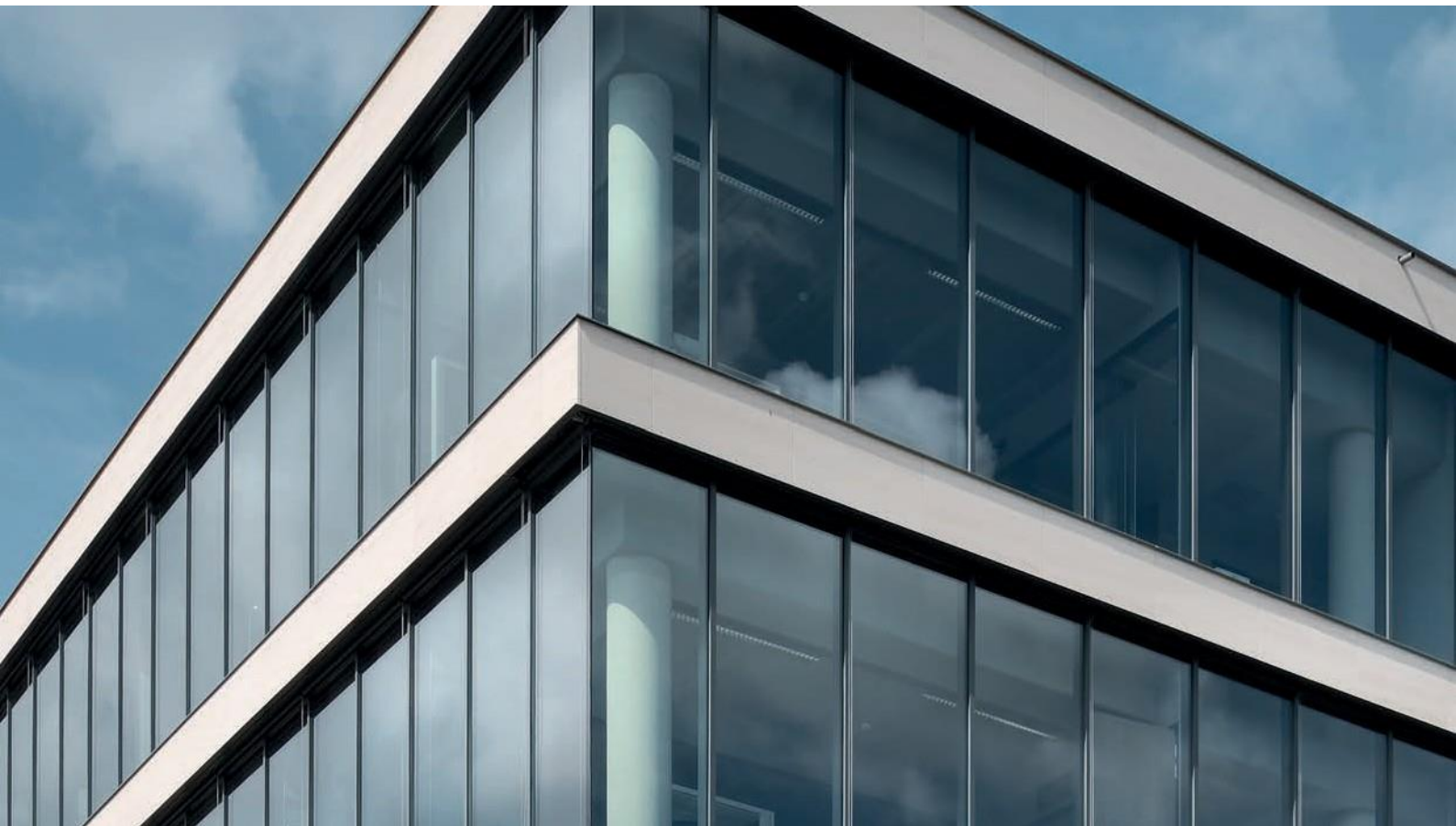


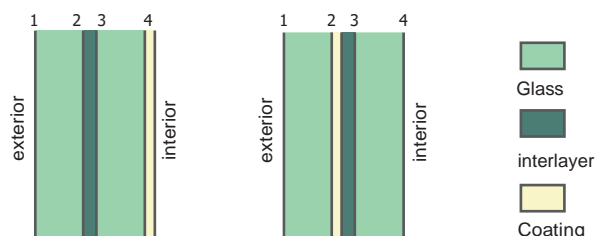
# SunGuard<sup>®</sup> in Laminated Glass Applications



BUILD WITH LIGHT<sup>®</sup>

Guardian SunGuard® products can be produced as laminated glass for requirements on safety and sound control. To maintain aesthetics and ensure superior performance, special care must be taken during the fabrication. When coated glass needs to be laminated, process parameters may need to be adapted due to the potential heat reflection of the coated surface. Please contact Guardian or the PVB manufacturer for assistance.

The coating can be applied on surface #4 (laminated with coating outside – picture left) or on surface #2 (laminated with coating against PVB – picture right).



## 1. SunGuard laminated with coating outside (surface 4)

Special attention needs to be paid if the coating is exposed to mechanical contact - especially if nip rolls are used for the pre-lamination process. The coated surface requires a quality control after each fabrication step under suitable light conditions.

Regarding any further handling (e.g. transportation, cutting, edge working, washing) specific instructions for handling of SunGuard products shall be followed - if you require more information, please contact Guardian.

## 2. SunGuard laminated with the coating facing PVB (surface 2, "Inside Lamination")

SunGuard coatings can significantly enhance the overall aesthetics and performance of laminated glass. However, various aspects require special attention when coatings are facing interlayers.

### 2.1 Compatibility

Laminated glass comprising coated glass with the coating facing an interlayer is subject to the same norms and standards that pertain to uncoated laminated glass. The durability of laminated glass is described in the product standard EN ISO 12543-4.

The tests are related to

- Humidity
- High temperature (bake test)
- UV exposure
- Adhesion (pummel test) – EN 14449 Annex B and C
- Bonding strength (compressive shear test) – EN 14449 Annex B and C

Following coating types are compatible with PVB interlayers:

- **SunGuard® HD** range
- **SunGuard® Solar** range
- selected coatings of the **SunGuard® HP** range – please contact Guardian for more information

The manufacturer of the laminated glass with embedded SunGuard coatings is responsible for ensuring the durability according to EN ISO 12543-4. The quality needs to be checked during the production on regular bases as part of a quality assurance plan (e.g. as part of EN 14449 compliance).



Guardian does not recommend the use of resins, structural interlayers or EVA foil if facing SunGuard coatings unless compatibility tests have been successfully carried out. Please contact Guardian for more information.

#### 2.1.1 Materials in contact with the edge of laminated glass

Without compatibility tests, the direct contact between PVB and any sealant materials should be avoided. Sealant and interlayer manufacturers provide tested combinations on request. The IFT Guideline DI-02/1 (IFT Rosenheim 2009) provides information about test methods and visual validation.

#### 2.2 Durability

Conditions that affect non-coated laminated glass can also have an adverse effect on coated laminated glass products.

Generally, the edges of laminated glass must not be standing in water or be exposed to high moisture. This would lead to optical deviations and finally de-lamination.

SunGuard HP coatings require special attention. If the intended application does not ensure the proper protection of the edges against moisture impact, the coating must be edge deleted prior to inside lamination to avoid corrosion of the sensitive coating. This requires the lamination of end-size cut glass.

Guardian gives no common approval for inside laminated split-silver coatings (SunGuard SN or SunGuard SNX). Attractive alternatives are SunGuard HD coatings in combination with clear or solar PVB. Please contact Guardian for more information.

#### 2.3 Safety/Security

Inside laminated coated glass products generally comply to EN ISO 12543-3 "Laminated glass". A few inside laminated coated glass products comply to EN ISO 12543-2 "Laminated safety glass".

Several types of the SunGuard HD range of products are certified in combination with different PVB interlayer types as laminated safety glass.

Typical applications are ventilated double skin facades, glazing to prevent people from falling and overhead glazing.

The increased shear and Young's modulus of interlayers with structural properties must not be used for structural design considerations and glass thickness calculations without special approval.

Please contact Guardian for more information.

#### 2.4 Appearance

Inside laminated coatings can have a significant colour deviation compared to non-laminated glass of the same type (especially SunGuard HP, SN and SNX coatings are critical).

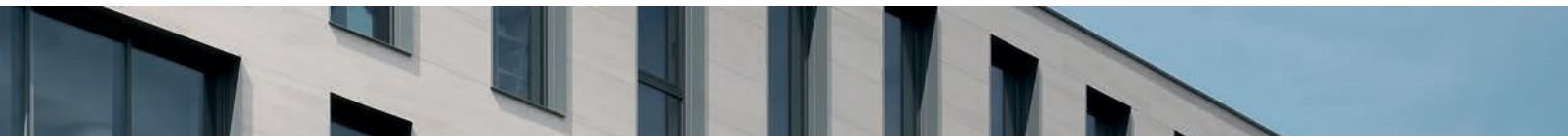
A colour shift may be noted when projects involve laminated and monolithic products side by side. Guardian recommends a mock-up.

The best optical appearance and highest level of durability can be achieved with the coatings of the SunGuard HD family.

In combination with multifunctional coatings (SunGuard HP, SN, SNX) only one production campaign of the coated base glass should be used due to stronger requirements on colour tolerances. Please contact Guardian regarding your particular project for further information.

#### 2.5 Thermal and solar energy performance

The spectro-photometrical performance of coated glass changes if the coated side is imbedded in laminated glass. The visible light reflection can drop while light and solar energy transmission increase. Inside laminated coatings lose their low emissivity properties, therefore inside laminated coated glass does not provide thermal insulation function, the U value will be the same as in the case of uncoated laminated glass. Guardian can assist its customers in estimating the product performance based on application.



Some coating-interlayer combinations can lead to higher solar energy absorption. Edge working or heat treatment of the glass prior to laminating significantly reduces or eliminates the risk of thermal breakage entirely. In critical cases, a thermal stress analysis is recommended.

For further information, please contact your Guardian representative.

## Verification

The signature below verifies that the processor has read and understands the full content of these guidelines "SUNGUARD® IN LAMINATED GLASS APPLICATIONS" (GUARDIAN\_SGLaminated\_PG\_EN\_1120).

Name/Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Company/Stamp: \_\_\_\_\_

Date: \_\_\_\_\_

Please return this page signed via email at [information@guardian.com](mailto:information@guardian.com)

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This document is the only valid one regarding the use of SunGuard in laminated glass applications. Please contact Guardian for its most current version.

Guardian Glass -  
United Kingdom  
Phone: 0044 (0) 800 032 6322  
e-mail: [uktechnical@guardian.com](mailto:uktechnical@guardian.com)

Guardian Glass - Luxembourg  
Phone: 00 352 50301  
e-mail: [tacluxembourg@guardian.com](mailto:tacluxembourg@guardian.com)

Guardian Glass - Spain  
Phone: 00 34 948 817255  
e-mail: [tudela@guardian.com](mailto:tudela@guardian.com)

Guardian Glass - Hungary  
Phone: 0036 (0) 68 887 200  
e-mail:  
[Technical\\_Hungary@guardian.com](mailto:Technical_Hungary@guardian.com)

Guardian Glass - Germany  
Phone: 0049 (0) 3494 361 800  
e-mail: [anwendungstechnik@guardian.com](mailto:anwendungstechnik@guardian.com)

Guardian Glass - Poland  
Phone: 0048 (0) 34 323 9200  
e-mail: [tac\\_poland@guardian.com](mailto:tac_poland@guardian.com)

Guardian Glass - Russia  
(Ryazan)  
Phone: 007 (8) 4912 956600  
e-mail: [gsr\\_tac@guardian.com](mailto:gsr_tac@guardian.com)

Guardian Glass - Russia  
(Rostov)  
Phone: 007 (8) 86367 50900  
e-mail: [gsr\\_tac@guardian.com](mailto:gsr_tac@guardian.com)

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