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.

Pyrolytic coated cover glass

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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 × 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>5-500</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>0.9-12</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, 2.2, 3.0, 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>
</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.
The Pilkington OptiView™ range and Pilkington OptAR™ range of coated anti-reflective products provide a complete set of solutions to minimise reflections in digital signage. These products product reduce glare that reflects off computer screens, televisions, flat panels, aircraft transparencies and similar electronic displays. As a result, displays are easier to read, eye strain is minimised and visual acuity is increased.

Monolithic anti-reflective

Manufactured on-line with a durable, single-sided pyrolytic coating, Pilkington OptiView™ and Pilkington OptAR™ and Pilkington OptAR™ Plus offer all the benefits of on-line coated glass products including, easy handling, fabricating, cutting, tempering, bending and more. Pilkington OptiView™ Ultra is a durable and robust magnetron sputtered coating, providing reduced reflection and high light transmission and is available in toughenable and non-toughenable forms. Monolithic anti-reflective products are ideal when optically bonded to the front of the display or when a mid-level reflection reduction is required. Pilkington OptAR™ Plus and Pilkington OptiView™ Ultra can be used in combination with a projected capacitive touch foil on #2.

Available thicknesses*

- 3 mm
- 3.2 mm
- 4 mm
- 6 mm
- 10 mm

Features and benefits

- Low reflection, less than 1% from coated surface
- Can be electrically conductive or fully dielectric
- Excellent visual performance with high light transmission
- Compatible with all touch screen technologies
- Easily fabricated
- Bendable
- Durable and robust coating
- Available on low iron substrate
- Large stock sizes up to 6000×3210 mm depending on product type and thickness

*Other thicknesses and low iron glass are available on request. Pilkington OptiView™ Ultra is only available on low iron glass.

Pilkington OptiView™ and Pilkington OptAR™ - performance data

<table>
<thead>
<tr>
<th>Product</th>
<th>Nominal glass thickness</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>1&lt;sup&gt;-1&lt;/sup&gt;</td>
<td>91</td>
<td>8</td>
</tr>
<tr>
<td>Pilkington OptAR™</td>
<td>3.2</td>
<td>1&lt;sup&gt;-1&lt;/sup&gt;</td>
<td>92</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Pilkington OptAR™ Plus</td>
<td>3.2</td>
<td>1&lt;sup&gt;-1&lt;/sup&gt;</td>
<td>95</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Pilkington OptiView™</td>
<td>3.2</td>
<td>1&lt;sup&gt;-1&lt;/sup&gt;</td>
<td>92</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Pilkington OptiView™ OW</td>
<td>3.2</td>
<td>1&lt;sup&gt;-1&lt;/sup&gt;</td>
<td>93</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Pilkington OptiView™ Ultra</td>
<td>3.2</td>
<td>1&lt;sup&gt;-1&lt;/sup&gt;</td>
<td>95</td>
<td>&lt;5</td>
</tr>
</tbody>
</table>

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

Double-sided coated anti-reflective glass

Pilkington OptiView™ Ultra provides the option of a glass with an anti-reflective coating on both sides. This allows reflection to be reduced while providing a glass thickness and weight, which is as low as possible. Pilkington OptiView™ Ultra is available in toughenable and non-toughenable forms.

Reflectance of laminated
Pilkington OptiView™ Protect compared to 6 mm clear glass
Laminated anti-reflective glass

Pilkington OptiView™ Protect and Pilkington OptiView™ Ultra Protect for outdoor digital signage.

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

- High light transmission: >90%
- Low reflection: <2%
- Neutral color
- Large sizes available up to 6000×3210 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.

Safety & Security

Vandal resistant. The Pilkington OptiView™ Protect range 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, minimising the risk of injury.

Durability

Pilkington OptiView™ Protect range is durable and easy to clean like ordinary glass. Pilkington OptiView™ Protect range meets the requirements of EN1096-2, Class A.

- Acid resistance
- Condensation resistance
- Salt spray resistance
- Abrasion resistance
- Pencil hardness 8H

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.

Pilkington OptiView™ Protect and Pilkington OptiView™ Ultra 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>Clear glass (non-laminated)</td>
<td>6</td>
<td>88</td>
<td>77</td>
</tr>
<tr>
<td>Pilkington OptiView™ Protect</td>
<td>6.4</td>
<td>92</td>
<td>70</td>
</tr>
<tr>
<td>Pilkington OptiView™ Protect</td>
<td>8.4</td>
<td>90</td>
<td>67</td>
</tr>
<tr>
<td>Pilkington OptiView™ Protect</td>
<td>12.4</td>
<td>88</td>
<td>62</td>
</tr>
<tr>
<td>Pilkington OptiView™ Ultra Protect</td>
<td>6.8</td>
<td>98</td>
<td>77</td>
</tr>
<tr>
<td>Pilkington OptiView™ Ultra Protect</td>
<td>8.8</td>
<td>98</td>
<td>77</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 OptiView™ Ultra Protect 6.8 (laminated glass) = 3 mm Pilkington OptiView™ Ultra (#1) + 0.76 mm clear PVB layer + 3 mm Pilkington OptiView™ Ultra (#4);
- Pilkington OptiView™ Ultra Protect 8.8 (laminated glass) = 4 mm Pilkington OptiView™ Ultra (#1) + 0.76 mm clear PVB layer + 4 mm Pilkington OptiView™ Ultra (#4).
**Easy installation**

Pilkington OptiView™ Protect range 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 range provides crisp, clean views, free of distortion.

**Available thicknesses**

- 6.4 mm laminated glass
- 8.4 mm laminated glass
- 12.4 mm laminated glass
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
- Touch screens

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

Available thicknesses
- 3.2 mm
- 4 mm
- 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>3.2 Clear</td>
<td>25</td>
<td>65</td>
<td>61</td>
<td>Mirror coating toward viewer-side</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Clear</td>
<td>25</td>
<td>65</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Clear</td>
<td>25</td>
<td>65</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilkington MirroView™ 50/50</td>
<td>3.2 Clear</td>
<td>36</td>
<td>53</td>
<td>51</td>
<td>Mirror coating toward viewer-side</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Clear</td>
<td>35</td>
<td>53</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Technical performance according to EN 410.
Uncoated cover glass for digital displays

Pilkington Optiwhite™ low iron glass

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 Outside</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>
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<td></td>
<td>6</td>
<td>91</td>
</tr>
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<td></td>
<td>8</td>
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</tr>
<tr>
<td></td>
<td>10</td>
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</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 **Microwhite™** thin float glass

**Made to precise standards**

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

**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

**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

**Pilkington **Microwhite™** - performance data**

<table>
<thead>
<tr>
<th>Product</th>
<th>Thickness range</th>
<th>Light transmittance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilkington <strong>Microwhite™</strong></td>
<td>1.0-1.6 mm</td>
<td>91.7% at 1 mm</td>
</tr>
</tbody>
</table>

Technical performance according to EN 410.
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