High Performance Glass Products for digital signage, digital displays and touch screens
Digital signage and displays are one of the media’s most powerful sources. The demand for digital signage and displays is steadily growing. Digital displays are being used in many markets and are prevalent in restaurants, hotels, schools, retail, healthcare, and financial institutions.

NSG Group offers the widest range of robust, pyrolytic, toughenable, coated glass products available today. Our products offer solutions to a multitude of industry requirements.

- High light transmission
- Anti-reflection
- Transparent conductive
- Anti-static
- EMI shielding
- Heating

Glass products for digital signage and displays

NSG TEC™

NSG TEC™ products are a perfect option for touch screen cover lites where a TCO coating is required. Our range of NSG TEC™ products provide excellent performance at a competitive price point. NSG TEC™ glass is very durable and robust.

For capacitive and resistive touch screens, a transparent conductor is needed. NSG TEC™ products use fluorine doped tin oxide as the TCO, and offer an excellent value alternative to ITO.

NSG TEC™ products are easily fabricated, including cutting, tempering and bending.

Our range of NSG TEC™ products are available in a variety of substrates and thicknesses, including low iron and clear glass. NSG TEC™ can be tuned to specific customer requirements.
Benefits
- More cost effective than ITO coatings
- Widest range of TCO sheet resistant products available
- Durable and robust coatings
- Coatings available on a range of glass thicknesses
- Capability of tuning coatings to meet specific requirements
- Large stock sizes up to 6000 x 3210 mm depending on product type and thickness

Features
- Anti-static
- EMI shielding
- Heated glazing
- Active component of touch screens

Applications
- Digital displays
- Touch screens
- Digital signage

<table>
<thead>
<tr>
<th>Property</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet resistance (Ω/□)</td>
<td>5-250</td>
</tr>
<tr>
<td>Visible light transmittance (%)</td>
<td>80-85</td>
</tr>
<tr>
<td>Haze (%)</td>
<td>0,2 to &gt;50</td>
</tr>
<tr>
<td>Thickness (mm)</td>
<td>1,3-10</td>
</tr>
</tbody>
</table>

NSG TEC™ – performance data

<table>
<thead>
<tr>
<th>Product</th>
<th>Thickness (mm)</th>
<th>Visible light transmittance (%)</th>
<th>Sheet resistance (Ω/□)</th>
<th>Haze (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSG TEC™ 5</td>
<td>3,2</td>
<td>80</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>NSG TEC™ 7</td>
<td>2,2, 3,0, 3,2</td>
<td>80-81,5</td>
<td>6-8</td>
<td>&lt;2</td>
</tr>
<tr>
<td>NSG TEC™ 10</td>
<td>2,2, 3,2</td>
<td>83-84,5</td>
<td>9-11</td>
<td>≤1</td>
</tr>
<tr>
<td>NSG TEC™ 15</td>
<td>1,3, 1,6, 1,8, 2, 3, 3, 2, 4, 0</td>
<td>83-84,5</td>
<td>12-14</td>
<td>≤0,5</td>
</tr>
<tr>
<td></td>
<td>5,0, 6,0, 8,0, 10,0</td>
<td>82-83</td>
<td>12-14</td>
<td>≤0,5</td>
</tr>
<tr>
<td>NSG TEC™ 50</td>
<td>6,0</td>
<td>83-84</td>
<td>43-53</td>
<td>≤0,55</td>
</tr>
<tr>
<td>NSG TEC™ 70</td>
<td>3,2, 4,0</td>
<td>82-84</td>
<td>58-72</td>
<td>0,5</td>
</tr>
<tr>
<td>NSG TEC™ 100</td>
<td>3,2, 4,0</td>
<td>83-84</td>
<td>125-145</td>
<td>0,5</td>
</tr>
<tr>
<td>NSG TEC™ 250</td>
<td>3,2, 4,0</td>
<td>84-85</td>
<td>260-325</td>
<td>0,7</td>
</tr>
<tr>
<td>NSG TEC™ 500</td>
<td>3,2</td>
<td>88</td>
<td>1000-3000</td>
<td>0,5</td>
</tr>
</tbody>
</table>

Nominal values shown. Specifications subject to change. Substrate = clear soda lime glass.
Other glass thickness and sheet resistance options are possible upon request.
Anti-reflective glass for digital signage

Monolithic anti-reflective

Pilkington OptiView™ and Pilkington OptAR™ anti-reflective glasses are affordable alternatives for reducing glare that reflects off computer screens, aircraft transparencies, televisions, flat panels and similar electronic displays.

Manufactured on-line with a durable, single-sided pyrolytic coating, Pilkington OptiView™ and Pilkington OptAR™ offer all the benefits of on-line coated glass products including, easy handling, fabricating, cutting, tempering, bending and more.

These anti-reflective products reduce glare (reflected light) and provide low reflectivity. As a result, displays are easier to read, eye strain is minimized, and visual acuity is increased.

Available thicknesses*
- 2.2 mm
- 3 mm
- 3.2 mm
- 4 mm
- 6 mm
- 10 mm

* Only Pilkington OptAR™ is available in 2.2 and 3.2 mm.
* Available on a low iron substrate.

Features and benefits
- Low reflection, less than 1% from coated surface
- Electrically conductive
- Improved visual performance with high light transmission
- Easily fabricated
- Bendable
- Durable pyrolytic coating
- Available on low iron substrate
- Durable and robust coating
- Large stock sizes up to 6000 x 3210 mm depending on product type and thickness

Applications
- Digital signage and displays
- Touch panel displays
- Aircraft transparencies
- Flat-panel LCD monitors
- Televisions and HDTV
- Specialty vehicle windshields and instrument panels
- Specialty electronic applications

Pilkington OptiView™ and Pilkington OptAR™ – performance data

<table>
<thead>
<tr>
<th>Product</th>
<th>Nominal glass thickness (mm)</th>
<th>Coated surface reflection (%)</th>
<th>Visible transmittance (%)</th>
<th>Total visible reflectance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear glass</td>
<td>3</td>
<td>&lt;1</td>
<td>90</td>
<td>8</td>
</tr>
<tr>
<td>Pilkington OptAR™</td>
<td>2.2</td>
<td>&lt;1</td>
<td>91</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Pilkington OptiView™</td>
<td>3.2</td>
<td>&lt;1</td>
<td>91</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Pilkington OptiView™</td>
<td>3</td>
<td>&lt;1</td>
<td>91</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Pilkington OptiView™</td>
<td>4</td>
<td>&lt;1</td>
<td>91</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Pilkington OptiView™ OW</td>
<td>6</td>
<td>&lt;1</td>
<td>90</td>
<td>&lt;5</td>
</tr>
</tbody>
</table>

Front (coated) surface reflectance of Pilkington OptiView™ and Pilkington OptAR™ glass compared to 3 mm clear glass

Sheet resistance (Ω/□) is <200 for all products listed above.
Laminated anti-reflective

Pilkington OptiView™ Protect for outdoor digital signage

Many signage installations are used outdoors. Outdoor applications require additional strength and security. Laminated Pilkington OptiView™ Protect offers many of benefits for outdoor signage.

- High light transmission: >90%
- Low reflection: <2%
- Neutral color
- Large sizes available up to 6000 x 3210 mm depending on product type and thickness
- UV Control. UV and IR rays can damage displays. Laminated Pilkington OptiView™ Protect blocks almost 100% of UV and reduces infrared radiation (see performance chart page 6).
- Available on low iron glass

Safety & Security

Vandal resistant. Pilkington OptiView™ Protect is a laminated safety glass that performs under impact. Ordinary glass shatters into large pieces when impacted. Laminated lites of Pilkington OptiView™ Protect may break when impacted, but the glass fragments will remain firmly bonded to the interlayer, minimizing the risk of injury.

Reflectance of laminated Pilkington OptiView™ Protect compared to 6 mm clear glass

![Reflectance graph](image.png)
Anti-reflective glass for digital signage

Laminated anti-reflective

Durability
Pilkington OptiView™ Protect is durable and easy to clean like ordinary glass. Pilkington OptiView™ Protect meets the requirements of EN1096-2, Class A.
- Acid resistance
- Condensation resistance
- Salt spray resistance
- Abrasion resistance
- Pencil hardness 8H

Easy installation
Pilkington OptiView™ Protect is easily installed. Most laminated combinations can be easily cut to size and fabricated.

No visual distortion
Distortion can occur with heat-strengthened and toughened glass, known as roller wave distortion. Pilkington OptiView™ Protect provides crisp, clean views, free of distortion.

Design flexibility
Pilkington OptiView™ can be bent, toughened, heat-strengthened, painted for spandrel and a ceramic frit can be applied.

Custom designs, images, logos, text, patterns, or tinted interlayers can be laminated into the lites to create a truly customize design or application.

Available thicknesses
- 6,4 mm laminated glass
- 8,4 mm laminated glass
- 12,4 mm laminated glass

---

Pilkington OptiView™ Protect – performance data

<table>
<thead>
<tr>
<th>Product</th>
<th>Nominal glass thickness (mm)</th>
<th>Visible light (%)</th>
<th>Solar energy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Transmittance</td>
<td>Reflectance</td>
</tr>
<tr>
<td>Clear glass (non-laminated)</td>
<td>6</td>
<td>88</td>
<td>1,7</td>
</tr>
<tr>
<td>Pilkington OptiView™ Protect</td>
<td>6,4</td>
<td>92</td>
<td>1,7</td>
</tr>
<tr>
<td>Pilkington OptiView™ Protect</td>
<td>8,4</td>
<td>90</td>
<td>1,7</td>
</tr>
<tr>
<td>Pilkington OptiView™ Protect</td>
<td>12,4</td>
<td>88</td>
<td>1,7</td>
</tr>
</tbody>
</table>

Clear float glass performance based on non-laminated, monolithic glass. (Note – all thicknesses are nominal.)

Thickness of laminated glass = thickness of glass layer + thickness of PVB + thickness of glass layer:
- Pilkington OptiView™ Protect 6,4 (laminated glass) = 3 mm Pilkington OptiView™ (#1) + 0,38 mm clear PVB layer + 3 mm Pilkington OptiView™ (#4);
- Pilkington OptiView™ Protect 8,4 (laminated glass) = 4 mm Pilkington OptiView™ (#1) + 0,38 mm clear PVB layer + 4 mm Pilkington OptiView™ (#4);
- Pilkington OptiView™ Protect 12,4 (laminated glass) = 6 mm Pilkington OptiView™ (#1) + 0,38 mm clear PVB layer + 6 mm Pilkington OptiView™ (#4).
Pilkington MirroView™ digital display mirror for low light applications

Pilkington MirroView™ is a highly reflective mirror coating with a clear substrate. Pilkington MirroView™ gives digital displays and video screens a modern, transitional look.

Pilkington MirroView™ is ideal for concealing digital displays and video screens for commercial and residential applications.

When the screen is turned ‘off’, Pilkington MirroView™ maintains a mirrored appearance, which conceals the screen. When the screen is turned ‘on’, the picture on the video screen shows through.

Pilkington MirroView™ is very durable and can be easily handled, transported and processed, including toughening and laminating. Due to the durability of the pyrolytic coating, it does not degrade over time, which gives the product a virtually unlimited shelf-life.

**Applications**
- Bars and restaurants
- Bathrooms
- Digital signage

Available in large stock sizes, which can conceal one or multiple displays. With its highly reflective and durable coating, Pilkington MirroView™ can be used as a traditional mirror with a small video screen concealed beneath. Ideal for bathroom applications, this allows individuals to easily view themselves in the mirror while watching television.

Pilkington MirroView™ 50/50 digital display mirror for high light applications

Pilkington MirroView™ 50/50 offers the same qualities as the original product, yet it is designed for use in applications with high ambient light.

**Applications**
- Hotel rooms
- Lobbies and salons
- Retail
- Digital signage

**Pyrolytic coating advantages**
- Durable coating
- Easily handled and transported
- No edge deletion required
- Virtually unlimited shelf-life
- Tempered and laminated

**Available thicknesses**
- 3 mm (Pilkington MirroView™ only)
- 6 mm

Pilkington MirroView™ and Pilkington MirroView™ 50/50 – performance data

<table>
<thead>
<tr>
<th>Product</th>
<th>Nominal glass thickness (mm)</th>
<th>Glass substrate</th>
<th>Visible transmittance (%)</th>
<th>Visible reflectance coated side (%)</th>
<th>Visible reflectance glass side (%)</th>
<th>Proper glazing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilkington MirroView™</td>
<td>3</td>
<td>Clear</td>
<td>20</td>
<td>76</td>
<td>70</td>
<td>Mirror coating toward viewer-side</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Clear</td>
<td>20</td>
<td>74</td>
<td>66</td>
<td>Mirror coating toward viewer-side</td>
</tr>
<tr>
<td>Pilkington MirroView™ 50/50</td>
<td>6</td>
<td>Clear</td>
<td>45</td>
<td>53</td>
<td>50</td>
<td>Mirror coating toward viewer-side</td>
</tr>
</tbody>
</table>

* Nominal values shown.
Pilkington Activ™ self-cleaning glass

Pilkington Activ™ is the world's first pyrolytic self-cleaning glass. This revolutionary kind of glass actually uses the power of the sun to clean itself.

The Pilkington Activ™ coating is applied to the surface of the glass via an on-line chemical vapour deposition process. It is an integral part of the surface, and lasts the entire life of the glass.

Pilkington Activ™ uses daylight, which is abundant even on cloudy days, to keep glass clean with a two-step process:
1) Pilkington Activ™ loosen dirt, and gradually breaks down organic residue using energy from daylight.

2) The hydrophilic nature of the Pilkington Activ™ coating allows water to sheet off its surface, removing organic residue, dust particles and inorganic dirt. Under most conditions, natural rain is sufficient to keep the glass clean but use of a hose will achieve the same result.

In addition to providing an easy to clean surface, the Pilkington Activ™ range is also oleophobic, acting as an anti-fingerprint coating. The photodecomposition properties of Pilkington Activ™ break down organic contaminants, e.g. stearic acid, acetone or paraffin wax. Pilkington Activ™ can also contribute to the destruction of bacteria and ozone.

Available in large sizes, up to 6000 × 3210 mm, and glass thicknesses of 3 mm to 10 mm.
Pilkington Optiwhite™ offers a variety of benefits for touch screen and digital signage applications. Pilkington Optiwhite™ is an extra-clear, low iron float glass; it is practically colourless, and the green cast inherent to other clear glasses is not present. It is perfect for applications where transparency and purity of colour are desired.

Available in thicknesses between 2 mm and 19 mm (the widest range on the market), Pilkington Optiwhite™ provides increased design flexibility and, when combined with other Pilkington glass products, it can offer additional benefits such as anti-reflective or conductivity.

It also comes with all the reassurance of not only being a market-leading product in its own right, but of bearing the market-leading Pilkington name, and with the unrivalled support you would expect from our brand.

**Features**

- High light transmittance for true colour and outstanding visual clarity when an unrestricted view is required
- Purity of color with minimum colour cast when viewing through the glass, ensuring a true representation of the designer’s vision
- Ensures a more natural, brighter view
- Improves aesthetics of laminated glass
- Brilliant clarity when compared to ordinary standard clear float glass
- Can be toughened or laminated for safety and security
- Can be painted or silk-screened for spandrel or decorative applications
- Can be combined with other products from the Pilkington glass range to provide additional benefits

---

**Pilkington Optiwhite™ — performance data**

<table>
<thead>
<tr>
<th>Product</th>
<th>Nominal glass thickness (mm)</th>
<th>Visible light (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transmittance</td>
<td>Reflectance</td>
</tr>
<tr>
<td></td>
<td>Outside</td>
<td>Inside</td>
</tr>
<tr>
<td>Pilkington Optiwhite™</td>
<td>2</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>90</td>
</tr>
</tbody>
</table>

* Technical performance according to EN 410.
**Pilkington Microfloat™** and Pilkington Microwhite™ thin float glass

**Made to precise standards**

Pilkington Microfloat™ and Pilkington Microwhite™ are extremely thin, high-grade float glass products manufactured to precise standards. They are made according to the highest specifications with very low thickness tolerances, to ensure flat and uniform products, suitable for a variety of applications.

The requirements of larger area touch screens and displays are different from those used in mobile devices. Large digital displays do not always require ultra-thin glass, less than 1 mm.

Pilkington Microfloat™ and Pilkington Microwhite™ are both manufactured by the standard float glass process. Pilkington Microfloat™ is the classic version manufactured from clear float, the new Pilkington Microwhite™ is a low iron composition which produces a very pure, clear glass and has the added benefit of increased light transmission.

**Applications**

- Digital signage and displays
- Microscope slides
- Cosmetic mirrors
- Chromatographic plates
- LCD photo masks
- Automotive and technical glass
- PC display screens and tablet PC’s

**Features**

- High-grade thin float glass with very low thickness tolerances
- Flat and uniform products
- Excellent optical transmission
- Improved wetability through a silane coating (optional)
- Cut to customer specifications

Additional features of Pilkington Microwhite™:

- Neutral edge colour
- Superior light and energy transmission

---

**Pilkington Microfloat™ and Pilkington Microwhite™ – performance data**

<table>
<thead>
<tr>
<th>Product</th>
<th>Thickness range</th>
<th>Light transmittance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilkington Microfloat™</td>
<td>1,0-1,6 mm</td>
<td>91,2% at 1 mm</td>
</tr>
<tr>
<td>Pilkington Microwhite™</td>
<td>1,0-1,6 mm</td>
<td>91,7% at 1 mm</td>
</tr>
</tbody>
</table>

Technical performance according to EN 410.
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, NSG, “TEC”, “OptiView”, “OptAR”, “MirroView”, “Activ”, “Optiwhite”, “Optifloat”, “Microfloat” and “Microwhite” are trademarks owned by Nippon Sheet Glass Co. Ltd, or a subsidiary thereof.