Mirrors –
Perfect Sealing and Bonding

OTTO CHEMIE
Sealants • Adhesives

Preface

‘Mirror, mirror on the wall, who is the fairest of them all...?’

You need an optimal installation and products that are compatible with the mirror material to be able to enjoy a distortion-free view in the mirror every day in the long term.

Everyday mirrors have a flat surface made from an aluminium-coated glass plate. They are mainly used in households. Besides these there are also optical mirrors. These are designed so that the reflecting surface itself is usually applied to the front of the base material. If parallel incoming rays from the entire mirror are to be focussed on one point, a parabolic mirror must be used, as they are in solar thermal power plants for example.

Besides the 'traditional' way of manufacturing mirrors, there is an environmentally-friendly production method that does not require the use of copper sulphate. In addition, only lead-free paints with significantly fewer ammonia salts are used here.

Pre-treating the substrate

The demands on adhesive bonds are subject to the respective external influences. Extreme temperature fluctuations, tensile or shear forces, repeated contact with water etc. make high demands on bonds. By far the most common substrate for bonding a mirror is a natural mineral, such as concrete, plaster, masonry, plasterboard, porous concrete, or untreated wood materials. The first step for sustainably bonding a mirror is therefore always removing contaminants, such as release agents, preservatives, grease, oil, dust, water, and old adhesives/sealants from the bonding surface, as well as other substances that could be detrimental to adhesion. Cleaning non-porous substrates is done with **OTTO Cleaner T** and a clean, lint-free cloth. For porous surfaces, cleaning is done mechanically, with a steel brush or grinding wheel, for example, in order to clean loose particles from the surface.

After cleaning, mineral substrates must usually be pre-treated with **OTTO Primer 1105**. The reason here is not only improving adhesion, but also the essential blocking of the alkalinity. Non-blocked alkalinity can, in combination with moisture, result in damage to the back of the mirror in certain circumstances. Pre-treatment with the primer recommended in the respective technical data sheet canalso be useful for substrates in order to achieve the most resilient bond possible.

The back of the mirror

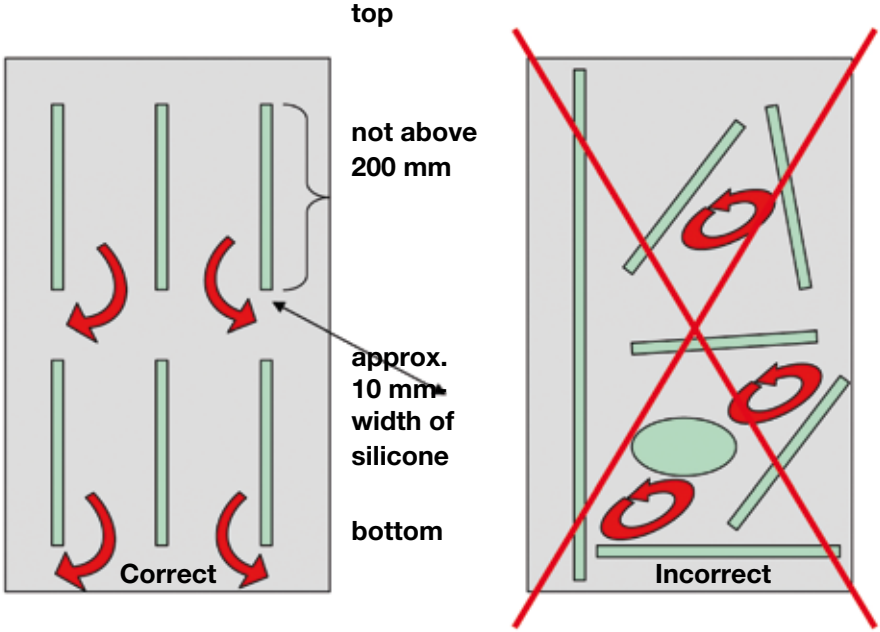
When using **OTTOCOLL® S 16**, **OTTOCOLL® M 570** or **OTTOCOLL® S 610**, it is also possible to produce a bond on **conventional mirror** surfaces without primer.
In bonding Plexiglas mirrors, **OTTOCOLL® S 16** and **OTTOCOLL® S 610** provide very good adhesion without primer on the mirror coating layer. Using **OTTOCOLL® M 570** is not recommended for this.
For mirrors with a protective film, we always recommend carrying out preliminary tests.

OTTOCOLL® HiTack can also be used for bonding mirrors. When bonding mirrors on fibre cement, untreated wood or porous concrete, we recommend using **Primer 1105.**

Installation with OTTOCOLL® S 16 1-component adhesive

When bonding mirrors do not apply the adhesive point-shaped or full-surface, but in vertical stripes (beads) so that the resulting splitting product can escape. The length of a bead should not exceed 200 mm.

3 beads are to be applied per m² in a way, that after pressing on the mirror the width of the bead does not exceed 10 mm and the space between the beads is of at least 200 mm. This will make the necessary air circulation for the vulcanization possible. For an ideal loading capacity an adhesion surface of minimum 10 cm² / kg of the mirror‘s weight is necessary.



In order to avoid the confinement of the splitting product, a minimum space of 1,6 mm between mirror and substrate has to be kept mandatory. This space can be avoided most purposefully by sticking spacers onto the mirror. It does however not overrule the minimum distances for ventilation given by the Institute of Glass Manufacturing in Hadamar (www.glashandwerk.de).

The mechanical strength, necessary for the bonding, will be achieved after approx. 48 hours at the earliest (+23 °C, approx. 50 % RH). Until this point a mechanical fixation is necessary. This can be done with removable mechanical fixations, e.g. blocks of wood, wedges or single sided adhesive tapes used at the front of the mirror or with double sided adhesive tapes applied to the back of the mirror.

Installation with OTTOCOLL® S 610 or OTTOCOLL® M 570 2-component adhesives

The correct arrangement of the adhesive beads and the application of the adhesive corresponds to the information inmirror adhesion with **OTTOCOLL® S 16** (see page 6 above and drawing).

When using two-component material, please also note the following: The maximum ambient temperature of 60 °C must not be exceeded while curing. In order to achieve good adhesion and good mechanical properties air entrapment must be avoided.

Pressure must be applied to the mirror within the pot life of the adhesive.

When bonding Plexiglas® mirrors (only possible with **OTTOCOLL® S 610**) we recommend an adhesion test on the mirror laque layer. To ensure free ventilation of the splitting product a distance between mirror and substrate has to be kept. The mechanical strength necessary to remove the mechanical fixations is reached after 8 hours curing time (23 °C, 50 % RH). Until this point a mechanical fixation is necessary. This can be done with removable mechanical fixations, e.g. blocks of wood, wedges or single sided adhesive tapes used at the front of the mirror or with double sided adhesive tapes applied to the back of the mirror.

Overhead installation and elevated wall heights

When mounting mirrors on ceilings or on walls, whose upper edge is more than 4 m above the floor must be secured additionally mechanically with screws or by placing them in frames.

For the combination with anti-splinter foils and similar, please contact our technical departmen or carry out preliminary tests.

Preconditions for sealing when bonding with OTTOCOLL® S 16

Please note: The mirror must not be sealed before the mirror adhesive has not completely cured and splitting product has not discharged. Curing takes about 7 days. Concerning mirrors without a glass rear only the vertical mirror edges should be sealed, to avoid damaging of the mirror coating by condensation.

Preconditions for sealing when bonding with OTTOCOLL® S 610 or OTTOCOLL® M 570

Please note that the sealing must be effected after has completely cured and the splitting product has escaped. This takes approx. 3 days. An immediate sealing is possible, if one edge of the mirror stays open in order to make the escape of the splitting product possible. On mirrors without a back out of glass only the vertical edges should be sealed to avoid a damage of the mirror coating due to formation of condensation.

Sealing the mirror to the wall

OTTOSEAL® S 120 and **OTTOSEAL® S 121** is recommended for sealing the edges of a mirror adjacent to other materials such as ceramic, metal, glass etc.

If using smoothing agent remove the remaining water streaks on the adjoining surfaces immediately after sealing. If the surfaces are cleaned at a later time, permanent streaks may remain.

Sealing mirrors in connection with natural stone

OTTOSEAL® S 70 is recommended for sealing the edges of a mirror adjacent to marble or natural stone.

Especially with unpolished natural stone surfaces make sure not to spread the sealant beyond the joins, as the sealant is difficult to remove once it enters the pores of the natural stones. To avoid this, the joint is sealed with an adhesive tape that is removed after grouting. For smoothing use **OTTO Marble Silicone Smoothing Agent** (undiluted). Wash / remove excess agent immediately. We do not recommend the use of usual smoothing agents (e.g. dishwashing detergents etc.) because of the high sensibility to staining of some marble and natural stone varieties. For natural stones which are subject to permanent wet conditions (e.g. in bath rooms and showers) we recommend to apply always **OTTO Primer 1216.**

Remark on the processing of the colour „stainless steel“: Please note that when „modelling“ the silicone, i. e. when silicone layers are pushed on top of each other (e.g. in corner areas) dark, clearly visible dividing lines could appear. These dividing lines can not be removed by smoothing the lines afterwards. This effect occurs solely for the colour „stainless steel“ and is caused by a special colour pigment which is necessary to create the metallic effect. It is a typical characteristic of the colour „stainless steel“ and it does not represent a deficiency of the material. In order to avoid such effect, layers of silicone should not be pushed on top of each other when smoothing material.

Matt-finished colours have to be rebated dry, in order to keep the matt-effect on the surface.

Remediating mould

Upon restoring of joints contaminated with mould the existing elastic sealant must be removed completely. Before re-jointing, the affected jointing areas are to be treated with **OTTO Anti-Mildew Spray** to remove possibly existing fungal spores. Otherwise a new mould attack may occur in the joints again, despite the mould protection technology of the sealant. Please observe the Technical Datasheet of **OTTO Anti-Mildew Spray**.

Navigator to the right adhesive

With the new adhesive compass, OTTO provides an excellent orientation aid on its homepage for anyone who, given the diversity of available adhesives on the market, is perplexed by the question of which would be the 'right thing' for the respective adhesive task. In just a few steps, the OTTO adhesive compass takes the professional user safely to their destination: to the product that perfectly matches the materials used and the requirements made.

www.klebstoff-kompass.de

OTTOCOLL® M 550

The hybrid adhesive with high initial adhesion

Characteristics:

- 1-component sealant based on silane-terminated polymers (hybrid)
- Extremely high initital adhesion
- Excellent primerless adhesion on numerous substrates - even when exposed to water
- Very high mechanical strength, resistance to notches, tension and tearing
- For stress-compensating bonding and dynamic stresses
- Low odour
- Free of isocyanates
- Silicone-free
- Good weathering and ageing resistance
- Compatible with coatings according to DIN 52452

Fields of application:

- For application in interior and exterior areas
- Elastic bonding and mounting of various materials such as wood, derived wood products, glass, metals (e. g. aluminium, stainless steel, anodising aluminium, brass, copper), plastics (e. g. unplasticised PVC, plasticised PVC, fibrereinforced plastics etc.), mineral substrates (e. g. brick, tile, ceramic), fireproof building panels (gypsum board etc.)
- For the bodywork and vehicle construction, waggon and container construction, metal construction and apparatus engineering, ship building
- Elastic bonding of mirrors on ceramic, glass, plastic, stainless steel, aluminium, wood, concrete etc.
- Bonding of stone, natural stone and ceramic
- Bonding of window sills, floor strips, decorative strips and stairs

Standards and tests:

- Suitable for applications according to IVD instruction sheet no. 19-1+24+30 (IVD = German industry association sealants)
- French VOC-emission class A+
- Certified according to GOS
- Tested according to UL-94 HB

OTTOCOLL® M 570

The 2-component hybride mounting adhesive

Characteristics:

- The 2-component hybrid-polymer-based (STPU) adhesive
- Fast curing even in thick layers
- Excellent primerless adhesion on numerous substrates - even when exposed to water
- For stress-compensating bonding and dynamic stresses
- High resistance to notches, tension and tearing
- Low odour
- Free of isocyanates
- Silicone-free
- Good weathering and ageing resistance
- Compatible with coatings according to DIN 52452

Fields of application:

- For application in interior and exterior areas
- Elastic bonding and mounting of various materials such as wood, derived wood products, glass, metals (e. g. aluminium, stainless steel, anodising aluminium, brass, copper), plastics (e. g. unplasticised PVC, plasticised PVC, fibrereinforced plastics etc.), mineral substrates (e. g. brick, tile, ceramic), fireproof building panels (gypsum board etc.)
- For the bodywork and vehicle construction, waggon and container construction, metal construction and apparatus engineering, ship building
- Sealing of air condition and ventilation systems
- Bonding of stone, natural stone and ceramic
- Elastic bonding of mirrors on ceramic, glass, plastic, stainless steel, aluminium, wood, concrete etc.

Standards and tests:

- Suitable for applications according to IVD instruction sheet no. 30 (IVD = German industry association sealants)
- French VOC-emission class A+
- Certified according to GOS

OTTOCOLL® S 16 LEED®

The mirror adhesive

Characteristics:

- Neutral-curing 1-component silicone adhesive based on alkoxy
- Adheres on all commercial mirror coatings without any primers
- Does not damage the mirror coating

Fields of application:

- Elastic bonding of mirrors on ceramic, glass, plastic, stainless steel, aluminium, wood, concrete etc.
- Also suitable as adhesive for acrylic glass mirrors (e. g. Plexiglas®)
- Bonding of lacquered and enamelled glass

Standards and tests:

- Testet on coated glass (2-comp. PU Direct Decklack 7-530 made by Selemix System) made by Glas Nagel - status 11/2006
- Tested on Lacobel (varnished glass) - status 10/2010 (The test results are available on request at our technical department)
- The information provided with regards to our adhesion and compatibility tests reflects the status at the time of testing. Changes to the coatings are possible but outside our sphere of influence. With regards to these we advise to contact the producers of glass/coatings concerned.
- Suitable for applications according to IVD instruction sheet no. 30 (IVD = German industry association sealants)
- Suitable for applications according to IVD instruction sheet no. 30 (IVD = German industry association sealants)
- Conform to LEED® IEQ-credits 4.1 (Indoor Environmental Quality) adhesives and sealants
- Fulfills DGNB-characteristics 06 (DGNB e.V. = German Organisation for sustainable building)
- French VOC-emission class A+
- Certified according to GOS

OTTOSEAL® S 70 LEED®

The premium natural stone silicone

PREMIUM

Characteristics:

- Neutral-curing 1-component silicone sealant
- Guarantee - does not cause any migratory staining on natural stone
- High resistance to notches, tension and tearing
- Excellent weathering, ageing and UV-resistance
- Non-corrosive
- Contains fungicides
- Also in “structure” colours with a stonelike surface
- Also available in “matt-finished” colours
- Matt colours are only to be smoothed off dry
- Stress expansion modulus at 100 % (DIN 53 504, S3A): 0,5 N/mm^2

Fields of application:

- Sealing and jointing on marble and all natural stones, e. g. sandstone, quartzite, granite, gneiss, porphyry etc. in interior and exterior areas
- Sealing of expansion joints in wall and façade areas
- Movement-compensating bonding of natural stone on metal, e. g. stairs on a metal construction
- Sealing and jointing of marble / natural stone swimming pools, also underwater joints
- Sealing of lacquered and enamelled glass
- For the external sealing of mirrors in connection with natural stone

Standards and tests:

- Tested according to ISO 16938-1 of SKZ Würzburg (Testing for migratory staining of sealants on natural stone)
- Tested according to ASTM C 1248 by DL Laboratories, New York (Testing for migratory staning of sealants on natural stone)
- “Highly recommendable non-hazardous building product” according to building material list (TOXPROOF) of the TÜV Rheinland, Germany
- Quality seal of the IVD (Industrial association for sealants, registered society), tested by the ift Rosenheim (Institute of window engineering, registered society)
- According to regulation (EG) Nr. 1907/2006 (REACH)
- Suitable for applications according to IVD instruction sheet no. 14+23+25+27+30 (IVD = German industry association sealants)
- Conform to LEED® IEQ-credits 4.1 (Indoor Environmental Quality) adhesives and sealants
- Fulfills DGNB-characteristics 06 (DGNB e.V. = German Organisation for sustainable building)
- French VOC-emission class A+
- Certified according to GOS
- Declaration in “baubook” Austria

OTTOSEAL® S 120

The premium alkoxy silicone

PREMIUM

Characteristics:

- Neutral-curing 1-component silicone sealant based on alkoxy
- Excellent weathering, ageing and UV-resistance
- Excellent early resistance to stress
- Highly abrasion-resistant and non-streaky
- Good compatibility with paints according to DIN 52452 (not paintable)
- Tack-free surface
- Low odour
- Non-corrosive
- Contains fungicides
- Stress expansion modulus at 100 % (DIN 53 504, S3A): 0,4 N/mm²
- Also available in “matt finished” colours

Fields of application:

- Window pane sealing on wooden windows
- Glass, window and metal construction
- Suitable for sealing glazing units made of laminated and tempered glass. Please contact our technical department for further information.
- For the external sealing of mirrors in connection with materials such as ceramic, metal, glass etc.

Standards and tests:

- Tested according to DIN 18545, part 2, resistance group E (ift Rosenheim, Germany)
- According to the requirements of DIN 18540-F
- According to the requirements of ISO 11600 G 25 LM
- Suitable for applications according to IVD instruction sheet no. 7+9+10+13+14+19-1+20+22+24 +25+27+29 (IVD = German industry association sealants)
- “Highly recommendable non-hazardous building product” according to building material list (TOX-PROOF) of the TÜV Rheinland, Germany
- Quality seal of the IVD (Industrial association for sealants, registered society), tested by the ift Rosenheim (Institute of window engineering, registered society)
- According to regulation (EG) Nr. 1907/2006 (REACH)
- French VOC-emission class A+
- Certified according to GOS
- Declaration in “baubook” Austria

OTTOCOLL® S 610

The 2-component special silicone sealant

Characteristics:

- Neutral, condensation-curing 2-component silicone adhesive and sealant based on alcoxy
- Excellent weathering, ageing and UV-resistance
- High resistance to notches, tension and tearing
- Excellent adhesion on many substrates, partly in combination with primer
- Non-corrosive
- High expansion-tension value guarantees high stability bonding
- Reduced cycle times - due to the fast curing bonded parts can be further processed extremely soon
- Fast curing even in thick layers
- Low odour

Fields of application:

- Elastic bonding and sealing of various materials, e.g. glass, wood, metal and plastics
- Sealing of floor joints subject to high mechanical stress, e.g. in storage and production halls, yard areas, parking decks, underground car parks, workshops, car washes etc.
- Elastic bonding of mirrors on ceramic, glass, plastic, stainless steel, aluminium, wood, concrete etc.
- Also suitable as adhesive for acrylic glass mirrors (e.g. Plexiglas®)
- Not suitable for the structural bonding of structural glazing units

Standards and tests:

- Suitable for applications according to IVD instruction sheet no. 30 (IVD = German industry association sealants)
- French VOC-emission class A+
- Certified according to GOS

OTTOCORD PE-B2 back up foam rod

Characteristics:
Extruded back-filling poly-urethane (PE) material. For interior and exterior applications. With closed cells according to DIN 18540. Water repellent. Colour: anthracite. Coresponds to building material class B2 (normal flammability).

Fields of application: For pre-filling and pre-plugging interior and exterior joints. For tenders in comliance with DIN 18540.

OTTO Cleaner

Characteristics:
Very good cleansing and degreasing effect. No airing necessary. Dries fast and free of residue.

Fields of application:
Cleaning glass, metals and some plastics, such as PVC and polyester.

OTTO Primer

Characteristics:
Primer specially made to be used with OTTO sealants.

Fields of application:
Improving the adhesive properties of OTTO silicone sealants to the relevant substructures.

OTTO Fugenboy

Smoothing tool made of superior plastics for professional joint design. Set of three, small: 5 mm, 8 mm, round. Set of three, big: 11 mm, 14 mm and 17 mm.

OTTO Smoothing agent

Characteristics:
Aquaeous solution of surface-active substances
Gentle on the skin due to dermatologically tested active ingredients
Does not dry out the skin
Dilutable with water; 2 (smoothing agent) : 1 (water)
Keeps the shine of the sealant surface intact
Colouring pigments of the sealant are not washed off
Not suitable for marble and other natural stones

Fields of application:
Smoothing of sealant surfaces including silicone, polyurethane and MS hybrid polymer sealants

Note:
For marble and other natural stones, please use the OTTO marble-silicone-smoothing agent

Hand-operated Gun H37

Heavy duty hand-operated gun made of highly impact-resistant plastic, very lightweight. With closer for sliding sleeve, smooth driving rod and sliding sleeve for 290/300/310 ml cartridges. Automatic pressure relief.

Hand-operated Gun H 400 (COX)

Hand-operated gun, aluminium cylinders. For foil bags up to 400 ml. For 290/300/310 ml cartridges. Ladderhook available separately. No spare part service.

Compressed Air Gun P 400 Air3 (COX)

Compressed air gun with ergonomically designed gun handle. Aluminium cylinder for foil bags up to 400 ml. Not suitable for cartridges.

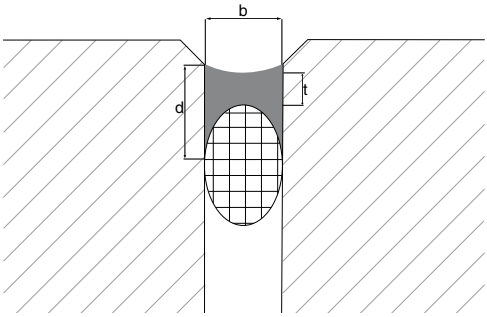
Compressed Air Gun P 620 Air3 (COX)

Compressed air gun with ergonomically designed gun handle. Aluminium cylinder for foil bags up to 620 ml. Not suitable for cartridges.

General valid joint dimension

Joint width b in ration of joint depth t [mm]					
b	10-15	15-20	20-25	25-30	30-35
t	8±2	10±2	12±2	15±3	15±3

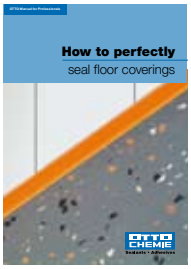
Source: Industrieverband Dichtstoffe e.V. / HS PR. Additional information to the IVD's information leaflets under www.ivd-ev.de



The rule of thumb for calculating the joint dimension is as follows:

Sealant depth (t) = 0,5 x joint width (b).

The thickness of the sealant (d) equals 2/3 of the joint width (b).



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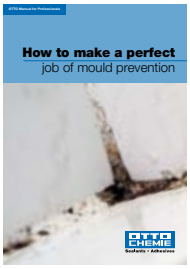

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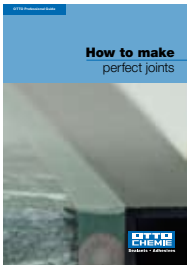

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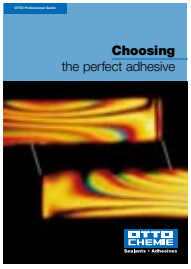

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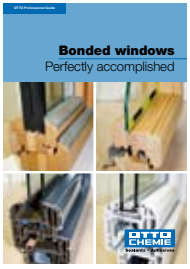

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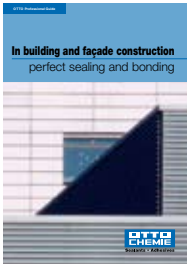

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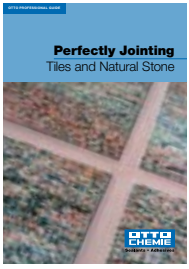

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Part n° 9999596

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Your specialised dealer:

In order to ensure a quick and correct handling of your orders we would like to ask you to send them by fax or e-mail. Thank you in advance for your cooperation.

Notes:
The information in the present document corresponds to the status quo on going to print, refer to the index.
Due to the many possible influences during and after application, the customer always has to carry out trials first. Please observe the respective technical data sheet! This information is available on the Internet at www.otto-chemie.com. Errors and typographical errors are excepted.

For further information please contact:

Sealants • Adhesives

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