

THE PRODUCTS DESCRIBED HEREIN CAN ALL MAKE A POSITIVE CONTRIBUTION TO THE SUSTAINABILITY OF A BUILDING, AS QUANTIFIED IN RATING SCHEMES SUCH AS LEED, BREEAM AND THE CODE FOR SUSTAINABLE HOMES. THEY ARE ORGANISED BY BENEFIT CATEGORY THROUGHOUT. FOR MORE INFORMATION VISIT OUR WEBSITE AT WWW.PILKINGTON.COM

PRODUCT ANNEX: GLASS FOR SUSTAINABLE BUILDINGS

Solar Control

Pilkington **Optifloat™** Tint and Pilkington High Performance Tint (e.g. Pilkington **Arctic Blue™**) is a range of low to medium solar control performance uncoated body-tinted glass, with low light reflection and high energy absorption.

The products are particularly suitable for applications that demand solar control without the use of surface coatings, for residential or commercial applications. To achieve thermal insulation, the products have to be combined with low-emissivity glass in Insulating Glass Units.

Pilkington **Reflite™** is a range of medium solar control performance on-line coated clear or body-tinted glasses, with low light transmittance and medium light reflectance. The products are available in a range of colours (Clear, Arctic Blue, Emerald Green, Bronze and Grey).

Suitable for single glazing or incorporated in Insulating Glass Units, the products can be used in a wide range of residential and commercial applications. To achieve thermal insulation, the products have to be combined with low-emissivity glass in Insulating Glass Units.

Pilkington **Eclipse™** is a range of medium solar control performance on-line coated glasses in two rich golden colours.

Suitable for single glazing or incorporated in an Insulating Glass Unit, the product can be used in a wide range of residential and commercial applications. To achieve thermal insulation, it has to be combined with low-emissivity glass in an Insulating Glass Unit.

Pilkington **SunShade™** Silver is a medium solar control performance off-line coated glass, with low light transmittance and high light reflectance.

It is ideal for use in commercial façades as well as residential applications in hot climates with intense solar glare and sunlight. The product has to be used within an Insulating Glass Unit. To achieve thermal insulation, the product has to be combined with low-emissivity glass in an Insulating Glass Unit.

Pilkington **Eclipse Advantage™** is a range of good solar control performance on-line coated clear or body-tinted glasses, with unique colours (Clear, Arctic Blue, Blue-Green, Bronze, EverGreen and Grey) and low-emissivity properties.

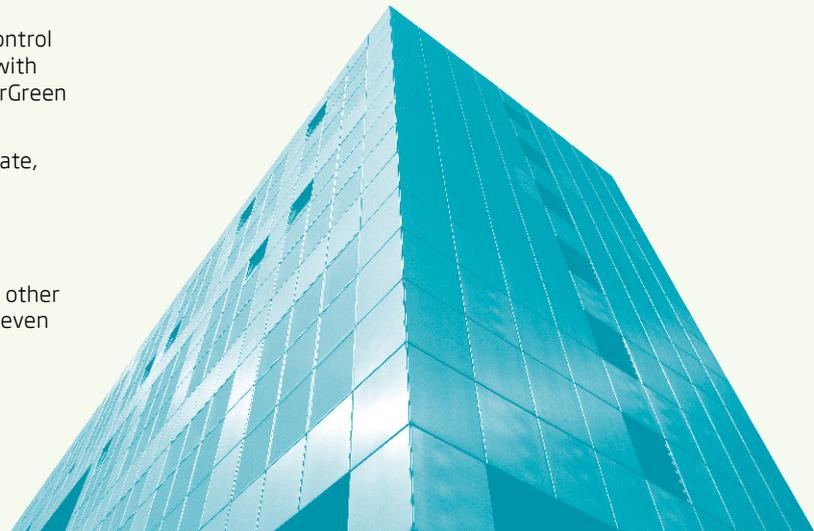
Specifically designed for use in countries with a warm climate, well-suited to both commercial façades and residential applications, the products offer unique colour options for original and innovative architecture designs. Extremely versatile, they can be used in their monolithic form or in Insulating Glass Units. The products can be combined with other low-emissivity glasses in Insulating Glass Units to achieve even higher levels of thermal insulation.

Pilkington **Solar-E™** is a range of good solar control performance on-line coated glasses, with medium light transmittance, low light reflectance and low-emissivity. The products are available in a range of colours (Clear, Arctic Blue, EverGreen, Blue-Green and Grey).

They are well-suited to both commercial façades and residential applications where high reflectance is undesirable and energy-efficiency in both summer and winter is required. Extremely versatile, they can be used in their monolithic form or in Insulating Glass Units. The products can be combined with other low-emissivity glasses in Insulating Glass Units to achieve even higher levels of thermal insulation.

Pilkington **Suncool™** is a range of superior solar control performance off-line coated glasses, with high light transmittance, low, medium or high light reflectance and outstanding thermal insulation (U-value down to 1.0 W/m²K in a double Insulating Glass Unit with 90% argon filled). The wide range of products is available in clear or neutral appearance and in two distinctive colours, blue and silver. They have been designed to be used in Insulating Glass Units. All products are available in combination with other products from the Pilkington range to offer additional benefits such as self-cleaning, safety/security or noise control. They can also be manufactured on Pilkington **Optiwhite™** low iron substrate to reduce the risk of thermal breakage and enhance the solar heat and light transmittance.

Designed to achieve optimum performance in large glazed areas, Pilkington **Suncool™** products are suitable for commercial and residential applications that demand high light transmission properties. The high selectivity index (light-to-heat ratio) combined with outstanding thermal insulation makes the range ideally suited for large areas of glazing, where the need is to control solar gain without significantly reducing the internal light level.



Solar Energy

NSG **TEC™** is a group of products, including a comprehensive range of TCO (Transparent Conductive Oxide) coated glass, optimised to suit a variety of thin film photovoltaic technologies, with different haze and conductivity levels. All our NSG **TEC™** products are manufactured using a patented chemical vapour deposition process to produce a durable, on-line coating that may be heat strengthened or fully tempered, providing complete flexibility for module production. Each of our products within the range is targeted at a particular thin film photovoltaic technology. Our NSG **TEC™** products are available in either standard or low iron glass composition depending on the substrate/coating combination.

Pilkington **Optiwhite™** is an ultra clear float glass with a very low iron content, which maximises the solar energy transmittance and, therefore, the efficiency of the module. Our range of products includes the standard and well established low iron Pilkington **Optiwhite™** and its new version, developed especially for the solar industry, Pilkington **Optiwhite™ S**, which offers even greater solar transmission. Pilkington **Microwhite™** is our Pilkington **Optiwhite™** in its extremely thin version (glass thicknesses down to 1.0 mm).

Because of their very high light transmittance and low absorptance Pilkington **Optiwhite™** and Pilkington **Microwhite™** are particularly suited to concentrator solar power technology too (i.e. solar mirrors).

Pilkington **Sunplus™** is a glass specifically developed for use in crystalline silicon modules. This high performance low iron glass has very high solar energy transmittance. When toughened, its strength and durability make it the ideal choice for this application.

Our range of Pilkington **Sunplus™** products include:

Pilkington **Sunplus™ SM**: ultra high solar energy transmittance and low light reflectance due to a combination of a prismatic pyramidal pattern on one surface - S -, and a matt pattern on the other - M -;

Pilkington **Sunplus™ MM**: ultra high solar energy transmittance and low light reflectance due to the matt pattern surfaces on both sides; Pilkington **Sunplus™ SM AR**: ultra high solar energy transmittance with Anti-Reflective properties due to the application of an AR coating, designed and optimised for crystalline silicon technologies.

Pilkington **Sunplus™** and Pilkington **Optiwhite™** are also ideal products for the cover plate of solar thermal collectors, as toughened, high transmittance glass is required for this application.

Thermal Insulation

Pilkington **Optifloat™** Clear is our high quality float glass. It can be used in a wide variety of applications, often representing a practical and stylish alternative to solid materials. It may be used in the exterior and interior of buildings to permit the transmission of daylight and allowing occupants to view their surroundings.

Pilkington **Energy Advantage™** and Pilkington **K Glass™** are on-line coated low-emissivity glass products that offer substantial improvement on thermal insulation when compared to clear float glass. They are also characterised by high solar heat gain, which means that as well as retaining heating warmth in a room, they allow high levels of solar energy to enter, for warmer and brighter interiors in sunny spells, and reduced heating and lighting costs.

Extremely versatile, they can be used in their monolithic form or in Insulating Glass Units. They are recommended for new buildings and renovations/modernisations where high solar heat gain is beneficial. They can also be manufactured on Pilkington **Optiwhite™** low iron substrate to enhance the solar heat and light transmittance.

Pilkington **Optitherm™** is a range of high performance low-emissivity off-line coated glass products that offer high to very high thermal insulation performance as well as neutrality.

Pilkington **Optitherm™ S3** is one of the market leading super neutral low-emissivity glasses, due to its very high light transmittance and low light reflectance. For applications requiring a U_g -value of 1.0 W/m²K, we offer Pilkington **Optitherm™ S1**.

Developed specifically for energy-optimised triple glazing, Pilkington **Optitherm™ GS** maximises solar energy gain and reduces heat loss to increase the energy-efficiency of houses. Pilkington **Optitherm™ GS** exceeds the criteria for Passiv Haus glazing, achieving a total solar energy transmittance (g value) of up to 63% whilst still attaining a U_g -value of as low as 0.6 W/m²K.

The Pilkington **Optitherm™** range has been specially developed for use in Insulating Glass Units. The products can be enhanced when combined with other products from the Pilkington range to provide additional benefits such as self-cleaning, noise control or safety/security properties. They can be used from the smallest installation to the most prestigious curtain walling applications - anywhere where there is concern for reduced energy consumption and heat loss.

Pilkington **Insulight™ Therm** is the name for our own range of Insulating Glass Units for improved thermal insulation. These are technically advanced, dual seal units which comply with national and international standards as required. They can achieve a range of performance levels using our range of low-emissivity coating options listed above. In the UK, Pilkington **energiKare™** is the name given to a range of Insulating Glass Units which incorporate Pilkington **K Glass™** and benefit from improved g value to optimise performance for Window Energy Ratings (WERs) for replacement windows in homes.

Pilkington **Spacia™** is the world's first commercially-available vacuum glazing. It offers the thermal performance of conventional double glazing in only the same thickness as single glass. It provides a real solution to the problems of balancing historical preservation with modern comfort and environmental requirements. Pilkington **Spacia™** has a low overall thickness as well as a good acoustic performance and is ideal for use in historic buildings, offering replacement windows more in keeping with the original design. It may even allow the use of the original frames if these are in a reasonable or repairable condition.



Fire Protection

Pilkington **Pyrostop**® is a clear, multi-laminated fully insulating fire-resistant safety glass that offers the highest level of fire protection, effectively blocking the transmission of conductive and radiant heat, while maximising the transmission of natural light and transparency. Pilkington **Pyrostop**® is designed for interior and exterior use where thermal insulation is required up to class EI 180. It is suitable for use with steel, aluminium and timber frames in monolithic form or Insulating Glass Units, and is ideal for use in transparent partitions, windows (special application), doors, screens and façades or for horizontal applications (roof and inclined glazing). Pilkington **Pyrodur**® is a clear multi-laminated fire-resistant glass designed to provide basic integrity performance and to reduce the radiant heat transfer. It is suitable for internal and external applications up to class EW 60. Pilkington **Pyrodur**® is available for use with steel, aluminium, softwood and hardwood timber frames. It is particularly suited for use in doors, screens and partitions where lightweight, narrow profiles are important and ease of glazing is a priority. Further applications include Insulating Glass Units in façades and roof glazing (special compositions for inclined applications). Pilkington **Pyroclear**® is a clear high performance monolithic basic integrity fire-resistant and safety glass. It is suitable for internal and external applications where integrity only performance is sufficient. Pilkington **Pyroclear**® has been approved in single and double glazed units for use with steel and aluminium systems. It is suited for use in doors, screens and partitions in line with national regulations as an effective barrier against fire, smoke and fumes.

Glass Systems

Pilkington **Planar**™ is the world's leading structural glazing systems. It uses a combination of glass and high grade stainless steel fittings, which when combined with a countersunk hole can attain a flush façade with very little distortion. There are various Pilkington **Planar**™ system glass types; from single toughened, laminated, double or even triple glazing to suit every requirement.

With the flexibility to incorporate most of the vast array of Pilkington glass products, including solar control, low-e as well as Pilkington **Activ**™ self-cleaning glass, Pilkington **Planar**™ allows clients and architects the ability to build attractive, sustainable buildings that produce a greater feeling of light and space, thus, improving the working environments within.

The Pilkington **Planar**™ system covers a large spectrum of applications and is not limited in size. The system can be utilised from small technically straightforward situations through to major building packages that are technically challenging. Past work includes curtain walling systems with opening lights, complex three dimensional façades and roofs, and curved façades.

Pilkington **Profilit**™ is a range of alkali cast glasses in U-shape, which are produced according to EN 572, Part 7, using the machine rolling process. The products are translucent, but not transparent, with or without a patterned surface on the outside and have the quality features of cast glass. The end result is a wall that obscures vision but allows light to pass through. Pilkington **Profilit**™ products can be used in interior or exterior applications. The glasses are available in a variety of functions, colours and textures with varying translucency, allowing for the passage of natural daylight without the loss of privacy. Pilkington **Profilit**™ products can offer thermal insulation, solar control, excellent sound reduction as well as safety characteristics. They provide the most cost-efficient glass walls systems available. The products come in various dimensions and shapes (e.g. Pilkington **Profilit**™ Wave), designs (e.g. Pilkington **Profilit**™ Opal), patterns (e.g. Pilkington **Profilit**™ Slim Line) and glass compositions (e.g. Pilkington **Profilit**™ OW low-iron glass). The range of products can be single, dual or triple glazed.

Noise Control

Pilkington **Optiphon**™ is a high quality acoustic laminated glass that offers excellent noise reduction without compromising on light transmittance or impact performance. The desired acoustic performance can be achieved through combining various thicknesses of glass with a special polyvinylbutyral (PVB) interlayer. With a large variety of product combinations, it offers the opportunity to achieve specific noise reduction requirements.

Pilkington **Optiphon**™ can be combined with other Pilkington products for a multi-functional noise-reduction monolithic glass or a multi-functional noise-reduction Insulating Glass Unit providing additional benefits, such as thermal insulation, solar control or self-cleaning. It is the ideal choice of glass in any buildings where there is excess noise from road, rail or air traffic, or other sources such as factories or nightclubs.



Safety/Security

Pilkington **Optilam™** is our laminated glass, produced by combining two or more sheets of float glass with one or more interlayers, the most popular of which is a PVB interlayer. The interlayers ensure the integrity of the glass, by holding the broken pieces in place should any damage occur. In fact, glass fragments adhere strongly to the interlayer, while the resistant cushioning effect dissipates the energy.

Pilkington **Optilam™** can be enhanced when combined with other Pilkington products to provide additional benefits such as self-cleaning, solar control or thermal insulation. We can influence the performance of Pilkington **Optilam™** simply by changing the number and thickness of each layer of glass and PVB interlayer. By doing this, we can offer a wide range of products suitable for many applications, whether it is for safety (glazed building entrances, internal doors, overhead and roof glazing, swimming pools and windows in critical risk locations), security (applications which display valuable goods, such as museums or in banks or building societies, as well as safety glazing in hospitals and prisons) or bullet resistance (high risk buildings such as banks, post offices, building societies, embassies, cash offices, military establishments and VIP residences).

Self-cleaning

Thanks to its revolutionary coating, our Pilkington **Activ™** on-line coated self-cleaning range of glasses stay cleaner, all-year round. Their unique dual-action coating uses the forces of nature to help keep the glass free from dirt, giving not only the practical benefit of less cleaning, but also clearer, better-looking windows.

The self-cleaning coating can be combined with solar control and/or thermal insulation glass in an Insulating Glass Unit for a comfortable environment all year round.

Pilkington **Activ™** is available in combination with other products from the Pilkington range to provide additional benefits such as impact resistance or increased security (Pilkington **Activ Optilam™**), noise control (Pilkington **Activ Optiphon™**), solar control (Pilkington **Activ™** Blue, Pilkington **Activ™** Neutral, and Pilkington **Activ Suncool™**) or thermal insulation (Pilkington **Activ Optitherm™**).

Special Applications

Pilkington **Optiwhite™** is an extra clear, low iron float glass with very high light transmission. It is practically colourless, and the green cast inherent to other glasses is not present. It is therefore ideal for use where glass edges are visible or where a neutral colour is desired. As its light transmission is 1% and 6% higher than clear float glass in 3 mm and 15 mm thickness respectively, it achieves greater brilliance and transparency, allowing a clear and true representation of colours when viewed through the glass. These same qualities also allow for maximum interior daylight; this is why it is the product of choice for architects for buildings where transparency and brightness are of paramount importance.

It can be combined with other products from the Pilkington range. For example, when combined with Pilkington **Suncool™** it decreases the risk of thermal breakage and reduces the need for toughening, whilst providing additional high performance solar control and low-emissivity. When used in exterior glazing, it enhances true colours and allows maximum light transmission, even in thicker laminated combinations. In domestic windows, Pilkington **Optiwhite™** maximises passive solar gain to reduce the need for heating during cold sunny days.

For more information please visit www.pilkington.com and consult your local representative about availability in your region.