



Guardian UltraMirror™ Processing & Installation Guidelines

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Guardian UltraMirror™ product is a high quality mirror offering durability and beautiful reflectance. The possibilities for decoration are unlimited: small and confined spaces become bigger, dark and dull rooms fill up with light. **Guardian UltraMirror™** is an ecologically friendly product that can be used on many applications such as interior architectural applications and internal automotive applications.

THE BASIC PROPERTIES OF ULTRAMIRROR™ CAN BE SUMMARIZED INTO:



Appearance: A highly reflective mirror offering a true image reflectance.



Environmentally Friendly: Respective for the environment thanks to its copper free manufacturing process and option to choose from a reduced lead content protective paint (<0.5%) or zero lead content protective paint.



Quality: The same copper free manufacturing process enhances mirror protection against corrosion. It offers more protection than conventional mirror – in accordance with ISO 3770.



Heat resistance: It can be used in environments up to 60°C. However, proximity with a strong heat source must be avoided.



Application:

- UltraMirror can be used only for interior usage
- Lamination with coating side please reach out to Guardian TAC team.
- Lamination with glass side can be done

Shelf life:

Guardian UltraMirror™ must be processed within the shelf-life time frames specified below. All storage conditions to apply during the shelf life.

The shelf life after delivery to the first buyer from Guardian is the following:

Shelf- life is maximum **ONE YEAR** without pack being open.

Packaging/storage:

Guardian UltraMirror™ can be bought in the several standard sizes with a maximum dimension of 2440mm x 3660mm; thicknesses from 3mm to 8mm; for more details concerning sizes and thicknesses please enquire through your Guardian Glass sales contacts.

Please refer the detailed storage guideline published on our website at www.guardianglass.com or details are attached as **Annexure A**.

Handling:

Do not open the glass pack until all the people responsible for handling and processing the glass have been properly trained on the correct handling, storage processing and transportation of mirror glass. Glass is sensitive to scratches please try to limit the manipulations amount. Always wear suitable clean gloves when handling any glass product.

Cutting:

The cutting table must be free of any impurities. Care must be taken to prevent scratches on mirror backing paint coating from glass chips on the cutting table. Mirrors of original stock sheet size will have coatings covering all its edges and are called the “factory edges”. Whenever possible, try to keep these or any of these edges in the final cut size mirror. The mirrors with factory edges can be used in high humid environments particularly in locations where puddling happens.

This document provides specific instructions regarding processing and installation. Non-compliance with these processing and Installation directives may lead to damage of the glass and will invalidate any claims.



Bevelling, grinding and drilling:

When bevelling **Guardian Ultra Mirror™** be sure to maintain a Ph value between 6 to 8 for the water used in the process and ensure proper cooling of the grinding wheels.

Edge work of UltraMirror can be carried out manually or on automated machines. The products are suitable for edge grinding, polishing, as well as arising. During manual processing, contact of grinding wheels or cross belts with the paint side should be minimized, limited to the edges. When using automated machines surface clamping or conveyor devices should not be excessive. With any type of grinding equipment always ensure an adequate supply of clean water. In order to prevent paint damage by glass debris accumulation from either arising or grinding, the glass should be rinsed with copious amounts of water before washing directly after mechanical transformation operation.

Washing during processing:

Guardian Ultra Mirror™ glass may be cleaned in the same fashion as float glass. Use mild detergents only when necessary and with minimum residence time. Detergent must be Ph-neutral and free of abrasives. The washing machine must be checked, cleaned and maintained at regular intervals in order to ensure that it operates correctly. The brushes, in particular, must be checked for cleanliness, alignment and ample supply of water.

Recommended inspection of machine before washing:

- Water hardness and cleanliness of the brushes (e.g. no lime deposits)
- Correct adjustment of the brushes (as recommended by the washing machine manufacturer)
- Cleanliness of the entire washing machine...no accumulated dirt and no debris (e.g. glass splinters, sand, lubricants, etc.)
- Washing machine manufacturer instructions should be followed at all times.

Specific details to be considered:

- Always use clean and de-ionized water (pH: 7 + 1; < 30 µS). The water must not contain any cleaning agents or non-dissolved particles (such as lime)
- Standard float glass washer settings may be utilized.
- During the washing process the glass must not remain stationary in the washing machine with the brushes revolving as excessive brushing may damage the paint surface.
- To prevent watermarks on the paint side, glass must exit the washing machine completely and must be dry.

Guardian UltraMirror™ Installer's

ALWAYS BE SAFE!

Wear personal protective equipment (PPE) whenever handling glass products.



GLOVES



ARM PROTECTION SLEEVES



SAFETY GOGGLES



HELMET OR HARD HAT
(for mirror installation above your head)



HIGH VISIBILITY VEST



SAFETY SHOES

MATERIALS/TOOLS CHECK LIST:



CLEAN CLOTH OR TISSUE PAPER



CUTTER/KNIFE



BLOCK OF WOOD OR CUTTING BOARD



SILICONE HAND GUN



SILICONE



Approved Silicone and Tapes for Guardian UltraMirror™

Guardian does not manufacture silicones, bonding tapes and cannot guarantee the effects of their application on **UltraMirror™**. At the time of testing, the listed silicones on the table were found to have good compatibility with **Guardian UltraMirror™**.

Silicone manufacturer may change the composition of their product without notifying the end-users.

We recommend performing your own test before actual installation and strictly adhering to the silicone manufacturer's recommendations for use.

Types of silicones

It is recommended to practice safe installation of mirror on vertical surfaces. Ensure that newly installed mirrors are stable and will not fall out while waiting for the silicone to completely dry. Temporary fastening or support materials may be used to hold the mirror keeping in mind that it should not cause any damage or scratch on the mirror.

Brand	Product Name/Code	Result
Jorakay	Crocodile Adhesive Nail	✓
Pattex	Pattex Fix Total PL600	✓
3M	Super Strength Nail Adhesive	✓
V-Tech	VT-230 Vital Nails Construction Adhesive Sealant	✓
Sparko	Super Nail Constriction Adhesive	✓
Dow	DC 71	✓
Soudal HQ Belgium lab	Silirub WS+ (oxime silicone)	✓
Soudal HQ Belgium lab	Mirror Fix (hybrid polymer)	✓


* Compared to alcoxy silicones, the oxime silicone needs more time to dry, please refer to the silicone's fabricator recommendations. The potential traces that can appear will disappear during the drying.

The silicones that have been tested by Guardian and are recommended for use on UltraMirror are Alcoxy Silicones, Oxime* Silicones, MS Polymer and Hotmelt. We would not recommend using, on the other hand, Rubber silicones, Acetic acid silicones and Polyurethane based silicones.

For safe installation on a vertical surface, we recommend the additional use of a double of the silicone to insure the UltraMirror glass is adhered to the surface until the silicone is completely dry.

It is recommended to use below mentioned edge sealant for edge protection of Guardian UltraMirror™ from corrosion.

Brand: SOLHEM GmbH
Product code: SOL923
Application Method: Marker tip
Dry: Airdry



Types of double tape bonding

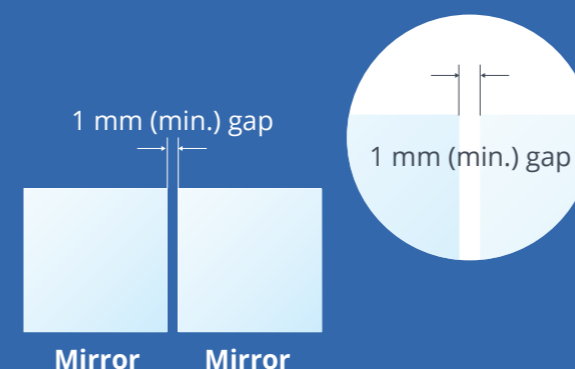
We can recommend Acrylic, modified acrylic and your own test before actual installation and strictly adhering to the manufacturer's recommendations for use.

Brand	Product Reference / Colour	Type of Product
3M	4430/White	Acrylique
Lohmann	981/White	Acrylique
Mactac	M1702/White	Acrylique
tesa	2952/White	Acrylique

Installation

Important recommendations:

- When more than one mirror is installed on the same surface, keep a gap of at least 1 mm between the edges of these mirrors.



- The base where the mirror is installed must be clean, dry, completely free of moisture, acidic or alkaline substances, or any other aggressive material. Avoid installing mirror on freshly painted walls and in solvent borne fumes in the environment. Do not use a base- materials that absorb moisture, such as wood, cork, newspaper, etc.

- Do not accept Guardian Ultra mirror™ that have scratches on the paint face. In the future, this risk could turn into a defect in the mirrored face.

Two types of fixations:

- Mechanical: for example: frame or studs to support edges
- Bonding: Silicones or double tape bonding

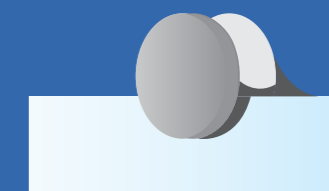
The back of the mirror should remain unscratched during installation, to avoid oxidation of glass that could create black or brown traces on the reflective side of the mirror.

Clips, bolts, french buttons:

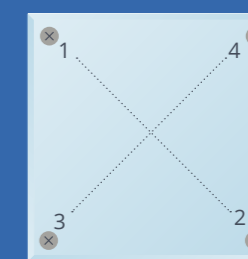
- Use washers or plastic spacers on both sides of the mirror to avoid excessive localized effort and ensure a minimum spacing of 3mm between the mirror and the base, favoring air circulation.



- Use plastic or rubber support to avoid direct contact of the metal with the mirror.



- The final tightening should only be done at the end of the installation and always through the diagonals of the parts, reducing the risk of breakage and deformations in the image.

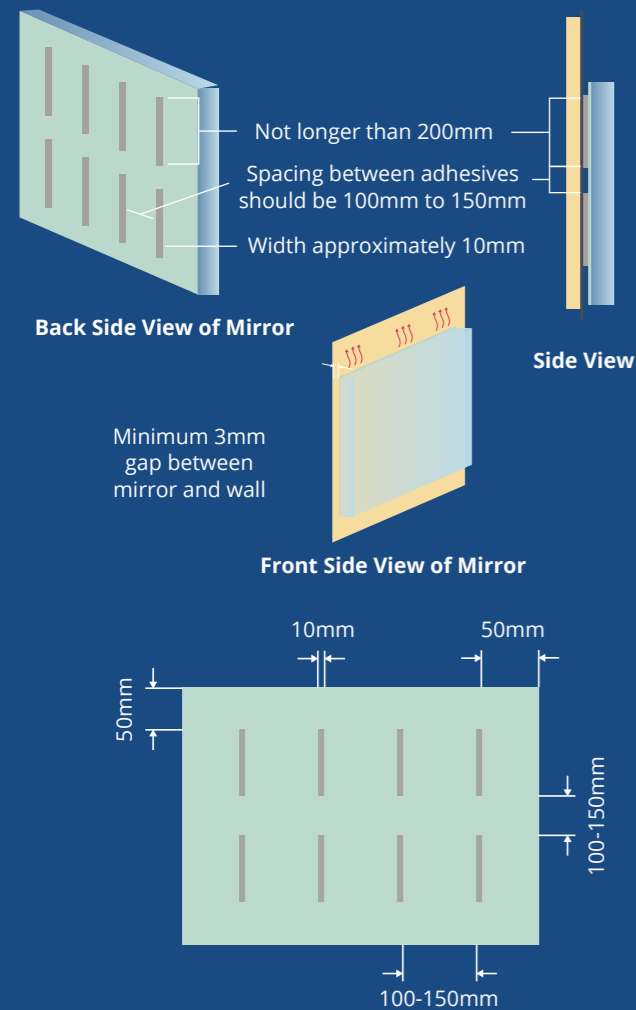


- Avoid direct contact between the fixing screws and the mirror surface, minimizing the risk of breakage and oxidation in the contact area. One solution to this is to use spacers.
- If shatter proofing sheets are applied on the mirror backing, ensure that its adhesive is mirror compatible. Guardian offers UltraMirror™ with vinyl sticker backing for safety glazing requirements.

Silicone Application Guide

Frameless mirror

Low risk of water splashing on UltraMirror™.

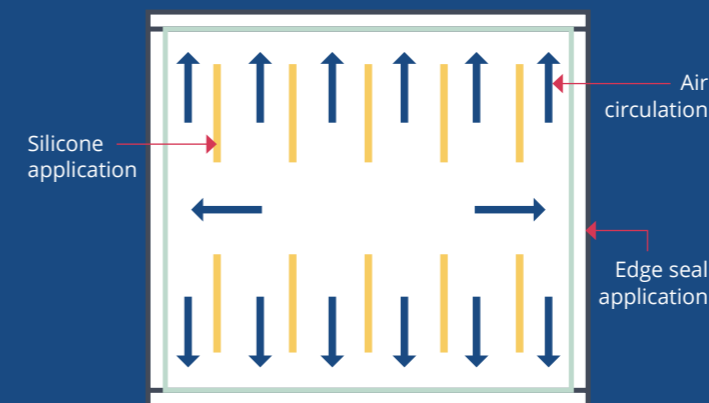


UltraMirror™ back side

1. Clean the back surface of the Ultra Mirror™ using a clean dry cloth or tissue paper.
2. Apply the silicone vertically on the back of the mirror according to how you will install the Ultra Mirror™ on the surface/wall.
3. Apply the first layer of silicon 50mm from the edges.
4. The bead of the silicone should be about 10mm wide.
5. Apply the succeeding silicone layers with a gap of 100 to 150mm.
6. Clean the wall or surface area where you will install the Ultra Mirror™. Ensure that it is dry.
7. Position and press the Ultra Mirror™ against the wall or surface of installation.
8. Press the mirror leaving gap of about 3mm to allow air circulation to dry the silicone.
9. Allow Silicone to cure from 24 to 72 hrs. Attach tape on the edges to support the weight of the Ultra Mirror™ while silicone dries.
10. When cleaning the Ultra Mirror™ after installation, use again clean dry cloth to wipe any dirt from the installation process. You can also use a damp cloth but do not for get to dry the mirror especially on the edges.

Frameless mirror with edge sealing

High risk of water splashing on UltraMirror™.



It is recommended to use SOL923 edge sealing from Solchem GmbH for ultimate edge protection that safeguards mirrors against corrosion where the high risk of water splashing on Frameless Mirror.

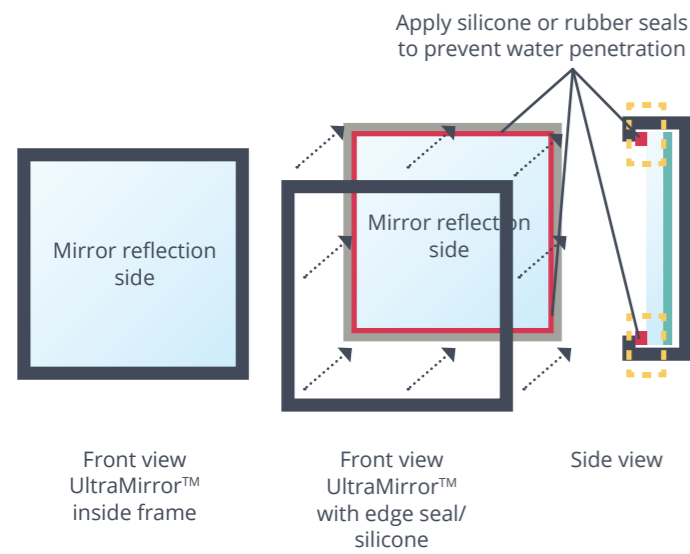
UltraMirror™ back side

1. Apply edge seal before installation of mirror as illustrated above. Start the following steps once it is cured.
2. Clean the back surface of the Ultra Mirror™ using a clean dry cloth or tissue paper.
3. Apply the Silicon vertically on the back of the mirror according to how you will install the Ultra Mirror™ on the surface/wall.
4. Apply the first layer of silicon 50mm from the edges.
5. The bead of the Silicone should be about 10mm wide.
6. Apply the succeeding silicone layers with a gap of 100 to 150mm.
7. Clean the wall or surface area where you will install the Ultra Mirror™. Ensure that it is dry.
8. Position and press the Ultra Mirror™ against the wall or surface of installation.
9. Press the mirror leaving gap of about 3mm to allow air circulation to dry the Silicone.
10. Allow Silicone to cure from 24 to 72 Hrs. Attach tape on the edges to support the weight of the Ultra Mirror™ while silicone dries.
11. When cleaning the Ultra Mirror™ after installation, use again clean dry cloth to wipe any dirt from the installation process. You can also use a damp cloth but do not for get to dry the mirror especially on the edges.



Framed mirror

High risk of water getting deposited on the edges UltraMirror/frame.



Should residues of sealants come onto the Guardian Ultra Mirror™ during sealing works, they should also be removed immediately.

Strong alkali solutions as well as acids, particularly liquid acids, and cleaning agents containing fluoride should never be used. These solutions may irreparably damage the glass surface.

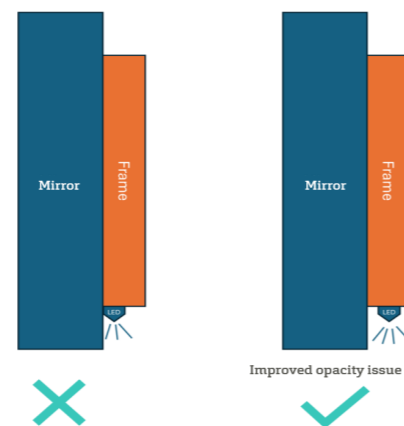
Sandblasting

1. In order to install LED lights at sandblasting portion (portion where back-paint is removed by sandblasting) /use other decorative applications at the sandblasting portion (portion where back paint is removed by sandblasting).

It is recommended to use Aluminium Oxide (Brown Corindon) for sandblasting.

Details are attached as *Annexure B*.

2. Light adhesive tape to be applied on back-paint of the mirror before sandblasting.
3. Sandblasting of mirror back-paint to be done only on back portion of the mirror where paint is to be removed. It is strongly recommended not to sandblast above the tape which might affect the paint adhesion below the tape.



Led Light Installation Guideline

UltraMirror™ back side

1. Follow the Procedure 1-9 mentioned in the frameless installation if the mirror needs to be bonded in a frame.
2. Apply Silicone on the edge of the glass and press the frame on to it. See figure above.
3. Remove and wipe excess silicone.
4. As an alternative to silicone application, a rubber seal can be used and inserted on the perimeter of the frame.

Cleaning of Guardian UltraMirror™

Cleaning of the Guardian UltraMirror™, as well as removal of residue from stickers and spacing pads is to be carried out using clean water or mild cleaning agents.

Sharp-edged tools such as razor blades and scrapers may cause fine scratches in the surface and the use thereof should be avoided.

Verification

The signature below verifies that the customer has read and understands the full content of Guardian Ultra Mirror™ Processing and Installation Guidelines.

Name/Signature:

Title:

Company/Stamp:

Date:

Please return this page signed via e-mail at fcesupport@guardian.com

Please contact your local Guardian Representative or your local Technical Advisory Center for further information.

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Important Notice to Traders:

To ensure optimal performance and adherence to best practices, it is essential that this Processing and Installation Guidelines document is shared with your customers whenever they purchase our glass products. This will help them properly understand the necessary handling, processing and Installation requirements to maintain the quality and integrity of the product.

The products in this publication are sold subject to Guardian's standard terms and conditions of sale and any applicable written warranties. It is the responsibility of the Purchaser to confirm that the products are suitable for their intended application in compliance with the applicable laws and regulations. Please contact your local Guardian representative to obtain any applicable handling and fabrication guides and for the most current production information.

Annexure A: Glass Storage Guidelines



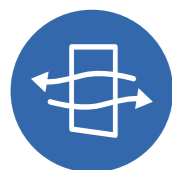
Purpose

The purpose of creating this document is to provide information about suitable practices for storing glass in warehouses.



Humidity

Exposure to water over a period can cause damage to glass surfaces. This is often found in the form of moisture, which reacts with the surface of the glass and leads to corrosion. However, it is practically impossible to completely eliminate moisture from warehouse spaces. Therefore, adopting appropriate practices is crucial for efficiently reducing or controlling the resulting impact.



Ventilation

Ventilation is considered one of the most crucial components of warehouse management. Good air circulation helps reduce the risk of moisture build-up on concrete floors or on stored glass surfaces. Air with moisture moves and condenses less on cooler surfaces.



Roof Openings and Leaks

In addition to leaks, roof openings pose a risk of water seepage, which can lead to glass stored in warehouses coming into contact with water or moisture. This is because the typical storage method for glass (stacked vertically) results in minimal spacing between glass sheets, increasing the likelihood of water or moisture lingering on the glass surface for extended periods due to limited moisture drainage between the sheets. This significantly elevates the risk of corrosion or rusting of the glass. Regular inspection of roof openings or leaks and prompt repair as necessary are crucial for mitigating these risks.



Opening Warehouse Doors

Reducing the frequency of opening warehouse doors or windows during periods of high humidity or rainfall can help decrease moisture accumulation in the warehouse.



Storing glass in a sheltered area with a roof to protect from rain and heat, free from leaks or contact with water, and ensuring good ventilation.



Avoid storing glass near openings such as doors or windows. Glass should be stored at least 15 meters or 50 feet away from openings.



Avoid storing glass near areas designated for chemical storage, especially those containing corrosive substances.



Rotating goods in the warehouse is crucial, so glass should be stored in a manner conducive to the First In, First Out (FIFO) system, ensuring that older stock is used before newer ones. This helps maintain an appropriate level of inventory turnover.



Avoid storing glass in areas with heat sources, as this may lead to heat accumulation within the glass and potential damage.



Regularly inspect for any leaks in the roofs of factories and warehouses. If any are found, promptly repair them as necessary.



If glass is packaged with moisture-resistant materials, caution should be exercised to prevent damage to the packaging during handling. If there are any tears or damages to the packaging, immediate repair is necessary.



Glass storage should always include interleaving materials or have minimal spacing between glass sheets at all times.



Condensation occurs when the air's humidity is compressed due to a drop in temperature until it reaches the dew point. This can happen naturally or due to inadequate air circulation and unsuitable storage conditions. Preventing glass from condensing moisture in the air can be achieved by storing it in areas with temperatures above the dew point. Dew point is the temperature at which air becomes saturated with moisture, causing water droplets to form and adhere to surfaces at a constant pressure, relative to the humidity level.



If glass received in packaging arrives while its temperature is lower than the temperature inside the warehouse, it should be allowed to acclimate to the surrounding temperature before unpacking to avoid condensation build-up on the glass surface.



Always keep the tag number with the stored glass so that in case of any issues with the glass, it can be easily identified and checked.

Annexure B : Brown Fused Alumina

Brown Corundum (Aluminium oxide)

Brown Fused Alumina belongs to the group of electro-corundum. It is produced by controlled melting of calcined bauxite in an electric arc furnace at temperatures of more than 2000°C. Brown fused alumina is iron-free and extremely tough.



Applications

- Grinding, lapping and polishing media
- Wet and dry blasting media
- Grinding wheels and grinding media
- Wear-resistant and refractory products

Typical Chemical analysis*

Al ₂ O ₃	95,20 %
TiO ₂	2,90 %
Fe ₂ O ₃	0,20 %
SiO ₂	1,30 %
CaO + MgO	0,40 %
CaO + MgO	0,40 %

Typical Physical analysis*

Specific gravity	3,96 kg/l
Bulk density	1,75 kg/l
Hardness (Mohs)	9,0
Grain shape	angular

*Average standard values



Available grit sizes

- NK F220 53 – 75 micron
- NK F120 90 – 125 micron
- NK F100 106 – 150 micron
- NK F80 150 – 212 micron
- NK F60 212 – 300 micron
- NK F46 300 – 425 micron
- NK F40 355 – 500 micron
- NK F36 425 – 600 micron
- NK F30 500 – 710 micron
- NK F24 600 – 850 micron
- NK F20 850 – 1180 micron
- NK F16 1000 – 1400 micron



Packaging

- 25 kg bags on pallets up to 1 ton
- Minimum order quantity: 50 kg
- Delivery time: approx. 1 - 2 days



Composition / Information on ingredients

Ingredient	Composition	N°CAS	N° EINECS	N° REACH
Oxyde d'Aluminium (Al ₂ O ₃)	96,1 %	1344-28-1	215-691-6	01-2119529248-35-0074
Oxyde de Tilance (TiO ₂)	2,70 %	13463-67-7	236-675-5	
Oxyde de Silicone (SiO ₂)	0,70 %	7631-86-9	231-545-4	
Oxyde de Magnesium (MgO)	0,20 %	1309-48-4	215-171-9	
Oxyde de Calcium (CaO)	0,12 %	1305-78-8	215-138-9	
Oxyde de Fer (Fe ₂ O ₃)	0,10 %	1309-37-1	215-168-2	



Hazard Identification

Explosion	No explosive hazards	Flammability	Non-flammable
Oxidization	Not an oxidizing substance	Radioactivity	Not radioactive material
Corrosion	Not corrosive	Other dangerous properties	No



First Aid Measures

Skin contact	Flush with soap and water
Eye contact	Flush with flowing water and get medical attention
Ingestion	Get medical attention
Inhalation	Move to fresh air and get medical attention



Fire Fighting Measures

Flash point	N/A
Flammable limits	N/A (non-flammable, non-combustible)
Fire extinguishing media	Extinguishing media appropriate for surrounding fire such as water spray, sandy soil, chemical foam or carbon oxide.



Accidental Release Measures

Spill with grains	Sweep up with spade and place into a dry container for disposal
Spill with powdres	Wear face mask and vacuum immediatly



Handling and storage

Handling	Use handling procedure which will limit exposure to exces airborne dust
Storage	Place in a cool, well-ventilated, covered area. Keep away from ignition sources, heat and flame. Store in a tightly closed drum or bag.



Exposure Controls / Personal Protection

Ventilation	Use exhaust ventilation to meet local regulatory requirements
Respiratory protection	Ensure a dequate centilation
Skin protection	Wear appropriate protective clothing and safety gloves
Eye protection	Wear face mask



Physical and Chemical Properties

Apperance	Powder, grains	Solubility	Soluble in water
Color	Brown (light to dark)	Vapor pressure	N/A
Odor	Odorless	Vapor density	N/A
Boiling point	N/A	Evaporation rate	N/A
Melting point	2050°C (3700F)	Volatiles by volume	0%
Specific gravity	3.97 g/cm3		



Stability and Reactivity

Stability	Stable	Hazardous polymerization	None
Reactivity	Inert	Decompostion products	None
Incompatibilities	N/A		

Toxicological Information

- The product is not classified as toxic or infectious substances

Ecological Information

- Not likely to cause air and water pollution

Disclaimer

The guidelines contained herein are for information purposes only and are not intended to be a comprehensive set of instructions but assume the processor has professional knowledge of glass processing. Guardian does not provide any warranty with respect to the content of this document, as well Guardian does not assume any liability for the accuracy or completeness hereof, unless otherwise stipulated by applicable law. It is the responsibility of the purchaser to confirm applicable laws and regulations. Guardian does not provide any warranty application in compliance with the applicable laws and regulations. Guardian does not provide any warranty regarding the intended further processing or end product, which remains the full responsibility of the processor.

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