

FLOTAL®

MIRROR PROCESSING AND APPLICATION HANDBOOK



FLOTAL®

**MIRROR PROCESSING
AND APPLICATION
HANDBOOK**

1.

General notes and warnings

Following the correct technical steps for mirror applications ensures product longevity and minimizes user risks and dissatisfaction.

This handbook aims to educate manufacturers, designers and users about mirror applications and provide guidance on technical procedures.

Flotal products are intended for indoor use only. They are suitable for use in humid environments like kitchens and bathrooms but should not be directly immersed in water.

They are not suitable for tempering, laminating or insulating glass unit processes.

a. Occupational health and safety

- ▶ Processing personnel working in the processing facility must wear PPE (Personal Protective Equipment), including work clothes, steel-toed shoes, hand-wrist protectors, glasses, helmets and earplugs.
- ▶ Processing personnel should ensure the work area is suitable and free of unauthorized personnel.
- ▶ Appropriate gloves should be worn during all processing operations.
- ▶ The 5S (Sort, Set in order, Shine, Standardize, Sustain) technique should be applied in all processing areas.

b. Quality control

- ▶ Upon receipt, visually check products for flat glass defects, optical deformation, scratches, scrapings, and measurement errors specified in TS EN 1036-1:2010.
- ▶ During cutting, processing and assembly, avoid deforming the mirror's back paint.

2.

Processing guide

a. Storage

- ▶ Store mirror packages or crates at a 3-5° angle to the vertical. Stop stacking crates when they begin to lean and empty them promptly.
- ▶ Separators should be placed between plates to ensure air circulation.
- ▶ Mirrors should be stored in well-temperated warehouses, with an ambient temperature of at least 10 °C and a humidity of no more than 60%. Avoid extremely humid environments or areas with chemical gases. Avoid contact with corrosive chemicals (concrete, plaster, building water outlet, etc.) that may damage the mirror.
- ▶ Avoid sudden temperature changes in the storage area. The storage area temperature must be above 10 °C and prevent humidity condensation.

b. Mirror transport / handling (In-House use)

- ▶ Transport mirror packages or crates at a 3-5° angle to the vertical.
- ▶ Place mirror packages on sulfur-free rubber and felt surfaces. Avoid direct metal contact with mirror packages. Wooden supports should be made of kiln-dried hornbeam or beech.
- ▶ Use suitable neutral powder, ash-free paper separator (paper must be ash-free with pH = 5.5 – 7.0), static cork or styrofoam between mirror plates. Avoid using newspaper, cardboard paper and acidic separator powder. Inappropriate separators may cause scratches, abrasions, cracking and corrosion. The user must check whether the separators damage the mirror paint.
- ▶ Loading and transport equipment must not be damaged.



All
separators
should be
**clean
and dry**

- During transport, secure packages or crates to the transport vehicle.
- Load and unload packages or crates using equipment appropriate for the packaging type to ensure occupational safety and prevent mirror breakage.
- Always lift mirror plates slightly upward when removing them from packages. Never slide mirror plates over each other to avoid damaging the painted surface. Suction cups and other equipment contacting the mirror surface must be free of separator powder and kept clean.
- Preserve the package label until the last plate is removed.

c. Cutting

- The cutting must be done from the unpainted surface of the mirror.
- The cutting table surface must be smooth and clean.
- Vacuum rubbers used to feed the mirror to the cutting table must be clean and sulfur-free.
- After each plate cutting, vacuum the cutting table.
- Mirror cutting requires volatile cutting oil, an appropriate cutting roller, and appropriate cutting pressure. Low pressure, small amount cutting oil use may lead to unwanted fractures, side breaks, and hackle marks during separating.
- Avoid excessive oil use when cutting mirrors.
- Avoid cutting with inappropriate liquids (e.g. petrol, low quality oils, kerosene).
- Since cutting oil contains solvents, avoid stacking cut mirror plates on top of each other. Place appropriate separators (cork, ash-free paper, etc.) between cut pieces to allow quick cutting oil evaporation.
- Temporary stresses from sunlight heating may hinder proper plate cutting. Therefore, ensure all sides of plates to be cut are at the same temperature.
- After cutting, promptly tear off and transfer mirror plates to stands.
- The cutting machine requires daily, weekly, monthly and annual maintenance. Keep regular maintenance records.



d. Edge processing and drilling

- Edge processing operations (channel opening, hole drilling, grinding, beveling, deburring, corner breaking) can be performed on the mirror. After each operation, wash the mirror and ensure complete water removal.
- Adjust the processing machine speed based on the number of grinding wheels and glass thickness. The engine speed of the wheels must be at least 2500 rpm.
- Avoid excessively angular shapes when using spherical wheels. Use a different type wheel for each glass thickness. Diamond grain sizes for trimming wheels must not exceed D=65.
- To protect mirror paint, use new wheels for glass grinding for the first half hour to 1 hour.
- The processing wheels are cooled with water containing non-abrasive coolant additives (neutral pH).
- Excessive mechanical stress damages the paint layer allowing water and glass dust to enter between the glass and the paint, leading to edge corrosion.
- A smooth glass grain free surface is required when processing the painted side of the mirror to prevent corrosion.
- Glass particles (dust) from mirror edge trimming can cause the pH value of processing water to rise above 10. Alkaline cooling water with high pH value initiates corrosion at the mirror edge.
- Prevent pH increases above 9 by using appropriate cooling agents and removing cooling water and glass dust (particles) immediately after processing with deionized or pure water.
- Various bacteria form in water containing coolant during processing. These bacteria reduce sulfate ions over time, creating hydrogen sulfide gas. Hydrogen sulfide gas tarnishes the silver layer.
- Adding appropriate biocides to the cooling water can prevent bacterial growth. Since regular biocide use can lead to bacterial immunity, apply high-dose shock treatment for very high bacterial counts.
- An appropriate precipitation system (e.g. flocking and hydrocyclone siphoning) must be used to settle and remove glass dust generated during grinding and beveling.
- The precipitant must not be too acidic and chloride-free.

- The precipitant must not chemically affect the coolant water.
- To prevent corrosion from edge processing solutions, immediately wash the mirror with demineralized water (conductivity not more than 30 µS and hardness not more than 5 °Fr) after grinding or beveling before the solutions on the mirror dry.
- The cerium oxide used for beveling must be of appropriate quality for mirror processing.
- Mirrors cannot be tempered or laminated.
- Edge processing errors, such as chipping during grinding, beveling, drilling, channel opening and detail opening, must be avoided as they can lead to edge deterioration over time.
- Hand grinding of mirrors is prohibited.
- Edge processing can be done on automatic horizontal (double edger, CNC) or vertical grinding machines.
- Manual deburring operations (cross banding, hand sanding) can damage the paint and should be avoided.
- The glass must remain moist during edge processing, and washed immediately afterward.
- Horizontal grinding lines (double edger) must be capable of working in two directions and have equipment for automatic 90-degree glass turning. All four glass edges must be ground and washed at the line exit. There must be no manual intervention to the glass during the process.
- If a security film is applied behind the mirror, confirm that the adhesive will not damage the mirror paint.
- If a security film is applied behind the mirror, it must be class 2B2 according to EN 12600.
- During grinding, a grinding speed of 8-20 m/min is recommended.
- Sharpen grinding wheels after 20,000-40,000 m of grinding.
- During grinding and beveling, check for surface roughness, hackle marks (chipping) and hairline cracks using a magnifying glass (loupe). Faulty mirrors must be separated.
- Daily, weekly and annual maintenance must be planned and implemented for grinding and beveling machines. Head vibrations must be especially avoided.

Cutting processes on Flotal

	Max. size (mm)	Min. size (mm)
Circular cutting	Ø 1.000	-
Oval cutting	Length 1.200 Width 1.000	Length 100 Width 50

Processes on Flotal

	Glass thickness (mm)	Max. size (mm)	Min. size (mm)	Tolerance (mm)
Hackle marks	3-6	1,500x1,200	-	
Grinding	3-6	1,600x2,500	200x200	
Beveling	3-6	2.300	140	Bevel width tolerance
Hole*	3-6	Ø30	Ø5	Hole diameter tolerance ±1 Misalignment tolerance relative to hole center ±1

*The edge-to-hole distance must be at least three times the hole diameter. The distance between two holes must be at least four times the glass thickness.

e. Mirror washing

- Glass and dirt particles in worn and dirty washing brushes can scratch both mirror surfaces.
- The inlet brush or plate, designed to prevent water splashing, must be positioned to avoid contact with the glass surface.
- Avoid mechanical damage to the mirrors during washing. To prevent mechanical damage, the mirrors must pass through the washing machine without stopping. If the mirror gets stuck under the washing brushes, stop the washing machine.
- Use demineralized water with conductivity not exceeding 30 µS, hardness ≤5 Fr, pH 6.0-7.5 and temperature 35-50 °C in the washing machine.



- A system must continuously measure water temperature and conductivity.
- Washing water must be chlorine-free.
- No detergent or other chemicals should be added to the washing machine water.
- Keep the washing machine air knife filter clean.
- Clean air knife filters daily and avoid dust in the air intake area.
- Regularly check and clean air blowing blades and hoses.
- Use opaque pipes and water tanks to prevent algae and similar organism growth.
- After washing, the mirror must be completely dry and free of stains.
- After washing, place a clean, neutral separator between the mirrors.
- Pre-washing removes dust trapped between the mirrors and edge processing residues. The mirror surface is now ready for washing.
- A water flow rate of 2.8 l/min is recommended for washing.

f. Cleaning

- Wipe the mirror with a damp, soft cloth.
- Avoid removing dry stains. Instead, gently rub wet stains with a hot, damp cotton cloth that has been soaked in clear hot water and wrung out well.
- Do not spray cleaner directly onto the mirror surface.
- Ensure that no water remains on the lower mirror edge.
- Avoid using abrasive chemicals, ammonia-based, acidic and alkaline cleaning materials on mirrors.
- Avoid using materials that may scratch the surface, such as spatulas. To protect the mirror surface, a neoprene or plastic gasket should be placed between the glass and any screws inserted through holes in the mirror.

3. Application

- Roughness and uneven application surfaces must be corrected to prevent image defects,
- Mirrors should not be applied to newly plastered or painted surfaces before they are completely dry,
- A gap should be left between the mirror and the application surface to allow air circulation and prevent moisture buildup,
- Elastic materials should be placed between the frame and the mirror to prevent edge damage,
- For multi-piece mirror applications, a gap (joint) must be left between mirrors to prevent breakage. For vertical mirror applications, ensure that the mirror forms a 90° angle with the ground for optimal image quality,
- To protect the mirror surface, a neoprene or plastic gasket should be placed between the glass and any screws inserted through holes in the mirror.

Use of Double-Sided tape and Silicone in mirror applications

- Double-sided tapes and silicones used for mirror applications must be solvent-, acid-, and base-free. The application surface must be dry and clean.
- Adhesives or tapes used to attach the mirror must be applied vertically.
- The application surface must be strong enough to support the mirror's weight.
- If the application surface is chipboard or similar, it must be covered with a non-resin bleeding paint or varnish.
- Applications should not be done on cold surfaces. An average room temperature of 18-35 °C is ideal.
- For double-sided tape applications, the mirror thickness should not exceed 3-4 mm.

➤ When using double-sided tape, use smaller, more frequent pieces instead of long strips.

➤ Flat surfaces like wardrobe doors and standard doors are suitable for tape application.

➤ In double-sided tape applications, the tape must not be used horizontally or pointwise.

➤ Silicone applications must be vertical to ensure air circulation behind the mirror.

➤ Silicone must not be used horizontally or pointwise.

➤ In mirror applications, neutral curing alcoxy-based, condensation curing alcoxy-based, 1 or 2 component hybrid silicones must be used.*

*Every chemical substance used in mirror applications must be declared suitable for mirror use by the manufacturer and tested before application.

➤ Avoid using acid silicones and water/rubber/polyurethane-based adhesives.

➤ For mirror applications in very humid areas, seal the mirror edges with neutral silicone to prevent future corrosion.

➤ If the application surface is not smooth, the mirror must be supported from the bottom for an average of three days.

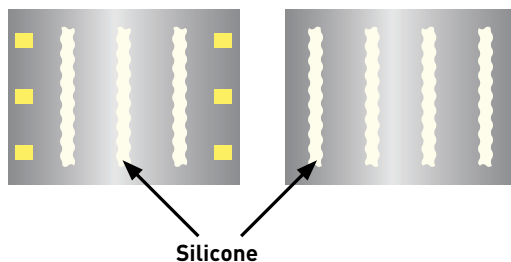
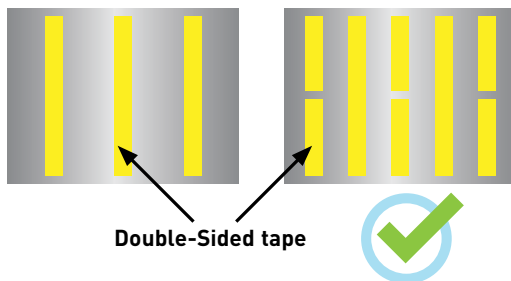
➤ For silicone applications, double-sided tape can be used to increase strength, as shown in the figure.

Use of fixing screws and profiles in mirror applications

For mirror application with nails and profiles:

➤ Ensure nails and profiles have the cross-section and strength to support the mirror plate.

➤ When using metal nails and profiles, place a gasket between the mirror and the metal surface to prevent contact.



For mirror applications with fixing screws:

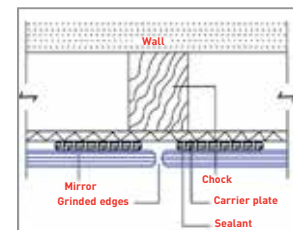
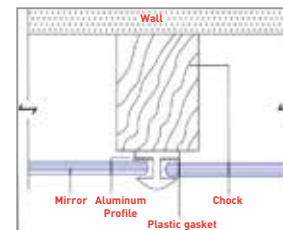
➤ A neoprene or plastic gasket must be placed between the mirror and the elements such as screws that pass through drilled holes.



Junction of the mirror with the mirror

If mirrors are placed side by side and image continuity is desired:

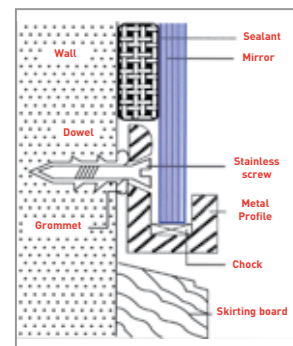
➤ Adjacent edges must be joined using a press strip, profile or mirror gluing method.



➤ If mirror edges are left open, they must be ground and deburred.

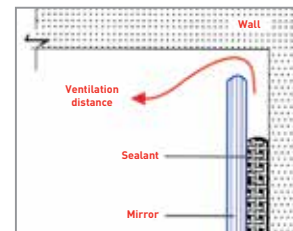
Junction of the mirror with the floor

➤ If the mirror is desired to start from the floor covering, it is preferably placed on wedges inside the profile.



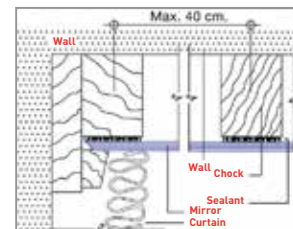
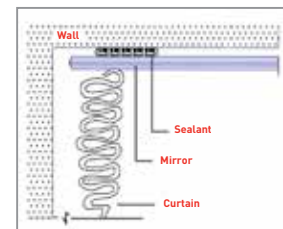
Junction of the mirror with the ceiling

➤ In mirror applications that reach up to the ceiling, a distance should be left between the mirror edge and the ceiling to ventilate the back of the mirror.



Junction of the mirror with vertical elements

➤ If the walls are wood panelled, the mirror can be fixed with slats without a frame.



➤ Curtains can easily hide the frame and wall connections of mirrors placed next to windows.

a. Security film application

➤ Security film should be used to minimize injuries in areas where mirrors are likely to break.

➤ If the mirror breaks, the film holds the glass pieces together, reducing the risk of injury.

➤ Additionally, the film prevents back paint scratches and corrosion in humid environments.

➤ The security film is applied to the painted back surface of the mirror. The mirror with the security film must be placed on the surface using double-sided tape or mechanical fasteners.

➤ It is recommended to use security film especially in places where there is movement and density of people, such as overhead mirrors, mirrors placed up to 80 cm above the ground, and sports facilities, dance studios and beauty salons, nurseries, schools, hotel lobbies, and shopping malls.

➤ The security film to be applied to the mirror must comply with the TS EN 12600 2B2 standard.



FLOTAL®

flotal.com

© /flotalayna

 ŞİŞECAM

sisecam.com