MIRO TECH

MIRROR FACTORY & ALL GLASS WORKS

Technical Data Sheet

ISO 9001
BUREAU VERITAS
Certification

OHSAS 18001
BUREAU VERITAS
Certification

ISO 14001
BUREAU VERITAS
Certification

UKAS QUALITY MANAGEMENT 008

UKAS ENVIRONMENTAL MANAGEMENT 008

TÜVRheinland CERTIFIED

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DATA SHEET

1 INTRODUCTION

This Technical Datasheet provides information of Miro Tech copper free mirrors. The Miro Tech mirror are silver palladium mirrors with double coat paint.

2 STANDARDS

Miro Tech products comply with:

* EN 1036-1 – Glass in building – Mirrors from silver-coated float glass for internal use –Part 1: Definitions, requirements and test methods

* EN 1036-2 - Glass in building – Mirrors from silver-coated float glass for internal use – Part 2: Evaluation of conformity/Product standard

All Miro Tech products are produced in ISO 9001, ISO 14001 & OSHAS 18001-certified plants. Miro Tech have Nederland certificate of the mirror´s quality. TUV certificate.

3 COMPOSITION AND PROPERTIES

The base glass used for Miro Tech mirror is float glass that complies with EN 572-1 & 2. The properties of the float glass are listed below.

3.1 CHEMICAL COMPOSITION

Standard EN 572-1 defines the magnitude of the proportions by mass of the principal constituents of float glass as follows:

SiO_2	69 to 74%
Na_2O	10 to 16%
CaO	5 to 14%
MgO	0 to 6%
Al_2O_3	0 to 3%
Others	0 to 5%

3.2 MECHANICAL PROPERTIES

* Weight (at 18°C): $\rho = 2{,}500$ kg/m³
* Density: 2.5
* Young's modulus (modulus of elasticity): E = 70,000 N/mm²
* Poisson's ratio: $\mu = 0.2$
* Shear modulus: $G = E/[2(1+\nu)] \sim 29{,}166$ N/mm²
* Knoop hardness: 6 GPa
* Mohs hardness: 6
* Characteristic bending strength: 45 N/mm²

3.3 THERMAL PROPERTIES

* Softening point: ~ 600 °C
* Fusion temperature: ~1,500 °C
* Linear expansion coefficient: $\alpha = 9.10^{-6}$/K (between 20° and 300°)
* Specific heat capacity: C = 720 J/(kg.K)

3.4 OPTICAL PROPERTIES

* Refractive index N to visible radiation (380 to 780 nm):
- air/glass: 0.67
- glass/air: 1.50

3.5 ELECTRICAL PROPERTIES

* Specific resistance: 5.10^{7} Ω.m at 1,000 Hz and 25 °C
* Dielectric constant: 7.6 at 1,000 Hz and 25 °C

4 DURABILITY OF MIRO TECH MIRROR

Miro Tech products are tested using the durability method described in EN 1036-1.
Miro Tech products outperform the requirements set out in EN 1036-1.

	EN 1036-1 criteria	Performance of Miro Tech Mirrors
Neutral salt spray test: - Maximum corrosion around the edge	1.0 mm	0.05mm
Copper accelerated acetic acid salt spray test: - Maximum corrosion around the edge - Maximum number of spots (diameter between 0.2 and 3 mm)	1.5 mm 2 (accepted provided < 0.2 mm)	0.25 mm < 1 (accepted provided < 0.2 mm)
Condensation water test - Maximum corrosion around the edge - Maximum number of spots (diameter ≤ 0.3 mm)	0.2 mm 1	0.05 mm 0

5 DIMENSIONAL TOLERANCES

The actual thickness will be the average of four measurements, rounded to the nearest 0.01 mm, taken at the centre of each side.
The actual thickness, rounded to the nearest 0.1 mm, must not vary from the nominal thickness by more than the tolerances given in the table.

	Minimum (mm)	Maximum (mm)
1.9	1.8	2.0
3	2.8	3.0
4	3.8	4.2
5	4.8	5.2
6	5.8	6.2
8	7.7	8.3
10	9.7	10.3

6 MIRRORING SPECIFICATIONS

Miro Tech only uses chemical products from prestigious and well-known companies in Germany. Both its chemical products and the mirror as the 2 protective paint layers that apply to all our mirrors, come from the best companies in the world located in Germany.
The glass is cleaned with a special product that removes the remains of oils generated by cutting machine.

Copper - free mirror is made with a super sensitized palladium chloride instead of traditional copper layer, silver grain clusters is more fine, with double passivation, spraying double imported lead-free environment friendly corrosion resistant waterproof paint.

6.1 Production procedures composition compare with other mirrors

	MiroTech copper-free mirror	Other copper-free mirror	Typical conventional mirror
washing	✓	✓	✓
scrubbing	✓	□	□
polishing	✓	✓	✓
rinsing	✓	✓	✓
sesitization	✓	✓	✓
super sinsitization*	✓		
	use palladium ti improve the adhesion of sikver film to glass substrate.		
silver deposition	✓	✓	✓
passivation*	✓	✓	
	rinsed with deionized water. Through the copper free production to protect the silver film from oxidation		
paint adhesive treatment	✓	✓	✓
drying of metalic coating	✓	✓	
application of first coat of paint	unleaded	leaded/unleaded	leaded/unleaded
first coat baking	✓	✓	✓
application of second coat of paint	unleaded	leaded/unleaded	leaded/unleaded
second coat baking	✓	✓	✓

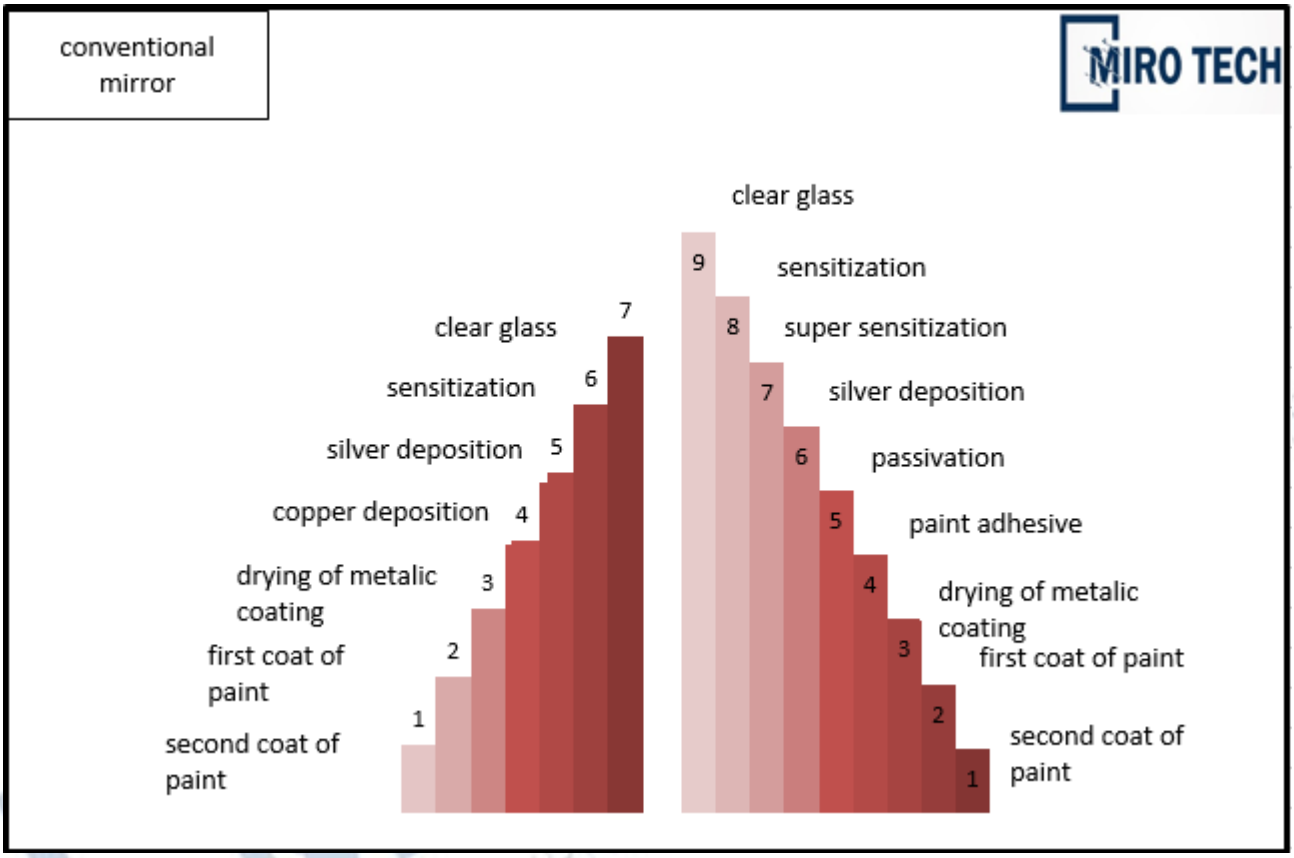
6.2 Production procedures durability compare with other mirrors

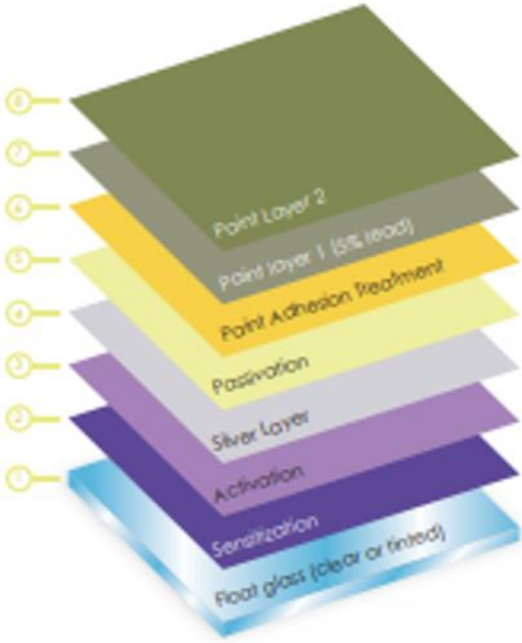
	European Norm EN1036	typical conventional mirror	mirotech copper-free mirror
ISO 3768 CASS Test @ 120 hours			
maximum edge corrosion (µm)	2500	500 - 1000	250
spot failures-number/sq dm.	2<0.3 mm	3	≤1
	3<0.3 mm		
ISO 3770 salt test @ 5%			
maximum edge corrosion (µm)	1500	300	100
spot failures-number/sq dm.	2<3 mm	1	≤1
	5<0.3 mm		
ASTM C 1503-01 salt spray test - 20% US spec for 300 hours			
maximum edge corrosion (µm)	3000	500	200
spot failures-number/sq dm.	2<3 mm	1	1
	5<0.5 mm		
max. nomber of spot failures	5		
DIN 50017humidity test - 480 hours			
maximum edge corrosion (µm)	200	0	0
appearance	no clouding of silver film	clouding occurs in 3-4 days	no clouding of silver film
ammonia immersion (10%) - 240 hours	no standard established	paint delaminates in 3-5 dayes	no paint delamination 10 days
typical edge failure - 2 hours (µm)	250	200	≤50
heat test @ 160 degrees F (71 C)	no standard	severe clouding after 4 hours	no clouding after 10 days
heat test @ 425 degrees F (218 C)	no standard	severe clouding after 30 minutes	no clouding after 10 hours

6.3 Normal standard for Miro Tech´s mirrors.

Silver thickness	>	0,76	g/m2
Cooper thickness	>	Cu Free	
Base coat	27 µm	±	7 µm
Top coat	27 µm	±	7 µm
Grid test	≤	2	
Xylene test	≥	100	

6.4 New generation Miro Tech mirror.





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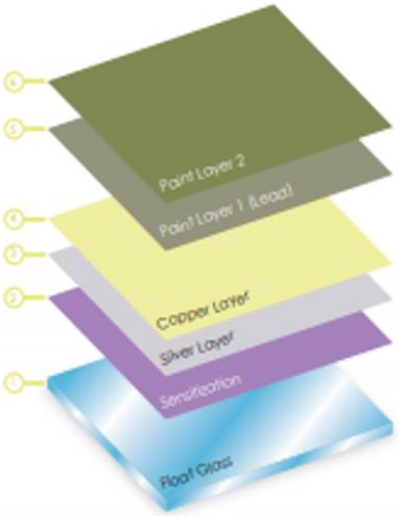
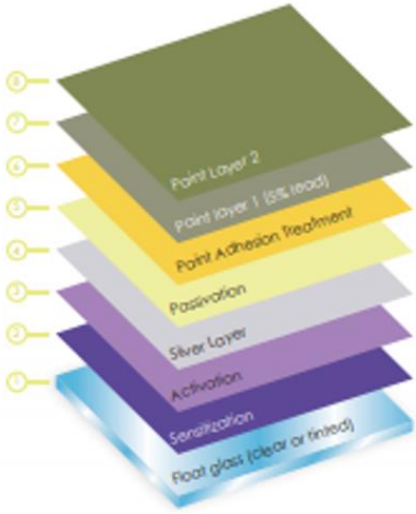
COMPARISON OF TRADITIONAL MIRROR AND NEW GENERATION MIRROR BY MIRO TECH

	TRADITIONAL MIRROR	NEW GENERATION MIRROR (MIRO TECH)
MIRROR MANUFACTURING PROCESS		
CONTENTS	COPPER + LEAD PRESENT	COPPER REMOVED LEAD CONTENT REDUCED SIGNIFICANTLY
RESISTANCE TO CORROSION	AVERAGE	BETTER RESISTANCE THAN TRADICIONAL MIRROR
RESISTANCE TO SCRATCHES	AVERAGE	AVERAGE
ADHESION	ADHESIVE TAPES	GLUES, SILICONES AND ADHESIVE TAPES

7 QUALITY REQUIREMENTS

7.1 INTRODUCTION

Mirror quality can be affected by faults that distort the appearance of the image of reflected objects. Such alteration of the image can result from optical faults, faults in the glass and faults in the reflective coating.

7.2 DEFINITIONS OF FAULTS

The following definitions apply:

- Optical faults: faults directly associated with the distortion of the reflected image.
- Glass appearance faults: faults which alter the visual quality of the mirror on silver-coatedfloat glass. They can be spot and/or linear and/or enlarged area faults.
- Spot faults: solid or gaseous inclusions, deposits, crush marks etc. In some cases, spot faultsare accompanied by a type of distortion called 'halo'. The nucleus of the spot fault is measurable.
- Linear faults: scratches, extended spot faults, etc.
- Brush marks: very fine, barely visible circular scratches that are associated with glass cleaning techniques.
- Scratches: any kind of scratches that are not brush marks.
- Reflective silver coating faults: faults in the reflective silver layer that alter the appearance of the silvered glass. They consist of scratches, stain, colour spots and edge deterioration.
- Stain: alteration of the reflective coating characterised by a more or less brownish, yellowish or greyish coloration of zones which can sometimes cover the entire reflective surface.
- Colour spots: alteration of the reflective coating taking the form of small, generally coloured spots.
- Edge deterioration: discoloration of the reflective silver at the edge of the silvered glass.
- Protective coating(s) faults: faults where the metallic layer is exposed. These can be scratches or loss of adhesion of the protective coating(s).
- Edge faults: faults that affect the as-cut edge of the silvered glass. These can include entrant/emergent faults, shelling, corners on/off and vents.

7.3 GLASS FAULTS

7.3.1 INSPECTION METHOD

The silvered mirror must be observed in a vertical position, with the naked eye and under normal diffused lighting conditions (natural daylight or simulated daylight, between 300 lux and 600 lux at the silvered mirror), at a distance of at least 1 metre. The direction of observation is normal, i.e. at right angles, to the silvered mirror. The use of an additional lighting source, e.g. spotlight, is not allowed.

The dimension and number of brush marks, scratches and spot faults which distort vision must be noted.

7.3.2 ACCEPTANCE LEVELS

The tables below show the acceptance levels for glass faults for standard sizes.

Acceptance level for linear faults in standard sizes

	Mirrors with clear and tinted glass substrate	
	Jumbo size (defects/ sheets of 6 m x 3.21 m)	Other sizes (defects/m²)
Brush marks (≤ 50 mm)	8	0.375
Scratches (≤ 50 mm)	3	0.139

Acceptance level for spot faults[a] in standard sizes

	Mirrors with **clear** glass substrate			
	Jumbo size (defects/ sheets of 6 m x 3.21 m)		Other sizes (defects/m²)	
	Max/sheet	Average/sheet	Max/sheet	Average/sheet[b]
≤ 0.2 mm	Accepted[c]	Accepted[c]	Accepted[c]	Accepted[c]
> 0.2 mm and ≤ 0.5 mm	26	18	1.35	0.93
> 0.5 mm	3	2	0.16	0.11
	Mirrors with **tinted** glass substrate			
	Jumbo size (defects/ sheets of 6 m x 3.21 m)		Other sizes (defects/m²)	
	Max/sheet	Average/sheet	Max/sheet	Average/sheet[b]
≤ 0.2 mm	Accepted[c]	Accepted[c]	Accepted[c]	Accepted[c]
> 0.2 mm and ≤ 0.5 mm	30	29	1.55	1.50
> 0.5 mm	4	3	0.21	0.16

[a] The dimensions stated are without the halo effect and relate to the largest of the fault dimensions.
[b] The average must be calculated taking into account the total individual pack area (m²).
[c] Accepted, providing they do not form a cluster.

7.4 REFLECTIVE SILVER COATING FAULTS

7.4.1 INSPECTION METHOD

Same as section 7.3.1.

7.4.2 ACCEPTANCE LEVELS

The reflective silver coating faults are not allowed if they are visible under the condition set out in section 7.3.1.

7.5 PROTECTIVE COATING FAULTS

7.5.1 INSPECTION METHOD

Same as section 7.3.1.

7.5.2 ACCEPTANCE LEVELS

Using the method described in section 7.3.1, the presence of pinholes, burst bubbles, flaking of the protective coating along the edges or other faults in the protective coating(s) must not be allowed.

7.6 OPTICAL QUALITY

7.6.1 QUALITATIVE VISUAL INSPECTION METHOD

A silvered mirror must be examined in 500 mm × 500 mm areas at a time. The observer must be located at a distance of 2 m in front of and perpendicular to the area being examined. There must be an irregular background behind the observer. The reflected image must not be optically distorted, e.g. by another reflective surface or window.

7.6.2 ACCEPTANCE LEVELS

The mirror meets the requirements if it does not exhibit any distorting optical variation of the image following the visual inspection described in section 7.6.1.

7.7 EDGE FAULTS

7.7.1 INSPECTION METHOD

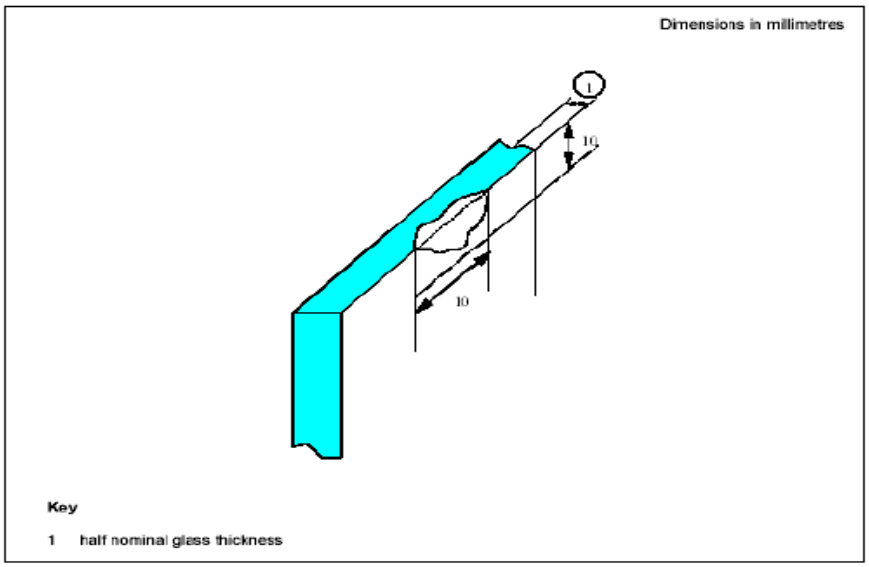
Same as section 7.3.1.

7.7.2 ACCEPTANCE LEVELS

The edge quality of stock size mirrors can be affected by the presence of entrant/emergent faults and shelling. Using the method described in section 7.3.1, the edges of the mirrors must be checked for the presence of shells, corners on/off and edge vents.

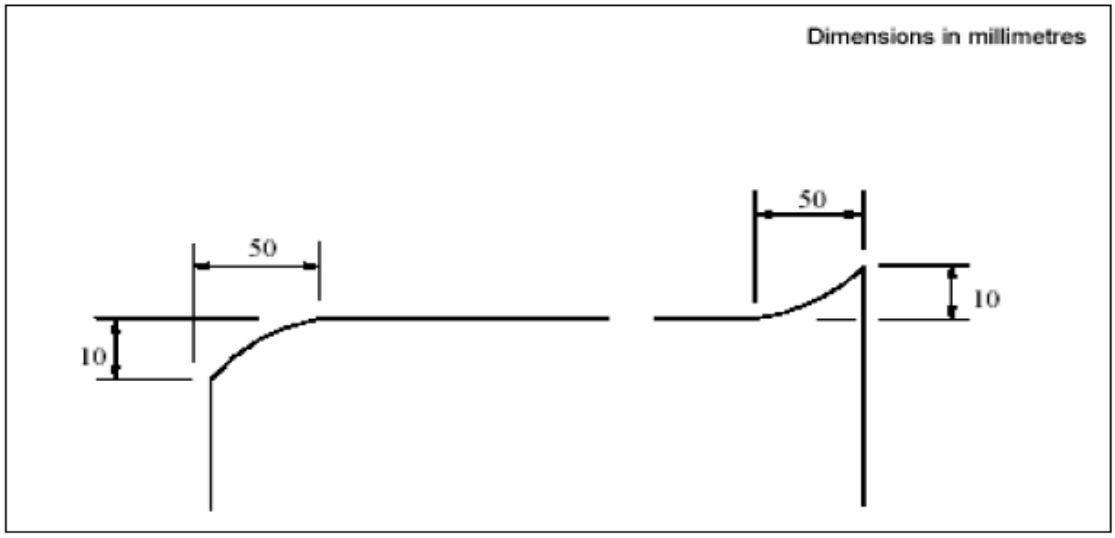
7.7.2.1 CHIPS OR SHELLS

For stock sizes, entrant or emergent chips or shells must be accepted provided they do not exceed a maximum length and depth of 10 mm and half the nominal glass thickness.



7.7.2.2 CORNERS ON/OFF

For stock sizes occasional corners on/off are allowed. No more than 5% of the sheets on a delivery may be affected.



7.7.2.3 VENTED (CRACKED) EDGES

Vented (cracked) edges are not allowed for stock sizes.

8 ENVIRONMENTAL CONSIDERATIONS

Miro Tech has been developed to be environmentally friendly.
The current Miro Tech production line has, among other things, made it possible to:

- Eliminate the copper layer
- Reduce lead content to < 0.3% (<3000 ppm)
- Reduce ammonia waste by 90%

Miro Tech´s mirrors:

1. Lead content in paints reduced to < 0.004% (< 40 ppm*)

* No lead intentionally added, only limited lead contamination from other natural materials used for the manufacture of the paint.

None of the substances identified as substances of very high concern (SVHC) in the REACH Candidate List* is present above 0.1% in Miro Tech products, concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals).

* http://echa.europa.eu/web/guest/candidate-list-table

9 HEALTH AND HYGIENE CONSIDERATIONS

A mirror's environment is its worst enemy. Over time, humidity and other atmospheric conditions, ammoniated cleaners, and many of the mastic adhesives used in installation eat away at a mirror's protective coatings and corrode its reflective surface. Copper-Free Mirrors are proven superior over conventional copper mirrors. The proof is in the test results...

For extend the life of your mirrors:

1. Keep bathrooms well-ventilated during showers to avoid condensation that can run and pool at the edge
2. Never use ammonia-inclusive cleaners on your mirrors
3. Never use acid silicon for the installation of your mirror
4. Never spray cleaners directly on a mirror. Spray a rag first, then wipe
5. Always protect the edge from excessive moisture. If you design the mirror to meet a countertop, be mindful to keep that countertop dry, or seal it with a silicone that is safe for use on mirrors.
6. When in doubt, gentler is better. A damp cloth can clean a mirror exceedingly well. An old photographer's trick is to wipe a mirror with newsprint to avoid lint.

10 INSTALLATION NORM

Installation must be performed following installation norm EN1036. A neutral silicon (free of solvent) or a double sided adhesive can be used (alcoxy based silicones preferred). The best way to apply silicone to glue it in vertical caterpillar formations with gaps between them.

11 CLEANING

11.1Cleaning recomendations:

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. To protect the glass during construction, Miro Tech 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.

11.2 Cleaning detergents:

Detergents help with the cleaning process. Use neutral commercial detergents designed to clean window glass. Do not use alkaline leachate, acids or liquids containing fluoride. Detergents with pH12 must not be used.

11.3 Cleaning mirror:

When cleaning the mirror, the edges must always be dried quickly and thoroughly. Miro Tech mirrors can be cleaned with modern pH-neutral cleaning products.
IMPORTANT: Never use ammonia-based products or abrasive products (such as anti-limescale products) to clean the mirror.

11.4 CLEANING: SHARP OBJECTS

Never use sharp objects, such as scrapers, to clean the glass.

11.5 CLEANING: SPONGES

Soft sponges can be used to clean the surface. Use plenty of water to avoid scratching or otherwise damaging the surface of the glass. Various products are available on the market. Always test cleaning products on a sample sheet of glass

12 RECOMMENDATIONS ON HOW TO USE THE MIRROR

1. **Keep the mirror clean, dry, and in good ventilation.**
2. **Wear gloves every time when holding the mirror.**
3. **Use seal the edge of the mirror every time after cleaning it.**
4. **Wet process with neutral solution (PH 6.5-7.5) is recommended when cutting the mirror.**
5. **To install the mirror, a space should be left between the wall. Don´t let the bottom part of it touch the wall. Dry away the water or solution from the edge of the mirror.**
6. **If the room is air-conditioned, the installation should be made after turning on the air-con.**
7. **In transporting the mirror, a piece of paper should be inserted between pieces or use cork/foam spacer.**
8. **To clean the mirror:**
    - **Use soft cloth dipped in warm water and dry until it is damp to clean the mirror.**
    - **Don´t use any chemicals with acid, alkaline, oil, or ammonia solution to clean the mirror as they may destroy the edge or the back or the mirror.**
    - **Don't use sprays or any cleaning solutions directly on the mirror.**
    - **Tre edge of the mirror should be wiped dry.**
9. **Use glue which is neutral and recommended by the manufacturers of mirror.**

13 MIRRORS, HANDLE WITH EXTREME CARE

13.1 PURPOSE

The purpose of this publication is to provide the latest available information to glass dealers, distributors and installers on the procedures recommended by the National Association of Mirror Manufacturers for the proper storage, handling, fabrication, shipping, installation and cleaning of high quality mirror products.

The NAMM has undertaken this project with the objective of helping preserve the integrity and prolonging the life of mirrors.

Publication of this information however, does not promise an end to all mirror problems. Sporadic and rapid edge deterioration ("black edge") is a current, unresolved problem in a number of geographic areas.

Research into more durable backing materials and improved mirror manufacturing processes is ongoing - not only as related to specific problems such as "black edge" but as a continuing effort to provide a more durable, trouble-free product.

However, a mirror - because it is a combination of many delicate materials and processes - will never be indestructible. Proper storage, handling, fabrication and good installation practices go a long way to reducing potential failures or damage. And educating consumers in the proper care and cleaning of mirrors requires a continuing effort on the part of the entire industry to assure that the mirrors will be properly maintained after they have been installed.

This publication contains the best information currently available from material suppliers, experienced dealer-installers, and major mirror manufacturers on the care and handling of today's quality mirrors.

13.2 MIRROR PRODUCT

A mirror is a delicate and beautiful product. Even though it's a combination of hard and durable components, the very nature of this blending creates a number of frailties that can ultimately lead to problems for both
buyer and seller.

A sheet of glass is, in itself, highly resistant to both mishandling and to the elements. Add to that same sheet of glass however, the sensitizing solution, the depositions of silver, then copper and finally baked enamel that converts it into a quality mirror and it is rendered highly vulnerable to a variety of imperfections and abuse. Scratches or brush marks virtually invisible on the glass become intolerable blemishes on the mirror.

Bits of dust or dirt that cling to the glass become unsightly black marks on the silvering and destroy the value of the mirror.

Today's mirrors are made from the highest quality glass produced by the float process, and are better in every way from those made a decade ago. Surfaces are flatter and there are fewer surface and internal imperfections. Better edges are possible and closer tolerances can be maintained. State-of-the-art technology is employed to assure a better sheet of glass for silvering. Silvering methods have improved to provide maximum depth and reflectivity. Better copper solutions and baked enamel coatings continue to provide the proper protection to the silvering for longlived performance.

But each of the five components which make up the mirror - glass, sensitizing solution, silver, copper, enamel - if improperly handled anywhere along the way from manufacture to final installation can lead to a failure of the mirror. Opportunities for mishandling are many. Each mirror must be shipped, stored, removed from storage, cut, perhaps beveled or drilled, finished, packed and shipped again, installed and cleaned. Because each mirror is indeed more than "just glass", an array of proper handling techniques described in this publication should lead to a durable installation. Two positive benefits will result from employing these procedures; a handsome, trouble-free mirror installation and a satisfied customer.

13.3 RECEIVING, STORAGE AND TRANSPORTATION.

Every time a mirror crate or an open mirror is moved, there is potential for damage. Therefore, the key to successful handling is to keep these movements to a minimum. Plan your storage in an efficient manner. Use proper handling techniques. Ship wisely. Review the suggestions below and compare them to your present practices.

- The very first-and important-step in maintaining mirror integrity is to check your shipments on arrival. If there appears to be moisture present, the mirrors should be unpacked and allowed to dry using a separating technique. Moisture can attack the backing or stain the face of a mirror over a period of time.
- Be sure that your mirror storage areas are in dry, adequately ventilated spaces. Don't store mirrors in areas of high humidity, exposed to chemical fumes, or near high heat such as steam or water pipes. These conditions can cause deterioration of the mirror edges, backing or surface staining.
- Mirrors should be unpacked as soon as possible to allow moisture caused by condensation to dissipate, especially if the mirrors have been subject to temperature changes during shipment.
- Store mirrors vertically, but do not pull mirrors from the ends of the case. Do not lay mirrors flat. Glass exhibits more strength, fewer strains when stored upright.
- Don't store mirrors outdoors or in unheated areas. The mirror can be affected not only by the moisture prevalent under these conditions, but also by excessive expansion and contraction caused by cyclic temperatures.

- Block mirror cases up off floor and away from walls. This will assist in proper ventilation of the storage area and prevent any water damage to the bottom of the cases. Also, do not store crates or mirrors on uneven surfaces. This can lead to stresses and strains on the mirrors, which can lead to cracks on the surface or in the backing.
- Protect cases and mirrors from falling objects. Even a small impact could cause cracks and ruin a mirror.
- Be certain to rotate your mirror stocks. Consume older stocks first. Many experts believe that "aging" helps in the curing of the paint backing and thus results in a more durable installation. This aging process takes about a week and is the result of the purging of all solvents in the paint coating. Organize storage areas so that faster moving items are more readily accessible. This will reduce traffic and handling and make damage less likely.
- Be certain that handling equipment is strong enough to handle the weight of the mirror. A dropped mirror is usually a ruined mirror.
- Do not ship partially unpacked mirror cases without proper repacking. Movement within the case can cause damage or breakage.
- If mirrors are transported in an open or exposed condition and become spattered or come in contact with foreign elements such as road salt, they should be washed with warm water and dried with a soft rag.

13.4 FABRICATION

It is important to emphasize that care be taken during every step of fabrication to maintain the integrity of the back and edges of a mirror. Any major damage to these two areas will result in a useless product. Equally important however, is cleanliness in the fabrication shop. Dirt, grit, solvents and other contaminants can lead to damage not only to the surface but also to the backing.

- Always use gloves when handling mirrors. This protection works two ways. Hands are protected from sharp edges and the edges and backing of the mirror from body salts and chemicals.
- Vacuum or sweep the cutting tables with a stiff brush regularly to keep dust down and to eliminate glass grit and particles that could scratch mirrors.
- Do as much fabrication in the shop as possible. This will reduce the possibility of on-site damage where conditions are usually less than perfect.
- Locate fabrication areas away from parts of the shop where mirrors could be exposed to solvents, heavy-duty cleaners, etc. which could affect the backing.
- Be sure that mirrors-especially backs and edges- are thoroughly washed after fabrication. Use only clean water for washing. If a glass washing machine is used, a recommended mild detergent may be used. No commercial glass cleaner can be recommended. Most contain ammonia or other strong chemicals, which can damage the edge of the mirror.
- After fabrication, the glass shop should apply an approved sealant to all edges. This will provide additional protection against moisture or other degrading chemical or atmospheric penetration of the backing.
- When grinding and polishing edges, remember that a wet belt sander is the recommended tool. If you are using dry belts, a recommended belt lubricant can be used, but some lubricants contain chloride contaminants. The best recommendation is the use of clean-fresh water. Also remember to keep the heat generated by sanding or swiping to a minimum to prevent damage to the mirror backing. Never allow a belt to "fire".
- Diamond wheels should always be dressed and maintained in good cutting condition. Set wheels so as not to grind excessively on the paint side and edge grind in only one direction. Diamond wheels should also be used with clean water as a lubricant. If coolant is used, it should be clean, pure and have a pH of close to 7.
- Try to retain at least one factory edge when trimming, preferably at the bottom where mirror is subject to puddling.
- Don't slide mirror lites one over another. Scratching of the surfaces can and does result.
- Be sure mirrors are inspected before and after fabrication and that adequate light is proved in the inspection areas.
- If questions arise concerning approved coolants, cutting oils, sanding belts or cutting tools, contact the mirror manufacturer or other suppliers for specific instructions.

13.5 INSTALLATION

The best mirror job is one that is not only striking in appearance, but one that was trouble-free during installation. Proper techniques, carefully and professionally employed can virtually guarantee this kind of result.

- As with fabrication, always use gloves when handling any mirror on the job site to prevent damage to the face or backing from skinborne salts or chemicals.
- Where possible, lay out a mirror installation in your shop before taking it to the job site. Any errors in cutting or sizing can be caught and remedied immediately and no excessive handling will occur.
- Never install mirrors on new plaster, new masonry or on a freshly painted wall. Also do not install in any new construction area where airborne solvents, heavy-duty cleaners, etc. are in the air.
- In humid climates, wait until the air conditioning is operating before installing mirrors.
- Never install mirrors outdoors without additional engineered protection for the backing of the mirror.
- Set mirrors off the wall with an air space behind to provide ventilation for the backing whenever possible.
- If mastic must be used, be sure it is approved for mirror use. Mechanical fastening devices should always be used in conjunction with the mastic. This can help prevent possible personal injury or
  damage from the mirror in the event of future failure of the mastic.
- Be certain that the room or space in which the mirror is to be installed is properly ventilated during and after installation, unless it is air-conditioned.
- Never permit edges of the mirror to be exposed to "puddling" conditions such as on back splashes. Instead, raise the mirror up off the bottom with an angle clip, which will not catch and retain water in contact with the mirror.
- Be sure that there are adequate tolerances between installed mirrors to avoid later problems as the building settles.
- Mirrors should be one of the last items installed in new construction after final cleanup. To insure the best mirror protection, installation should occur after air conditioning has been turned on in buildings located in hot, humid climates.
- Consult with mirror manufacturers or other suppliers, for recommendations on mastics, silicones (for trim outs), belt lubricants, and other installation materials and tools.

13.6 APPROVED SILICONE

Below are different neutral silicones approved by the Miro Tech quality department for the installation of the mirrors. Any other silicone used by the customer must be tested and approved by the Miro Tech quality team.

- DOWN CORNING 817 NEUTRAL SILICONE
- SILGLAZE N10 NEUTRAL SILICONE.
- V-TECH VT-210 NEUTRAL SILICONE
- WACKER GN NEUTRAL SILICONE
- DOLPHIN MIRROR NEUTRAL SILICONE

13.7 CLEANING RECOMMENDATIONS

The "final touch" on any outstanding mirror installation is proper cleaning. The techniques described here are good practices for you and should also be passed on to your customers so they can maintain the mirror for the life of the job.

- The best and safest cleaner for a mirror is clean, warm water used with a soft cloth. Be careful not to allow the edges of the mirror to get or remain wet over a period of time.
- Do not use any acid or alkali cleaners for mirror cleanup after installation. They can attack the surface and edges as well as the backing of the mirror. And never use an abrasive cleaner on any mirror surface.
- Do not use cleaners with heavy ammonia bases. These too can damage the mirror edges and backing and result in a ruined mirror.
- Remove surface marks or stubborn dirt with 0000 oil-free steel wool, not solvents. These could attack and damage the edges and backing.
- Never spray any cleaner directly on to a mirror. Instead, apply the cleaner to a soft cloth and then wipe the mirror. This will also prevent "puddling" at the mirror edge where the cleaner could attack the backing.
- Always use soft, grit-free cloths when cleaning a mirror to reduce chances of scratching the surface.
- Be sure to dry all joints and edges thoroughly to be certain no commercial cleaner comes in contact with the edge and backing.
- Be sure to let your customers know that routine cleaning maintenance can be accomplished simply and effectively by washing, rinsing and drying the mirror.

~ **NOTE:** Good ventilation will keep mirrors from "sweating" and creating condensing liquids which could be corrosive and damaging to mirrors.

DATA SHEET

MIRO TECH
MIRROR FACTORY & ALL GLASS WORKS

DATE: JANUARY 1, 2019 **PRODUCT: MIRO TECH MIRROR**

QUALITY CERTIFICATE

QUALITY STANDARDS:	CASS test: (Copper Accelerated Acetic Acid Salt Spray)	ISO 9227
	NSS test: (Neutral Salt Spray)	ISO 9227
	CONDENSATION WATER test: (Humidity spray)	ISO 6270
	PAIN THICKNESS (2 layers)	DIN EN ISO 2808
	CROSS CUT (GRID TEST ADHESION PAINTS TEST)	DIN EN ISO 2409
	XYLENE RUB	PA-ENS-26
	SILVER THICKNESS TEST	PA-ENS-15
	High tempreture, high humidity	EN ISO 12543
	Breaking behaviour test and bending test	EN 2881
	Ledership in energy and env.desing. (Suppliers certifications)	LEED 2009
	Quality Management System	ISO 9001
	Environmental Management	ISO 14001
	OHSAS 18001 (Occupational Health and Safety Assessment Series	ISO 18001
	THIRD PARTY FOR STANDARDS AND QUALITY CERTIFICATES:	TUV COMPANY
	valspar Dr.-Ing. Schmitt GmbH	SUPPLIERS
		BUREAU VERITAS

SPECIFICATIONS:

PRODUCTION AND QUALITY CONTROLS DOWN ISO STANDARS
COPPER FREE, SILVER PALLADIUM MIRRORS. (user friendly)
PALLADIUM AND GMP LAYERS
THICKNESS SILVER > 760mg PER SQUARE METER
DOUBLE COAT PAINT (Base red & Top green). Thickness > 45 microns paint protection.
CROSS CUT PAINT TEST (best=0/worst=5). MAX=2
XYLINE TEST: > 120
SPRAY SALT TEST: 480 hours of test - 35ºC (Pass all ISO specifications)
HUMIDITY TEST: 480 hours of test - 40ºC (Pass all ISO specifications)

Authorized signatory:

Miro Tech, mirror factory & all glass works
3rd Industrial City , 21442 Jeddah
King of Saudi Arabia

MIRO TECH
MIRROR FACTORY & ALL GLASS WORKS

MIRO TECH LIMITED WARRANTY

During a period of TEN years from the date of manufacture, Miro Tech mirror factory & all glass works is warranted to its immediate customer only subject to the terms and conditions of this limited Warranty not to contain silvering defects resulting in discoloration, black spots or clouding of the silver film that materially obstructs the mirror image of the vision area.

Miro Tech is not responsible for any warranties that its customer provides to subsequent customers or other end users of the product.

To make a claim under this Limited Warranty, Miro Tech´s customer must (a) notify Miro Tech of any alleged defect promptly in writing at the plant from which the purchase was made and (b) provide Miro Tech an opportunity to Inspect the Product before its removal from any end product or installation/flazing system. If a Product fails to conform to this Limited Warranty, Miro Tech´s liability is limited, at Miro Tech´s exclusive option, to Miro Tech replacing the Product without charge at the original point of delivery or, in the alternative, refunding 100% of the original net selling price to its customer. This Limited Warranty does not cover labor or any other replacement, Installation, or fabrication cost. The warranty period for any replacement Product supplied under this Limited Warranty extends only to the remaining warranty period on the original Product.

CONDITIONS THAT WILL VOID THIS LIMITED WARRANTY.

1. The Product is broken or fractured. Mirror or coating/paint-backing surface.
2. The Product is stored, processed, installed, cleaned, or otherwise handled contrary to Miro Tech advises or industry standards or deteriorating the protections layers.
3. The Product is discarded or destroyed before reasonable opportunity for inspection by Miro Tech.
4. The Product is damaged not due to any fault of Miro Tech, including for example by abnormal weather conditions, faulty installation, building construction or building design, exposure to acids, alkalis, or incompatible cleaning materials such as corrosive or abrasive compounds, or contact with abrasive items.

EXCEPT FOR THE EXPRESS LIMITED WARRANTY DESCRIBED ABOVE, THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF ANY KIND AND THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCTO OR ANY PART OR COMPONENT THEREOF AND NO WARRANTY SHALL BE IMPLIED BY OPERATION OF LAW OR OTHERWISE. IN NO EVENT SHALL MIRO TECH BE LIABLE TO ANY PERSON OR ENTITY FOR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR CHARGES FOR ANY REASON, EVEN IF SUCH DAMAGES OR CHARGES ARE FORESEEABLE, OR MIRO TECH HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR CHARGES.

No variation or change from this Limited Warranty will be binding upon Miro Tech unless made in writing specifically referencing this Limited Warranty and signed by an officer of Miro Tech.

Authorized signatory:

MIRO TECH mirror factory & all glass works
3rd Industrial City, 21442 Jeddah
King of Saudi Arabia

_____

Copper-Free Mirror | Beautifully reflective

Miro Tech factory

Mirror factory & all glass works

Third industrial area
Jeddah 21442
Kingdom of Saudi Arabia
Web: www.mirotechksa.com
mail:info@mirotechksa.com
Phone: +966551505237

Household Cleaners. Adhesives.
These are the enemies of the perfect reflection.
Miro Tech stands up to these
challenges with crystal clear reflectance and uncompromising durability using a patented, copper-free manufacturing process. Mrio Tech Mirror provides unparalleled protection against a range of climates, corrosion, chemicals, moisture and abrasion while