

MIROX MNGE & 3G

INSTALLATION GUIDE



VERSION 1.0 – NOVEMBER 2013

This version of the guide replaces and cancels all previous versions.
Please check www.yourglass.com regularly for any updates.



WARNING

Carefully read this manual before cutting and installing Mirox 3G & MNGE products!



Important Preliminary Instructions

- Mirox MNGE & 3G are coated glass products for use in interior applications only. They cannot be laminated (with PVB) or used in double glazing units, even on the inner side of the glazing unit. The plastifiers in the PVB would have a negative influence on the paint coating.
- For safety application, Mirox MNGE & 3G products are available with a safety backing film applied to the painted side of the glass (SAFE or SAFE+ version).
- All Mirox MNGE & 3G can be used in damp environments (kitchens, bathrooms, etc.) but should never be immersed in water. In damp environments AGC recommends the use of a SAFE or SAFE+ safety backing film.
- Thickness of Mirox MNGE & 3G products have to be defined in function of size and shape of each panel. AGC recommends 6 mm thickness for wall cladding (panels > 1 m²). For very large panels, thicker glass may be required.
- Do not fit Mirox onto walls that are not entirely clean, dry and pre-treated with a primer in case of porous surfaces. The glass should also be clean, it shouldn't be wet nor immersed in water during handling or setting.
- Ensure that the paint coating on the rear of the mirror has not been scratched during the cutting and assembly process.
- Always use adhesive/tape recommended by AGC and strictly respect the instructions supplied by the adhesive manufacturer (particularly regarding the quantities of adhesive to be used per m²). The use of any other adhesive not validated by AGC is on the sole responsibility of the user/customer. When bonding Mirox MNGE and 3G SAFE or SAFE+ glass with an adhesive, it is mandatory to pre-treat the safety backing film with a primer. For gluing without primer, please contact your silicone supplier.
- Care should be taken with the usage of adhesives on Matelac Silver glass as stains made on the matt surface cannot be properly removed afterwards.
- The use of safety gloves and appropriate personal protection is strongly recommended during all operation of handling and setting of the glass.

CONTENTS

1. INTRODUCTION.....	3
2. MIROX MNGE & 3G MIRRORS	3
3. SAFE AND SAFE+ SAFETY BACKING FILMS FOR MIROX.....	3
4. INSTALLATION GUIDE	4
4.1. Tips.....	4
4.2. Cutting Mirox.....	5
4.2.1 General recommendations	5
4.2.2 Cutting Advice.....	5
4.2.3 International Bohle contacts	6
4.3. Fitting mirrors	6
4.3.1. Bonding method.....	7
b) Glue and silicone	7
d) Table of recommended brands of adhesives	9
4.3.2. Mechanical fitting	10
5. CLEANING GUIDE	11
5.1 Cleaning recommendations	11
5.2 Cleaning Mirox MNGE	11
5.3 Cleaning Matelac Silver	11
5.4 Cleaning Mirox 3G	11

1. INTRODUCTION

Aimed at glaziers, this guide sets out AGC Glass Europe's recommended installation methods when fitting Mirox MNGE & 3G mirrors and offers some cleaning tips.

Fitting a mirror is a delicate procedure. Correct installation is key to ensuring:

- the safety of the end user - by preventing breakage. It should be noted that Mirox MNGE & 3G SAFE/SAFE+ provides optimal safety protection;
- the quality of the mirror - by preserving the paint;
- that the reflected image is not distorted.

The contents of this guide reflect our knowledge and experience at the time of publication. Customers and glass fitters can always contact AGC Glass Europe's Technical Advisory Services (TAS) for further assistance if required. Naturally, the glass fitter is entirely responsible for the installation of the glass and compatibility between the different materials used. AGC Glass Europe accepts liability for the product it supplies in accordance with its general sales conditions.

2. MIROX MNGE & 3G MIRRORS

Mirox MNGE & 3G respectively are the second and the third generation in a range of mirrors that have made significant progress in terms of quality, ecology and resistance.

AGC Glass Europe holds the exclusive patent for the manufacturing process of Mirox 3G. A 'Mirox 3G Ecological' marking on the rear side of the glass means that you can easily identify the new AGC mirror.

Mirox 3G represents a major development for manufacturers, processors, end users and the environment.

3. SAFE AND SAFE+ SAFETY BACKING FILMS FOR MIROX

Mirox MNGE & 3G mirrors also exist in safety versions, with a plastic film, either SAFE or SAFE+, applied to the painted side of the mirror. The film has a triple function:

- 1) If the glass breaks, the splinters stick to the film, thereby preventing injuries and damage.
- 2) It protects the paint from scratching.
- 3) It protects the paint in damp environments

SAFE and SAFE+ safety backing films comply with European EN12600 safety standard.

SAFE+ is PET material = Polyethylene terephthalate

SAFE is PP material = Polypropylene

When bonding SAFE and SAFE+ mirrors in wall covering applications, adhesives or double-sided adhesive tape must be used. A table of recommended brands can be found on page 9 & 10.

To find out which film has been applied to your glass (i.e. SAFE or SAFE+), please consult your supplier.

4. INSTALLATION GUIDE

4.1. Tips

To prevent a loss of quality owing to deterioration of the metal layers, the protective varnish or image distortion, the following instructions should be followed:

- when mounting mirrors, always apply the double sided tape and glue or silicone in **vertical strips** taking care to ensure that air can circulate between the back of the mirror and the substrate. Never use horizontal strips, nor plots;
- the mirror should be mounted on a **clean, dry surface** and contact with walls that could be affected by humidity should be avoided;
- pre-treat **porous surfaces** with a **primer**;
- **non-metal spacers should be used at the bottom side of the mirror and at the back of the mirror to ensure that air can circulate vertically** between the back of the mirror and the substrate. This is especially recommended when the mirrors are mounted in very moist areas such as bathrooms, gyms, etc.;
- the supporting **surface** must be perfectly **flat in order to avoid deformation** of the mirror and the image;
- surfaces which are not flat should be evened out or non-metal spacers should be used to compensate for uneven surfaces;
- care must be taken **not to scratch the back of the mirror** because this could cause oxidation (black or brown traces seen on the reflective side).



4.2. Cutting Mirox

4.2.1 General recommendations

Special cuts are sometimes required to avoid 'obstacles' on walls such as electrical sockets and water/air outlet pipes.

Large glass panels: ask your glazier to do the necessary cutting in the workshop.

Small tile formats: the cutting can be done by your tiler.

The use of safety gloves and appropriate footwear is strongly recommended.

Measuring

Regardless of the format of the glass, whether large panels or tile-size, precise measurements must be taken. Near pipes and sockets, the diameter of the cut glass should be 1cm larger than the original measurement.

Recommended thickness



The thickness of the Mirox product must be defined on the basis of the size and shape of each panel. AGC recommends 6mm thickness for wall cladding (panel > 1 m²). For very large panels, thicker glass may be required.

Tools

Before starting, read the manufacturer's instructions on how to use the different cutting tools. Work on a stable cutting table with a felt cutting mat. Ensure that the cutting table will not scratch the glass. To prevent injuries, lightly sand the edges of the cut glass. To prevent the glass from breaking, do not press too heavily on it when fitting around holes.

4.2.2 Cutting Advice

AGC advises using the following cutting wheels to successfully cut the glass with SAFE and SAFE+ film through the film side: <http://www.bohle-group.com/shop/>

Cutting wheel	Angle (°)	Thickness (mm)	
B0 03A100M	100	3-4	
B0 03A110M	110	4-5	
B0 03A115M	115	5-6	
Cutting wheel including plastic holder			
B0 416A100M	100	3-4	
B0 416A110M	110	4-5	
B0 416A115M	115	5-6	

When starting, cut slowly and build up pressure until you achieve a good cut.

Use ACECUT 5503 cutting oil or equivalent. To cut patterned glass, lower the cutting speed.

Correct cutting settings can differ from one cutting installation to another and can be tested by cutting test strips 100mm wide and at least 1m long. It should be possible to break the cut strips by hand.

The above-mentioned cutting wheels can also be used to cut non-painted glass without a SAFE or SAFE+ film.

AGC provides this information for advisory purposes. The user/customer is solely responsible for using this advice.

4.2.3 International Bohle contacts

Please consult the following website to find the nearest office to you:

<http://www.bohle-group.com/shop/>

4.3. Fitting mirrors

There are two main ways of fitting Mirox MNGE & 3G mirrors:

- The bonding method, using:
 - silicone
 - adhesive tape
- The mechanical method, using screws, metal clips or fixing the glass directly into a frame.



4.3.1. Bonding method

a) General recommendations

If you opt for the bonding method, you should use the adhesive best suited to your type of mirror (with or without SAFE or SAFE+ safety backing film) and the level of safety required due to the size of the glass. You should use (non-metal) blocks to support the mirror until the glue has completely set. When using silicone, AGC recommends also using double-sided adhesive tape to maintain the glass during the drying time of the silicone.

Under the trade name FIX-IN, AGC has developed its own range of high-performance and easy-to-use adhesive products for the professional installation of Mirox products, SAFE and SAFE+ versions included.

Based on a formula exclusively made for AGC, the perfect compatibility between FIX-IN components prevents corrosive damage to both the reflective silver layer and the paint on the back of AGC Mirox.

More than a standard set of adhesive components, FIX-IN is a system solution ensuring a professional finish and it is supported by a 5-year warranty (*).

AGC has identified other adhesives compatible with AGC glass products (**) for which you are kindly suggested to refer to the instructions and warranties supplied by the adhesives manufacturer.

(*) against silver layer corrosion, paint peeling or cracking

(**) see list here below

b) Glue and silicone

Silicone can be used with both Mirox MNGE and 3G, including the SAFE and SAFE+ versions. Always refer to the adhesive manufacturer's instructions about compatibility with the substrate. When using silicone, AGC recommends also using double-sided adhesive tape to maintain the glass during the drying time of the silicone.

Apply the glue or silicone in vertical strips taking care to ensure that air can circulate between the back of the mirror and the surface. **Apply regular pressure** over the entire surface of the mirror **ensuring that the reflected image is not distorted**. Never apply horizontal strips, nor dots of adhesive.

The amount of glue or silicone to be applied largely depends on the type of glue or silicone used and the weight of the mirror. The table below shows the weight per m² for different mirror thicknesses.

Thickness of mirror	Weight of mirror / m ²
3 mm	7.5 kg
4 mm	10 kg
5 mm	12.5 kg
6 mm	15 kg
8 mm	20 kg

The glue or silicone manufacturer will provide information on the drying time of the type of silicone used (varies from one brand to another) and on the quantity required depending on the weight of the mirror.

Table listing compatibility of different families of glues and adhesives (*)

Type of glue/silicone	Mirox MNGE & 3G	Mirox MNGE & 3G SAFE	Mirox MNGE & 3G SAFE+
Alcoxy silicones	YES	YES	YES
Oxime silicones	YES	NO	YES
MS polymers	YES	YES	YES
Rubber silicones	NO	NO	NO
Acetic acid silicones	NO	NO	NO
Polyurethane-based	NO	NO	NO
Hotmelt	YES	NO	NO

(*)This table only provides general recommendations for each group of glues or adhesives. This does not necessarily mean that all adhesives belonging to each group are suitable. For specific use, refer to the 'Table of recommended brands of adhesive' & to the 'Table of compatible brands of adhesive' below.

When bonding Mirox MNGE & 3G SAFE or SAFE+ mirrors, the safety backing film must be pre-treated with surface activator or a primer. See the list of recommended & compatible brands in the summary table on page 9 & 10.

Care should be taken with the use of silicone on Matelac Silver glass as stains made on the matt surface cannot be properly removed afterwards.

c) Adhesive tape

Mirox MNGE & 3G can also be bonded using adhesive tape (see recommended & compatible brands on page 9 & 10)

RECOMMENDATIONS FOR USE:

Always use plenty of adhesive and follow the manufacturer's instructions. The amount of adhesive tape required will depend on the type of tape being used and the weight of the Mirox mirror.



AGC Glass Europe recommends using ten 10 mm x 100 mm strips per kg of mirror and to apply several smaller pieces rather than one single length (as indicated above).

Table listing compatibility of different families of adhesive tape (*)

Type of adhesive tape	Mirox MNGE & 3G	Mirox MNGE & 3G SAFE	Mirox MNGE & 3G SAFE+
Acrylic	YES	NO	NO
Modified acrylic	YES	NO	NO
Rubber	YES	YES	YES

(*)This table only provides general recommendations for each group of glues or adhesives. This does not necessarily mean that all adhesives belonging to each group are suitable. For specific use, refer to the 'Table of recommended brands of adhesive' & to the 'Table of compatible brands of adhesive' below

d) Table of recommended brands of adhesives

	Type	Brand & manufacturer	Mirox MNGE & 3G	Mirox MNGE & 3G SAFE	Mirox MNGE & 3G SAFE+
Glue / silicone	Alcoxy	FIX-IN SL (AGC)	YES	YES + surface activator FIX-IN SA (AGC)	YES + surface activator FIX-IN SA (AGC)
Tape	Rubber	FIX-IN AT (AGC)	YES	YES + surface activator FIX-IN SA (AGC)	YES + surface activator FIX-IN SA (AGC)

e) Table of compatible brands of adhesives

	Type	Brand & manufacturer	Mirox MNGE & 3G	Mirox MNGE & 3G SAFE	Mirox MNGE & 3G SAFE+
Glue / silicone	Alcoxy	Ottocoll S16 (Otto-Chemie)	YES	NO	NO
		DC 817 (Dow Corning)	YES	YES + R40 cleaner + primer 1200 OS or primer C (Dow Corning)	YES + R40 cleaner + primer 1200 OS or primer C (Dow Corning)
		Illbrück FA140 (Illbrück)	YES	YES + Illbrück AT105 Primer NS (Illbrück)	YES + Illbrück AT105 Primer NS (Illbrück)
	Oxime	Parasilico AM 85-1 (DL Chemicals)	YES	NO	YES + Parasilico Cleaner + Detaprimer 435.10 (DL Chemicals)
		Silirub 2 (Soudal)	YES	NO	NO
	MS Polymer	Fix All Classic (Soudal)	YES	NO	NO
		Sealer 302 (Hercuseal)	YES	NO	NO
		Zwaluw Hybrifix Super 7 (Den Braven Sealants)	YES	NO	NO
		Paracol Miroseal MS (DL Chemicals)	YES	NO	NO
		Mirrocol (Bostik)	YES	NO	NO
		Seal & Bond MS 60 (Novatio)	YES	NO	NO
		MS Super Adhesive (Fratelli Zucchini)	NO	YES + primer M51 (Fratelli Zucchini)	YES + primer M51 (Fratelli Zucchini)
	A1970 (Collano)	NO	NO	NO	

	Type	Brand & manufacturer	Mirox MNGE & 3G	Mirox MNGE & 3G SAFE	Mirox MNGE & 3G SAFE+
Glue / silicone	Acetic acid	DC 787 (Dow Corning)	NO	NO	NO
	Rubber	CPM 801 (Adler)	NO	NO	NO
Tape	Acrylic	4632 (3M)	YES	NO	NO
		4032 (3M)	YES	NO	NO
		VITOMOUNT 125 SS-100 (VITO Irmen)	YES	NO	NO
	Modified acrylic	4952 (3M)	YES	NO	NO
	Rubber	MACmount M1702 (MACtac)	YES	YES	YES
		FM 7600 (Avery Dennison)	YES	YES	YES

4.3.2. Mechanical fitting

a) Framing

If using a frame to fit your mirror, you should:

- use blocks and spacers to prevent contact with the frame;
- avoid contact between the Mirox mirror and hard or brittle substances such as metals and porcelains.

b) Using metal clips or screws

If using metal clips and/or screws to fit your mirror, you should:

- insert a foam spacer between the clip and the glass;
- avoid contact between the Mirox mirror and hard or brittle substances such as metals and porcelains.

5. CLEANING GUIDE

5.1 Cleaning recommendations

Glass can get dirty, especially during the construction of a building.

Corrosive contamination must be avoided at all times, especially from plaster, mortar, concrete and cement slurry, all of which are alkaline and therefore capable of corroding the glass surface. Any such impurities must be washed off the glass immediately. Rinse with plenty of clean water to avoid scratching the surface. Use a soft clean sponge, cloth or chamois. Do not try to remove impurities while the glass is dry. Never use sharp objects, such as scrapers, to clean the glass.

To protect the glass during construction, AGC Glass Europe recommends covering installed glass with sheets of plastic film.

The other teams working on the project should also be informed about handling the glass properly.

5.2 Cleaning Mirox MNGE

When cleaning the mirror, the edges must always be dried quickly and thoroughly.

Mirox MNGE mirrors can be cleaned with clean water.

IMPORTANT: Never use ammonia-based products or abrasive products (such as anti-limescale products) to clean Mirox MNGE.

5.3 Cleaning Matelac Silver

The acid-etched surface of Matelac Silver is rougher than the untreated surface of Mirox mirrors. Dirt and other substances adhere better to the rough surface. Nevertheless it can be cleaned with clean water and neutral commercial detergents for normal day-to-day maintenance. Special care must however be taken during the installation of Matelac Silver since dirt and other substances adhere.

Note: Silicone, cement slurry and similar materials cannot be removed from the surface of Matelac Silver without leaving some residue.

5.4 Cleaning Mirox 3G

Whereas tips for cleaning mirrors have always recommended using only clean water, the Mirox 3G mirror breaks new ground in that it can be cleaned using standard cleaning products. Detergents help with the cleaning process.

Use neutral commercial detergents designed to clean window glass. Do not use alkaline leachate, acids, liquids containing fluoride, or commercially available limescale removers.

Mirox 3G (especially the edge areas of the mirror) should be dried immediately after cleaning.

Here are some examples of cleaning products that can be used:

- multi-purpose cleaning products such as 'Ajax deep cleaner', 'CIF Oxy-gel' and 'CIF Professional Cream';
- glass cleaning products such as 'Glassex Saint Marc professional glass cleaning product', 'Instanet quick-dry anti-condensation cleaning product' and 'Instanet no-trace glass cleaning product';
- bathroom cleaning products such as 'Muscle bathroom limescale remover', 'lemon Bref bathroom cleaning product' and 'Mr. Clean double-action bathroom spray';
- tile-joint cleaning products such as 'Sista tile-joint cleaning product', 'Lakeone tile-joint cleaning product' and 'HG mildew destroyer';
- a mild vinegar solution;
- a mild ammonia solution.

Do not use limescale removers, such as 'Antikal gel liquide anti calcaire' (Antikal liquid-gel limescale remover).

Table of products tested (*)

	Name	Packaging	Manufacturer	pH	Mirox 3G
Multi-purpose cleaning product	Ajax	1.25L	Colgate Palmolive	6.8	YES
	CIF Professional Cream	750ml	Unilever	10.8	YES
Glass cleaning product	Instanet anti-condensation cleaning product	500ml spray	Henkel	8.5	YES
	Instanet no-trace glass cleaning product	750ml spray	Henkel	10.0	YES
Bathroom cleaning product	Cillit BANG bathroom cleaning product	750ml spray	Reckitt Benckiser	1.0	NO
	Lemon Bref bathroom cleaning product	500ml spray	Henkel	3.8	YES
	Mr Clean bathroom / shower room spray	750ml spray	Procter & Gamble	3.8	YES
	Antikal liquid gel	500ml	Procter & Gamble	1.3	NO
Tile-joint cleaning product	Recta Clean super-active tile-joint cleaning product	500ml spray	NV Rectavit	13.3	YES
	Rubson tile-joint cleaning product for silicone and cement joints	500ml spray	Henkel	12.8	YES
	HG mildew destroyer for silicone joints	500ml spray	Hagesan	12.7	YES
Acids/bases	Acetic acid			2.8	YES
	Acetic acid			4.4	YES
	Ammonia solution 25% NH ₃	5ml in 100ml		10.8	YES

(*) Results following 48 hours of soaking in the product and five days drying of the detergent (without rinsing).