Pilkington **Pyrostop**® in compliance with fire resistance class EI 30 in continuous façade elements at full room height.

Expert support from Pilkington Austria

When the fire-resistant glass applications had to be developed and specified, the building benefited from the comprehensive support and expert advice provided by Pilkington Austria GmbH, Bischofshofen, from the planning phase through to completion. Part of the services involved the organisation and implementation of third party fire tests with doors, partition walls and façade elements providing proof and validation of the required fire safety properties for bespoke structures in large dimensions. Owing to the wide range of different applications, dimensions and glass compositions – combined with in total over 1,000 m² of fire-resistant glass – the project implementation, which was completed without delays, is impressive evidence for the competence and customer focus of Pilkington Austria GmbH. ■

ÖAMTC Head Office, Vienna (A)

Client: ÖAMTC, Vienna (A)

Architects and general planners:

Pichler & Traupmann Architekten ZT GmbH, Vienna (A)

Fire safety concept: Norbert Rabl ZT GmbH, Graz (A)

Glass supplier: Pilkington Austria GmbH, Bischofshofen (A)

Metal structure: Alu-Reflex d.o.o., Gornja Radgona (SI)

Fire protection with glass:

Pilkington **Pyrostop**® 30-35/36 and 30-28/38 in the inner façade plus Pilkington **Pyrostop**® 60-181 with anti-glare coating in a partial area of the faceted roof glazing; System Schüco FW50+ BF

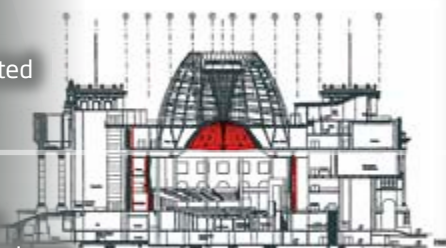
Amount of fire-resistant glass installed: approx. 1,000 m²

1997

- New fire-resistant combinations with noise reduction and burglar resistance launched

- Maximum PYROSTOP® tested glass dimensions increased to 1.5 m × 2.6 m

- "Reichstag" building: Fire-resistant glazing for the glass dome with additional performance features

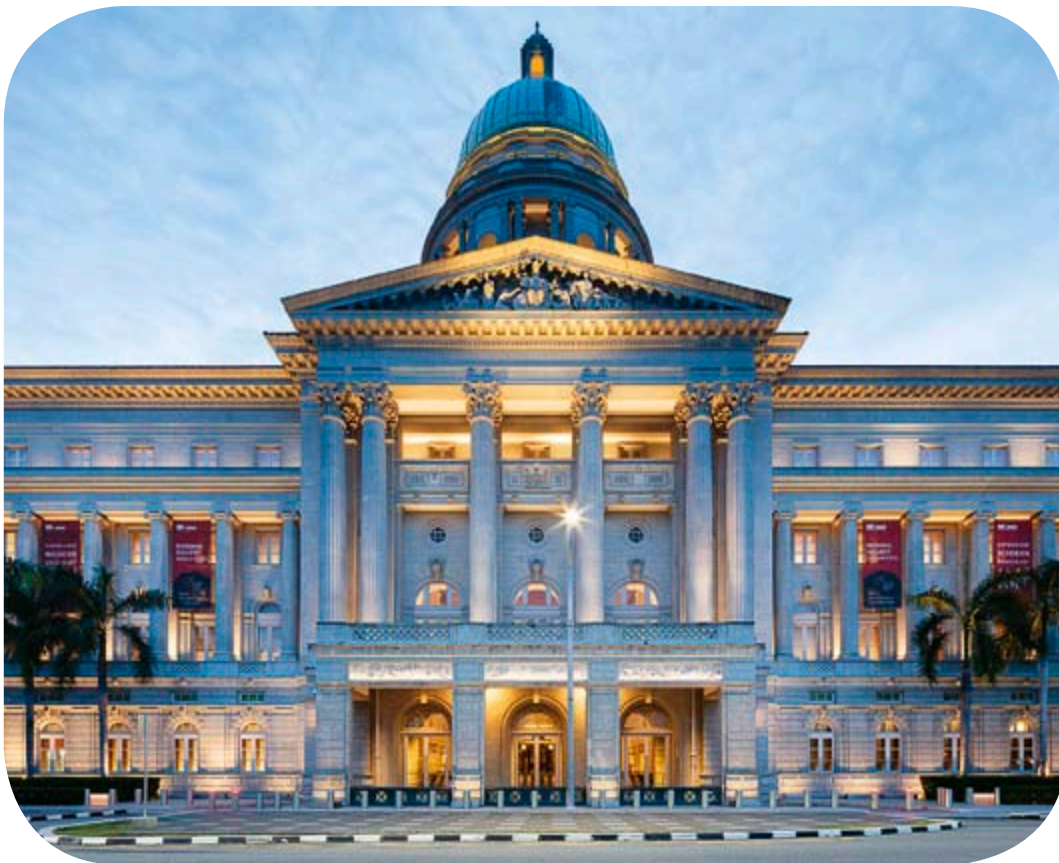


National Gallery, Singapore

Spectacular transformation

The new National Gallery Singapore presents itself as a functional fusion of two historic buildings – the Supreme Court and the City Hall. With minimal, yet highly efficient architectural intervention, architects Studio Milou succeeded in linking these architectural gems together and converting them into bright showrooms that stage the national

art collection and other temporary exhibitions. Pilkington **Pyrostop**® fire-rated glass in doors and partitions contributed to meet the demand of local building authorities, who wanted the transformed buildings to fully meet all relevant safety regulations while retaining most of their historical character and original structures.



The National Gallery Singapore is a functional fusion of two historic buildings – the Supreme Court and the City Hall.

1998/99

- EI 90 system approval with the new monolithic PYROSTOP® in an insulated glass unit obtained

- Specification of fire protection solutions for major project at Düsseldorf airport, Terminal A, and the ICE high speed train terminal at Frankfurt airport; requiring even further development of PYROSTOP® special functional combinations

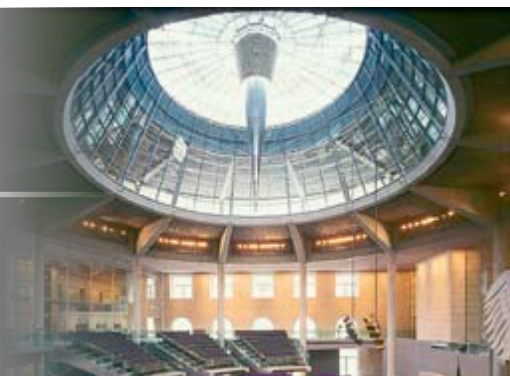
PROJECTS

The new National Gallery is intended not only to display the national collection of Singapore, but also to serve as a research institution on the art of South East Asia and as an institution that is open to the world as a whole. Its shape is formed by the two buildings, the Supreme Court, which symbolizes the historical anchoring of the collection by housing the permanent exhibition, and the City Hall building, which sends a message of openness, dynamism and modernity, through the presentation of its temporary exhibitions.

New regulations requiring changes

While preservation was a highly important target, the building regulations valid in Singapore required efficient upgrades

regarding acoustic and energy performance, fire safety, anti-terrorism and museum specific-standards conservation. The design by Studio Milou, Singapore, executed in partnership with CPG Consultants therefore aimed at introducing contemporary functions and design elements to the old buildings, rejuvenating them and maintaining a masterful balance between heritage and modern architecture. The functional transformation, for example, of the former Supreme Court was particularly demanding, as the access control separations typical for this type of courthouse buildings interfered with the new function as a place that is open to the public and inviting visitors to wander around in bright and spacious areas with transparent separations.



- Project Clinical Centre Berlin-Marzahn completed
- Opening of the "Reichstag" building after 5 years of planning and development: 5,000 m² of PYROSTOP® and PYRODUR® multi-functional glazing in special systems up to 16 m high; EI 30 double leaf door system with height of 2.70 m



The tree-like support structure of the new steel-and-glass roof.

The new structures were wrapped around the original structures of the Supreme Court and City Hall buildings.



A landmark roof design

A sweeping glass-and-steel roof structure, supported by tree-like structures, was placed above the Supreme Court and City Hall buildings, linking them together visually and functionally. This light and airy roof structure forms the prominent feature of the new National Gallery Singapore. Other main functional features and highlights of the design are

- the technical services and exhibit reception level
- a public gallery giving access to all the areas of the National Gallery Singapore
- Façades giving a face to the Children's Museum, shops, café and restaurant
- an exhibition level occupying the main floor of the National Gallery Singapore
- rooftop spaces open to activities and exhibitions, with spectacular views of the city.

The project has been designed to provide visitors with a platform that provides access to virtually all the exhibition areas without crossing back on itself, but allowing for developments according to changes in the presentation of the collection or scheduling of events. Like a circuit, the route leads through all the exhibition areas in the building, exiting onto the rooftop spaces of the Supreme Court building. It then crosses the high walkway above the entrance area, leads to the sculpture garden, and re-descends by the escalators to the exhibition level of the City Hall building, before finally ending in the entrance area in the lower gallery. An open space was built beneath the two buildings in the shape of a large underground concourse. This has left the ground-floor level and public spaces free of ticketing, reception and circulation areas, freeing them for the gallery's core activities. This basement structure, hosting a public access control as well as technical facilities, drew inspiration from those used in many prominent historic buildings adapted to house



2000/01

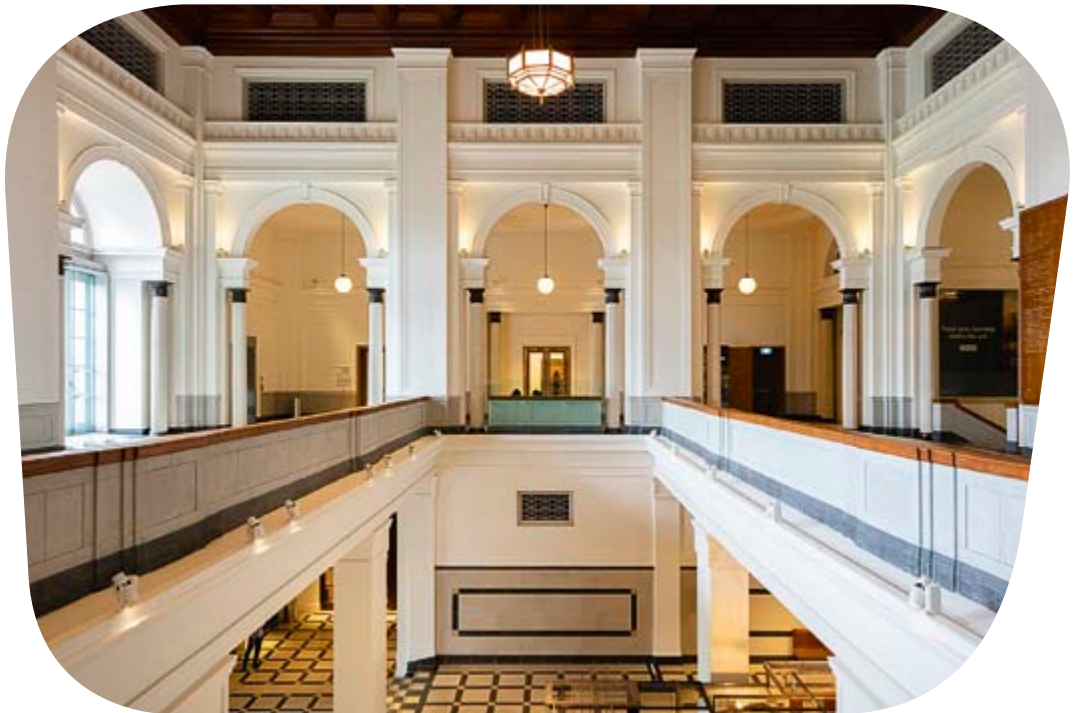
• Launch of Pilkington **Pyrodur**® 30-201 with safety performance acc. to DIN 1259: only 10 mm thick!

• Pilkington **Pyrostop**® in refurbishment project: 20 years old EI 90 glazing for the Aachen Clinical Centre is subjected to official fire test, excellent performance for more than 90 minutes verified

• Airport Düsseldorf, Terminal B, equipped with more than 3,700 m² Pilkington **Pyrostop**® and Pilkington **Pyrodur**®

PROJECTS

Extensive conservation work played a huge part in the project, while the overall design had to comply with the relevant building regulations and conservation standards, including fire safety.



The open space concourse in the basement, leading visitors towards the exhibitions in the two buildings. Fire-rated doors and partitions featuring Pilkington **Pyrostop**® glass allow views across the fire and smoke compartments.



2003

- Expansion of the production facilities at the Gelsenkirchen site to meet growing demand
- "TRAV" (regulation for impact resistance) is published: Pilkington fire-resistant glazing are subjected to more than 500 official impact tests





The standard dimensions for double leaf doors are 2,300 mm × 2,400 mm.



Pilkington **Pyrostop**® installed in double leaf doors as well as partitions supplied by Singapore based system supplier YJ International.



Fire-rated door with artistically designed film, integrated inside the IGU composition of Pilkington **Pyrostop**®.

2005/06

- New: Pilkington **Pyrostop**® 30-101 (16 mm thick)

- First EI 90 roof glazing (Pilkington **Pyrostop**® / System Klass GmbH) with maximum glass size of 1.20 m × 2.40 m approved

- New additional testing furnace capable of testing samples of up to 4 m × 4 m is commissioned in Gelsenkirchen

- First publication CE



PROJECTS



The profile design of the fire doors and partitions with Pilkington **Pyrostop**® fits in well with the mix of wooden framings and floors, bright wall and ceiling colorings and modern building materials.

famous Art Museums and Galleries worldwide, among them the National Gallery of Art in Washington, the Musée du Louvre in Paris, the Tate Modern in London and the Prado in Madrid.

Fire-rated doors and partitions

Fire safety regulations in Singapore in general follow the logic of requiring protective measures found in large public buildings around the world. Dividing the building into segments of fire compartments that prevent the spread of fire from one area to another is one main issue, quick access to safe escape routes for visitors and quick egress for the fire fighters is another important safety feature. For the National Gallery Singapore both were provided transparently using fire-rated door systems and partitions equipped with Pilkington **Pyrostop**®. Depending on the specific requirements of the building situation and conceptual function, doors and partitions are providing either 60 or 120 minutes of integrity and thermal insulation in the case of fire.

The fire-rated glass units were manufactured and supplied by our licensed processing partner Thai-German Specialty Glass based in Bangkok. The Singapore based construction company YJ International delivered and installed the glass in their approved proprietary fire-rated framing systems in the form of

single and double leaf doors and partition walls. In total, 60 doors and 20 partitions were manufactured and installed by YJ International, with dimensions of 1,200 mm × 2,400 mm for single leaf and 2,300 mm × 2,400 mm for the double leaf doors. ■

National Gallery Singapore

Architect: Studio Milou, Singapore

Consultants Security/Fire Protection:

CPG Consultants Pte. Ltd., Singapore

System Supplier for Doors and Partitions:

YJ International Pte Ltd., Singapore

Glass Supplier: Thai-German Specialty Glass Co. Ltd., Bangkok, Thailand

Fire-Rated Products: Pilkington **Pyrostop**® 60-101

23 mm, 60 minutes of integrity and insulation;

Pilkington **Pyrostop**® 120-104, 52 mm, 120 minutes of integrity and insulation; application in single and double leaf doors as well as partitions in proprietary framing system, designed by YJ International



2009/10

● Initial Type Test (ITT)
Pilkington **Pyrostop**® 180-10

- Pilkington **Pyroclear**® launch - new product line for reliable and cost-effective fire safety meeting integrity only requirements
- Manual attack resistance P1A and P2A acc. to EN 356 verified for monolithic Pilkington **Pyrostop**® EI 30 standard types

Tulsa City-County Central Library, Tulsa (OK, USA)

Photos:
Lara Swimmer
for MSR Design, Minnesota

Library starts a new chapter

Tulsa Library is an urban renewal project, which contributes to the revitalization of a second-tier city's struggling downtown core. Its intention was to transform a dilapidated, mid-century modern central library and inhospitable civic plaza into a prized community destination for active learning and creative engagement. The re-design by architects MSR features an extensive use of glass for spacious, naturally lit functional areas, including special fire-rated TGP Fireframes® Aluminum Series frames with Pilkington **Pyrostop®** for interior doors and partitions.



Holistically planned and well executed: The Tulsa City-County Central Library project was honored with the AIA/ALA Library Building Award 2018.

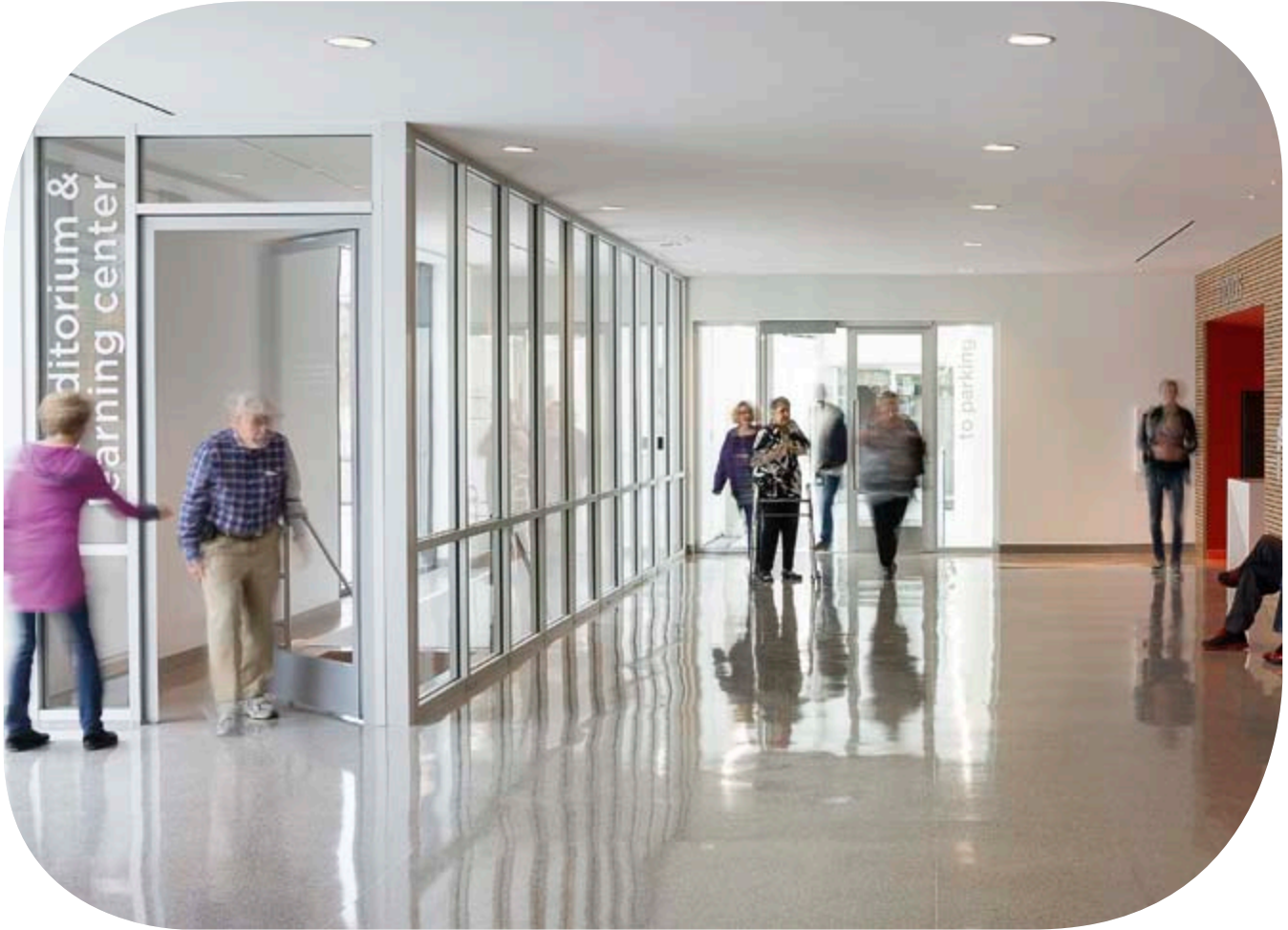


2013/14

- Sustainability at its best: after 24 years in service a fire door officially passed fire test at certified institute



- 33 years and still as safe as new: a reliable performance of 33 years old glasses verified by successful independent fire test



TGP's Fireframes® Aluminum Series partitions and Fireframes® Designer Series fire-rated doors with Pilkington **Pyrostop**® in one of the egress staircases.

The MSR design team targeted three primary goals for the project: 1. Become a downtown destination that contributes to renewal of the urban core. 2. Create a library building that responds to 21st-century library needs. 3. Be generative, positively impacting library users, the surrounding community, the library industry, and the environment. To achieve these goals, the design team crafted a building program and architectural response that includes a revitalized, humanized civic plaza and new public garden for interactive programs and community events; a clear, secure entry sequence in which all

ways of entering the library collect into one main lobby area; a new parking garage; an interactive education center; a maker space; and a destination children's library with direct access to the garden. Sustainable measures include improved thermal performance of the entire building envelope, daylight harvesting and lighting strategies, and the first rooftop photovoltaic solar array installed on a Tulsa building. The project was honored with the AIA/ALA Library Building Award 2018 for its elegance and timelessness in style as well as the revitalization effects on the surrounding neighborhood. »

● Pilkington **Pyrostop**® Line Triple launch: butt-jointed fire-resistant glass for flush glass design with slim colored edge print

● Web based Declaration of Performance (DOP's) acc. to new Construction Product Directive and Environmental Product Declarations (EPD's) for Pilkington fire-resistant glasses available →



Fire-rated enclosure on the third floor: the rating of the system is 60 minutes of integrity and thermal insulation (TGP Fireframes® Aluminum Series / Pilkington **Pyrostop**®).

2015/16

- Pilkington **Pyrodur**® 30-203 for EW 30/EI 20: larger, safer, more efficient
- Pilkington **Pyrostop**® 120-108: first monolithic glass type for EI 120
- Pilkington **Pyroclear**® Plus generation for E/EW 30 and E/EW 60
- Pilkington **Pyroclear**® Line 30-603 for butt-jointed E 30
- Incorporation of brighter Pilkington **Optifloat**™ Clear with higher light transmittance and more neutral colour of the monolithic Pilkington **Pyrostop**® EI 30 and Pilkington **Pyrodur**®
- Accreditation of the in-house fire test furnace





The library's third floor is a quiet space for visitors to work in the nonfiction and business areas. Additional noise reduction and impact resistance performance are provided by Pilkington **Pyrostop**® used for the transparent enclosure of the staircase.

Open layout for visual connectivity

A key goal for the interior design of the library was to create an open layout that maintains visual connectivity and allows ample natural light to pass through, while still retaining separations and meeting fire-rating standards. The design solution pairs Fireframes® Aluminum Series frames with Pilkington **Pyrostop**® fire-resistant glass, both supplied by Technical Glass Products (TGP). The renovation incorporates a fire-rated framing system in the areas surrounding the grand staircase and the stair entrance to the public areas located on the lower level.

Customized system technology

TGP's Fireframes® Aluminum Series frames offer narrow profiles and crisp sightlines, which help preserve the building's open layout by providing transparent compartmentalization around the central staircase. Custom-made aluminium face caps help create an unique look and maintain visual consistency with surrounding windows and curtain walls. In this application, the design team selected box-shaped aluminium cover caps, creating a framing system with sleek, linear profiles. Design professionals can use Fireframes® Aluminum Series frames in applications requiring a two-hour barrier to radiant and conductive heat transfer. »



2017

● Tried, tested, trusted and now even certified and guaranteed: fourfold added value included



- Pilkington **Pyrostop**®: monolithic butt-jointed glazing for EI 30 and EI 60 with constructive corner solution
- Pilkington **Pyroclear**® Plus 30-402: largest dimension in Europe available

All ways of entering the library collect into one main lobby area. Visual connectivity is retained across all floors.



Tulsa City-County Central Library, Tulsa (OK, USA)

Client: Tulsa City-County Library System, Tulsa

Architect: MSR Design Meyer, Scherer & Rockcastle, Minneapolis

Supplier for fire-rated glass and framing systems:
TGP Technical Glass Products, Seattle

Fire-rated products: Pilkington **Pyrostop**® 60-101 rated 60 minutes of integrity and insulation in TGP's Fireframes® Aluminum Series partitions and Fireframes® Designer Series fire-rated doors (approximately 150 m² in total)

www.tulsalibrary.org

Fire-rated glass with additional functions

Pilkington **Pyrostop**® is fire-tested as a wall assembly, allowing unrestricted amounts of transparent glazing. The fire-rated system surrounding the staircase serves as a barrier to radiant and conductive heat transfer, while maintaining visual connectivity and allowing plenty of natural light to pass between areas. The special Pilkington **Pyrostop**® glass type applied also meet the impact-resistance requirements of CPSC 16, CFR 1201, Category I and/or Category II – an important performance benefit for glass used around busy stairways. As an added benefit, the fire-resistant glass provides extra noise protection for the library's third floor, creating a quiet space for visitors to work in the nonfiction and business areas. The compatible Fireframes® Designer Series fire-rated doors used for the lower-level stair entrance feature narrow steel profiles that provide a sleek, modern alternative to traditional hollow metal steel frames. The frames can be powder coated to match desired project color schemes, and are available in stainless steel. ■

2018

- Pilkington **Pyrostop**® Line 120-60: 120 minutes fire resistance for flush glass design

- Pilkington **Pyrostop**® Line 90-600: 90 minutes fire resistance for flush glass design
- Interface between Pilkington Spectrum and LogiKal / Orgadata for fire-resistant glass products
- MED- und US Coast Guard-Certification

- Pilkington **Pyrodur**® TM 60-20 for Maritime applications
- 10-year haze-free guarantee worldwide



The people behind fire-resistant glass:

We are fire protection glass!

The continuous success of fire-resistant glass made by Pilkington for four decades and the striving for the development of new products and applications are being driven in the main by the competence, reliability, know-how and the ambition for innovation of the employees. BRANDSCHUTZ transparent has taken the successful team to the stage for the 40th production anniversary of Pilkington **Pyrostop**® for the reader to see.

Today, the workforce of more than 200 people of the strategic business unit fire protection division at the site in Gelsenkirchen forms the backbone of the product lines Pilkington **Pyrostop**®, Pilkington **Pyrodur**® and Pilkington **Pyroclear**®. Many of them remain hidden for the customers, others are in touch daily with national and international customers and users.

Loyal employees - consistent partnership

It is a sign of the extraordinary team spirit among the employees at the Pilkington site in Gelsenkirchen, that they stay with the company for many years. "The long-term experience with the products and all customer-related business processes is very valuable for us and for our customers", emphasizes Nils Brinkmann, Commercial Director Fire Protection Glass at Pilkington Deutschland AG. At the same time, he confirms the positive feedback given by the loyal customers: "Several leading manufacturers, who are using our fire-resistant glass in their systems, both then and now, have entered national and international markets and developed new applications together with the support of our employees. These consistent partnerships are significantly maintained by the continuous and competent 'human' contacts. In combination with the high-end products a major strength of our business." ■

In October 2018, the employees of the strategic business unit fire protection glass of Pilkington Deutschland AG gathered at the site Gelsenkirchen for a spectacular team photo for the occasion of the 40th production anniversary of Pilkington **Pyrostop**®.



BRANDSCHUTZ transparent
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OUTLOOK

- Exploiting of Maritime and Rail segments
- Developing of new geographical markets
- Further optimisation of the existing product range
- New multi-functional product compositions



pyrostop.com/valueadded



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.



CE marking confirms that a product complies with its relevant harmonised European Norm.

The CE marking label for each product, including declared values, can be found at www.pilkington.com/CE



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