

GUARDIAN THERMAGUARD® NRG COATED GLASS FOR REFRIGERATION AND HOT APPLIANCES

PROCESSING GUIDELINES

INTRODUCTION

Guardian ThermaGuard® NRG glass is manufactured using a high-quality magnetron coating technology (single and/or double side coated), providing exceptional product features for use in refrigeration and hot appliance applications. Single-sided and double-sided Guardian ThermaGuard NRG coated glass must be heat treated (tempered, heat strengthened or bent) in order to provide its special performance.

In order to process glass with such an efficient coating system without any adverse effects on quality, a number of important issues have to be considered. This document provides specific instructions regarding storage, handling and processing. Non-compliance with these processing guidelines may lead to damage of the glass or coating and will invalidate any claims.

STORAGE / HANDLING

Guardian ThermaGuard NRG is available in packs of Jumbos and split sizes. Standard thicknesses are 4 and 6 mm; please enquire regarding other thicknesses through your Guardian sales contacts.

Conditions, that affect non-coated glass, can also have an adverse effect on coated glass products. Glass products must not be stored outside. Storage should be in a dry and clean place, away from glass washers, external doors and corrosive chemicals. Relative humidity in the warehouse should not exceed 70% and a minimum temperature of 15°C should be maintained in order to prevent condensation forming and damaging the coated surfaces. If a pack has become particularly cold during transportation to the warehouse, do not open the pack until the glass has reached the ambient temperature in the warehouse, to avoid condensation forming on the coating. The warehouse should be well ventilated, and all stock rotated (first in, first out).

Guardian ThermaGuard NRG single-sided and double-sided coated glass is not limited regarding shelf life provided the storage conditions are as mentioned above. Incoming material should be inspected for damage prior to acceptance and any problems reported immediately to the Guardian facility that supplied the product.

INSPECTION

Upon receipt and after each processing step, Guardian ThermaGuard NRG coated glass must be inspected both in reflected and in transmitted light.

SURFACE IDENTIFICATION

The type of packaging and the arrangement of the coating on the panes are indicated on a label attached to the first pane in each pack. The label should be retained for reference until the whole pack has been satisfactorily processed.

It is important to always be aware of which side of the glass is coated. Do not touch the glass surface to identify the coated side. The functional layer of the Guardian ThermaGuard NRG coating is electrically conductive and can be identified with a commercial coating detector. To detect the coating using a conventional, conductivity-based detector, it is important to penetrate the protective layer on top of the transparent conductive layer. It's best to do this test along the edge (within 12mm) to avoid marks on the coating in the visible part of the glass. Coating detectors operating on the principle of induction are able to detect the coating without the need for any additional step.

CUTTING / EDGE WORK / WASHING

Since the coating is mechanically very durable, single and double side coated Guardian ThermaGuard NRG can be cut like normal float glass.

Make sure all tools and appliances which may come into contact with single-sided and double-sided Guardian ThermaGuard NRG are absolutely clean.

Edge-deletion of single-sided and double-sided Guardian ThermaGuard NRG is not required. Single-sided and double-sided Guardian ThermaGuard NRG is compatible with all usual glazing materials. Cleaning can be performed with glass washing machines, which are already commonly used in insulating glass manufacture.

The washing machine must be checked, cleaned and maintained at regular intervals in order to ensure it is perfectly clean and operating correctly. The brushes, in particular, must be checked for cleanliness, alignment and ample supply of water, the brushes must not operate dry.

Avoid gluing stickers at the coated surface as it might be possible that the adhesive will change the surface tension permanently.

ENAMELING, SILK-SCREEN PRINTING

Single-sided and double-sided Guardian ThermaGuard NRG can be painted for decorative purposes or to cover up certain fixing/hardware elements behind the glass. Ceramic frits - requiring firing - may be used under certain conditions, after compatibility and suitability tests. It is advisable to carry out tests to verify the colour appearance of the painted area. A certain colour difference in reflection between the painted and the non-painted areas of the glass is to be expected. For projects with painted single-sided or double-sided Guardian ThermaGuard NRG it is recommended to use glass out of the same batch.

Paint should be applied to the air side of the glass for optimal colour appearance. Single sided ThermaGuard NRG should be ordered from Guardian accordingly, with the ThermaGuard NRG coating either on the air or on the tin side depending on the application. In case of double sided ThermaGuard NRG, paint should be applied to the coating on the air side of the glass. Guardian delivers double-sided Guardian ThermaGuard NRG with the tin side marked.

In case of ceramic fritting, the settings for firing the enamel must be adjusted compared to regular clear float glass. Excess heating may lead to enamel discoloration and may damage the Guardian ThermaGuard NRG coating as well. Please see chapter Heat-treatment for more information.

The functional layer of Guardian ThermaGuard NRG coating is electrically conductive. Due to this reason, the product can be used for applications where the glass needs to be electrically heated. For more information, please refer to the document "Product Application Note – ThermaGuard NRG – Heated Application", available on request from your local Technical Advisory Center.

HEAT-TREATMENT

Single-sided and double-sided Guardian ThermaGuard NRG coated glass must be heat treated (tempered, heat strengthened or bent) in order to provide its special performance.

Since the ThermaGuard NRG coating is mechanically very durable, it can be placed in the furnace with the coating facing to the rollers.

The added performance characteristics require process adjustments to the furnace profile for successful heat treatment. As a rule, furnace temperatures should be decreased, and the furnace dip time increased in direct proportion to the infra-red reflection performance (emissivity) of the glass being heat-treated. In general, it is necessary to apply a longer heating time to ensure that the glass is heated uniformly.

Guardian recommends the use of forced air convection furnaces in order to enable improved heating control of the glass.

SO₂ (Sulphur Dioxide) must not be used at any time during the heat treatment. The SO₂ flow must be discontinued at least 2 hours prior to starting heat-treatment of the glass.

If the glass panes are intended for glazing in one project, ensure that all of the panes are processed with the correct dimension in the same direction during the heat treatment as the direction they will be installed in the application. Whenever possible it is advised that roller waves should be installed horizontally.

Some shift in outdoor reflected colour and visible light reflectance may be noticed after heat treatment. The colour shift due to heat-treating should be within the normal production tolerance.

In order to limit potential risk of spontaneous breakage of tempered glass, Guardian strongly recommends that a Heat-Soak process is carried out.

Guardian does not warrant glass against breakage or failure of any kind as well as any consequences that can occur or result from such breakage or failure.

INSTALLATION

Single and double side coated Guardian ThermaGuard NRG may be used as single glass or in insulated glass units.

PACKAGING

When packaging Guardian ThermaGuard NRG glass with the coating exposed, it is preferable to use a slot-racking system to prevent glass-to-glass contact. Ensure proper interleaving to minimize the potential for abrasion to the coated and uncoated surface. The use of protection lites for transportation is absolutely necessary.

Avoid gluing stickers at the coated surface as it might be possible that the adhesive will change the surface tension permanently.

| Recommended | Not recommended |
|----------------------------------|--|
| Lucite powder Acid-free paper | Newsprint Silver saver and Kraft papers Cardboard Powder separators containing acid |

Over long distances, powder separators may become non-uniformly distributed, creating pressure points that could mark the coated or uncoated glass surface.

Precautionary information should accompany the finished product a) alerting the end user that an exposed coating is present and b) instructing that, when cleaning is required, to use mild, fast drying household cleaners with a clean, soft cloth and avoid razor blades and other metallic scrapers on the exposed coated surface. For more information please see the General Processing Guidelines for Architectural Coated Glass, available on www.guardianglass.com or through your Guardian Technical Advisory Center.

CARE / CLEANING INSTRUCTIONS

Guardian ThermaGuard NRG glass is equipped with a high-quality magnetron coating, providing exceptional product features. In order to preserve glass with such an efficient coating system without any adverse effects on quality it is important to follow these cleaning instructions:

When installing this product in insulated glass unit, care must be taken not to damage the surface.

- Glazing sealant should be applied according to the sealant manufacturer's instructions.
- Do not use scrapers or razor blades on the glass surface.
- Some cleaning products may contain hydrofluoric and/or phosphoric acid and are corrosive to the monolithic- or insulated glass units, glass and coatings must only be used with extreme care following the manufacturers' directions including those for dilution, preparation, masking, application and clean-up.

Following installation, any regular cleaning of this glass should be performed (as with any monolithic or insulated glass unit) using a soft cloth or wet sponge and ordinary non-abrasive household glass cleaners.

For further processing of Guardian ThermaGuard NRG, such as bending and laminating, please contact your local Guardian Technical Advisory Center.

WARRANTY

The processing guidelines contained herein are for information purposes only and Guardian does not assume any responsibility for the accuracy or completeness hereof, unless otherwise stipulated by applicable law. It is the sole responsibility of the user to adequately inspect the Guardian ThermaGuard NRG coated glass product before each step of fabrication and prior to installation. Failure to apply professional standards, customary instructions and these processing guidelines will automatically void any warranty given by Guardian regarding ThermaGuard NRG product and no claim in relation to ThermaGuard NRG product will be admissible against Guardian if 1) the user's processing capabilities have not been certified by Guardian and 2) ThermaGuard NRG product is damaged in fabrication, handling or due to improper storage, installation or maintenance.

VERIFICATION

The signature below verifies that the processor has read and understood the full content of the full content of these processing directives "PROCESSING GUIDELINES / THERMAGUARD_NRG_PG_EN_1020".

Name/Signature: _____ Title: _____

Company/Stamp: _____ Date: _____

Please return this page signed via email at information@guardian.com

ThermaGuard Products are available at several locations situated throughout Europe. Please contact your local Guardian representative or your local Technical Advisory Center for further information.

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Guardian Europe
Reference code: THERMAGUARD_NRG_PG_EN_1020

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