Installation Guide
and **technical** information

CORSTONE
by Weiku

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1. Transport and **storage**

CORSTONE must be transported and handled with care as the product it is made up of glass boards. During the transport, temporary storage, long-period storage and construction site storage, must have care to ensure that the support base CORSTONE is always on one floor perfectly flat and that the boards don't are exposed to risk of being scratched or broken.

Storage must be done in a temperature between 10 C° and 35 C° and a relative humidity of less than 80%.

The material must be stored in a place protected from the sun and adverse weather conditions

CORSTONE can be packed individually or in a box with an internal easel. Each box can contain up to 24 product boards in 150x300cm format.

To move the packages, especially the boxes, the base must not be moved of the box by pushing or dragging it. In other words, using forklift forks to push the base of the box or to drag is not allowed, as it can compromise the internal easel and end up damaging the CORSTONE boards.

For loading and unloading of CORSTONE packaging boxes with maximum load, you must a forklift with a load capacity of at least 3,000 kg, or a truck with munck equipment with a load capacity of at least 3,000 kg, must be used. This way, it will be possible to safely lift and move the CORSTONE boxes.

CORSTONE wooden packaging must be used only for transport and never for long-period storage. ***It is not recommended to leave the product packaged for a period longer than 3 months.***

The purpose of individual boxes and packages of the CORSTONE is to protect the products during transport and also in handling from the factory until delivery to the client.

Storage for a period longer than as indicated, it can cause the boards to become slightly warped and stains may occur due to accumulation of moisture on the surface of the boards by a very long period.

In case of warping of the boards, before their use the boards must be placed on a horizontal surface until they return to their flat origin. Warping of boards can cause problems in the subsequent processing.

The boards must also have separators between them to prevent moisture build-up during this storage. The boards with any traces of condensation due to temperature variations during transport or storage should be dried or used as quickly as possible. Should not stay moist for a long time.

In cases of short-term storage (1 or 2 days), CORSTONE boards can be supported on a flat base with some protection made of wood or rubber and leaning against a wall also with a flat surface, protecting the edges with wood or rubber.

The ideal storage of CORSTONE for a longer period should be on easels with an angle 6° of the base in relation to the backrest and the backrest must have several crossbars for ensure the full support of the boards.

CORSTONE plates must be moved with adequate equipment (electric glass vacuum cups for large parts, triple manual suction cups, extenders with suction cups for moving large formats, etc.).

All equipment must comply with current laws and regulations and be approved by the competent authorities.

In cases of boards hoisting, whether by electric glass vacuum cups or extenders with cups, the equipment must be correctly centered on the surface of the board and checked if the suction of the suction cups is correct as indicated by the equipment. The board must first be hoisted and only later, after being hoisted, can it be moved. Avoid any risk due to contact between the surface of a board and the surface of another board.

We suggest the equipment produced and marketed by the following manufacturers:

- *www.raimondispa.com*
- *www.italotec.com.br/ventosas/*
- *www.cortag.com.br/br/inicio/1215-sistema-de-movimentacao-infinity-.html*
- *www.cortag.com.br/br/inicio/1213-sistema-de-transporte-infinity-.html*

2. **Quality** assessment

Considering the characteristics of CORSTONE, the descriptions of the standards ABNT NBR 14696: 2015 – Silver mirrors and EN 1036-1 should be taken as an evaluation parameter: 2007 – Glass in construction - Silver coated float glass mirrors for indoor use.

Visual Quality Inspection Methods

CORSTONE must be inspected in an upright position, with the naked eye and in natural light or Diffuse artificial light that simulates natural light, being at a distance of 1 meter from the plate and the observation must be perpendicular to the piece. Cannot be used for source inspection of additional light, such as a reflector, as this can distort the quality assessment..

The customer or installer must clean a surface cleaning if necessary and visually inspect the CORSTONE boards before carrying out any work or handling. Defects found must be reported prior to processing. After processing or handling, CORSTONE will not accept any claims for parts or installation of same.

Dimensional Quality Inspection Methods

For boards with sizes (width and/or height) less than or equal to 2000 mm, the standard finished size tolerance is +/- 2 mm. For boards with sizes (width X height) above 2000mm, the finished size tolerance is +/- 3mm.

The orthogonality tolerance is expressed as the difference in length between the diagonals of the boards. For boards where both dimensions are less than or equal to 2000 mm, the difference should not exceed 4 mm. For cards where one (or both) dimensions are more than 2000mm, the difference should not exceed 5mm.

3. Handling at the place of **placement**

Corstone can be processed on job site. Watch the videos available on our website: www.corstone.info

After cutting or drilling the CORSTONE, as required by the design or installation, if it is necessary to cut or polish the edges that have benefited.

Cutting corners reduces the risk of injury to people handling the pieces and, above all, eliminates any microcracks that may form during the process cutting and drilling.

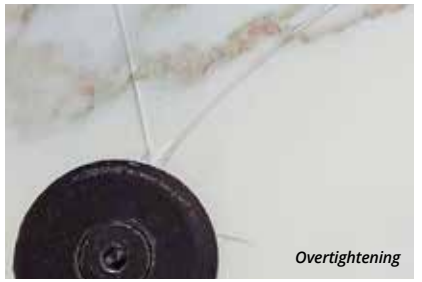
After installation or placement of parts, micro-cracks may gradually spread if not completely removed during installation.

The main causes of cracks or breaks originated by microcracks:

Excessive pressure applied when tighten support screws or accessories such as faucets, toilets and wall, electrical sockets, electronics, etc.

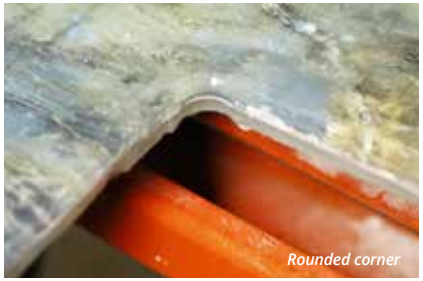
Structural movements of substrates caused by:

- Dilation of substrates due to variations in humidity and temperature of the environment;
- Continuous vibrations due to proximity to infrastructures with contact with heavy traffic;
- Use of sanitary ware from wall, shelves, hangers, lamps and, in general, any elements of furniture that is fixed to the wall by through unstable anchoring systems. (see section related to);
- Normal settlements and / or natural phenomena.



Overtightening

Unrounded corner



Rounded corner

In CORSTONE it is not recommended to do cutouts, slits or notches with "live" corners on the boards. The corners must be always rounded. It is recommended a minimum radius of 5 mm).

4. Cutouts and **notches**

To make cutouts, notches or slits somewhere on the CORSTONE board, first holes must be drilled with a diamond drill specific for GLASS, these holes must be made where the corners of cutouts, notches or crevices.

Only after the holes are made, use a "marble" saw with a disk specific plain diamond for cutting GLASS, to make a cut from a hole to the another, "connecting them".

If the cutout or crack is too much near the edge of the board, the risk of breaking or cracking the part is very high, as CORSTONE is a material extremely hard and with this it can contain tensions in its extension, for this reason it can end up breaking when cutouts or cracks are too near the edge. It is possible to drill holes, cutouts or slots in already installed boards. It is important that, after all the holes and cuts have been completed, the lapping/polishing of edges resulting from holes and cuts.

On CORSTONE boards that need to be benefited with 45° edges, it is recommended to cut one of the pre-existing 90° edges, transforming it into 45°. after, just cut the board on the opposite side (with a 90° cut) so that the board is the same size desired, with one edge at 45°.

General observations:

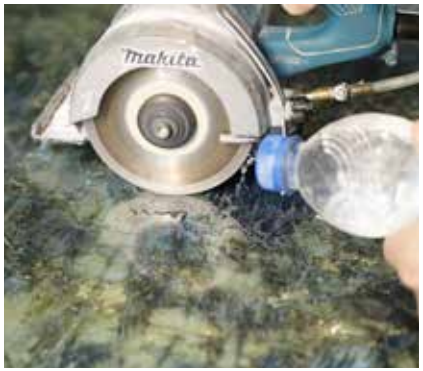
- All handling equipment, work benches, conveyor belts, etc. that may come into contact with CORSTONE must be kept clean or all the time;
- Before handling, check if the suction cups on the equipment are correctly adhering to the surface of the board;
- Prevent damage to the boards using specific protective items at the contact points;
- In cases where the boards are cut using molds, make sure they are clean without any traces of abrasive dirt;
- Always preserve the safety of everyone involved in installation operations;
- Technicians must have the ideal personal protection equipment to do the work;
- Everyone involved with installation / placement, must have received adequate training to be able to perform the job;
- Avoid the presence of unauthorized people in the areas for maneuvering and machining/ cutting the boards.

For custom cuts with more detailed designs or formats, the use of water jet cutting machine. The skill and experience of the installer is decisive conditions for a well-executed installation.

5. Cut **with saws**

CORSTONE can be cut with the circular saws, (that can work with disk cooling), marble saws available on the market and normally used in civil construction works for cuts of ceramics, marbles etc.

Cutting tutorial video:
https://abre.ai/cYMf



To cut CORSTONE, you need to:

- Special smooth diamond discs for cutting glass (without circumference interruptions);
- Recommended sharpening stones for these discs in order to keep the cutting disc always sharp;
- Make sure that the saw to be used is equipped with a disc cooling system and in perfect working order;
- The machine must be in good condition, stable and free from vibrations during cutting operations;
- For efficient cutting, cutting the first layer should be in a forward direction,and then cut the second layer in the reverse advance direction where the rotation of the cut meet the piece from bottom to top (check the video in qr code above);
- Cutting feed speed should be between 250-500mm/minute.

Cutting feed rate:

- Feed speed must be kept uniform throughout the cut;
- The advance speed must be slower as the board thickness increases;
- If the cut is at 45°, the feed speed must be reduced by 50% of the indicated speed;
- Always at the beginning and end of the cut (about 100mm), the feed speed should be 50% of the indicated speed;
- The condition or wear of the cut-off discs to be used to cut the CORSTONE board must also be considered in the feed rate. The data reported from feed are based on cutting discs with service life above 80%;
- Observe the conditions of the machine to be used and its limitations.

6. Using drills in **Corstone**

To drill the CORSTONE, equipment such as drills can be used benches (industrial or mobile), drills electric drills and battery drills, together with specific drills for glass drilling.

For a perfect drilling it is indicated that drilling is done in two steps. In the first step, the hole must be started on the face of the image and the perforation should proceed until through the polymer layer. After this process must turn the piece and, as a second step, finish the drilling started.

In this way, any splintering of the piece during drilling is avoided. After drilling must to be carried out the thinning of the edges of the hole with the spinning top or reel.

For the drilling process to be successful, some points are important and should be reviewed before start:

• During the entire drilling process it is it is necessary to cool the drill and the reamer with water;

• Workbench or place to support the piece it must be as aligned as possible;

• The workbench or place of support of the piece must be extremely clean so that the piece is not damaged with impurities that may be in the place during moving and drilling;

• After the part is pierced, it must have be very careful when moving the piece, because sudden movements or twists in the piece can cause cracks to occur from of the hole.

CORSTONE can also be drilled directly in just one step, but there is a risk that the hole will not come out perfectly and without chips. In addition to being necessary extra care is taken with regard to the force being applied to the drilling equipment when finishing the hole, because when the drill goes through the piece, you can hit the equipment against it and break the piece.

Drilling electric machine

Drilling battery machine

Drilling bench with suckers

Drill bench

Threaded drills for Drill bench

Drill BILCO electric or battery

Whipping-top reamer

Reel reamer

7. **Edge** cutting and polishing

CORSTONE is supplied in standard sizes or bespoke sizes and in different thicknesses. The factory default finish is with polished edges (image 1).

Other edge finishes as well can be ordered directly from the factory, as a 45° finish on the underside (image 2) or a "BISOTÊ" finish on the upper face (Image 3).

In cases of parts that are benefited after leaving the factory, it must be done at least the breaking of the corners formed in the cut (in cases of perfect cuts, without chips) with sandpaper diamonds and matte edge cutting for that any microcracks be removed with this process. Cutting can be done with different equipment, but the most common is wet polishing with diamond sandpaper (image 4).

For cuts that require a high degree of precision, it is necessary to use equipment that have linear guides, avoiding any blockage of the piece in the lapping process (image 5).

The cutting process can also be made using industrial equipment for cutting glass edges (lapidaryer or beveling machine). In this case it is necessary that the operator of the machine in question makes the adjustment according to the thickness of the piece of CORSTONE and the amount of material that it will be ground in lapping or polishing. The feed rate and the amount of material that can be removed must be adjusted according to the conditions and capacities of each machine. The best thing is to pass a test piece before make the work on the final piece.

Polished edges look aesthetically better and also make the parts more resistant to cracking at the edges of the parts.

For cutting or polishing edges it is necessary to use a lot water to constantly cool the glass and offset the friction caused by sandpaper or diamond stones.

IMAGE 1

IMAGE 2

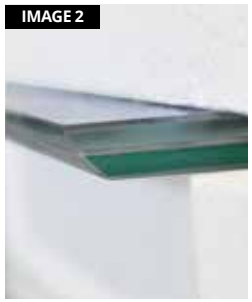


IMAGE 3

IMAGE 4

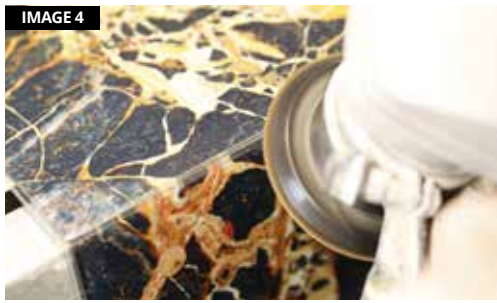
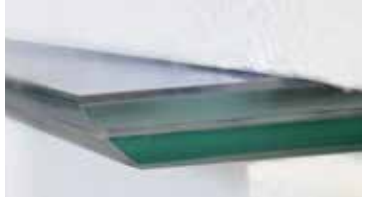


IMAGE 5

8. **45°** corners



The 45° finished corner is achieved by 45° roughing the edge of the CORSTONE, reaching or passing the polymer layer.

As the image is part of the polymers that are inside the CORSTONE board, between the two layers of glass, it will happen in cases where the thinning goes beyond the polymer layer, the fact that the meeting points of the plates end with millimeters of glass without the image. And for this reason, after gluing the pieces, if no putty with dyes is used, the junction of the pieces will be completely transparent.

This feature becomes more visible the greater the thickness of the CORSTONE board. The thickness between the face of the board and the polymer layer may vary depending on the chosen thickness of CORSTONE (4, 6, 8 and 10mm).

For junction / gluing the pieces at 45°, the following adhesives can be used:

- MS Ultra Clear Colorless Adhesive – Würth;
- "Tenax" brand adhesives, colorless and can also be colored with universal coloring paste;
- UV glue for glass.

For the use of products from other marks or models of adhesives, consult CORSTONE's commercial and technical area.

Cleaning before **installation**

Before installation, the piece of CORSTONE to be installed must have a clean surface to receive the adhesive/grout to ensure maximum adhesion to it. If necessary, clean using clean water with a small amount of neutral detergent.

Avoid any acidic and/or abrasive detergents (in particular those containing hydrofluoric acid.

In the case of automated cleaning, to avoid any damage to the glass surface, it is necessary to regularly check the hardness and cleanliness level of brushes, washing equipment and the water used for washing. If calcareous residues are visible on the surface of the CORSTONE, remove them before installation.

Before finalizing the cleaning, make sure that any residues that have scratched a surface of the glass during handling or drying, such as grains of sand, glass fragments, rust particles, have been removed.

In case of cleaning using water, the CORSTONE board must be dried immediately after cleaning.

9. Installation on **walls and floors**

Installing Corstone cladding can be compared to installing ceramic boards. For this reason, the planning and placement of the pieces must be done in accordance with the national regulation for the installation of ceramic materials, in this case the Brazilian regulation for wall coverings is NBR ABNT 13.754 and for floors is ABNT NBR 13753. These standards provide the necessary indications to ensure quality and correct installation performance.

Requirements for a good and correct installation

Substrates (pieces and installation places): Before placing / installing, check that if the substrates are clean, free of any loose parts, sufficiently dry and seasoned, flat and at the right height, and have an adequate level of mechanical strength.

Materials: Check that all materials used during installation (pieces, levelers, silicones, adhesives, sealants, etc.) are suitable for the intended use and are available perform the work.

Installation with a double layer of mortar: For the installation of Opaque CORSTONE boards on floors (floor) and walls, the adhesive must be applied both on the surface that will receive the coating and on the back of the CORSTONE. The adhesive should be applied to surfaces so that it covers them completely, leaving no gaps. For this reason, we recommend applying the adhesive with an 8x8 mm notched trowel on the two surfaces.

An important factor to be observed is the direction/orientation of the grooves made with the trowel, which must be in opposite directions between the CORSTONE surface and the surface that will receive the piece. In this way, the best coverage of the surfaces is guaranteed and it is guaranteed that no part remains with gaps (hollow or empty space) between the CORSTONE and the surface where it is applied, thus increasing the resistance against impacts.

10. Choosing the **right grout**

	SUBSTRATES	ARGALASTIC CERAMFIX	SUPER FORMATOS CERAMFIX	DUO TECH CERAMFIX
WALLS	Plaster	X	X	Building height up to 3m
	Machined concrete	X	X	
	Precast concrete	X	X	
	Existing substrates consisting of mosaic stone tiles (overlay)	With Primer P4 Ardex*	X	
	Waterproof substrates	With Primer P4 Ardex*	X	
	Cement and fiber cement panels	X		
	Light panels	X		
	Wood or metal surfaces	On request*		
	Furniture accessories	On request*		
FLOORS	Subfloor	X	X	X
	Separate, hardened subfloor or cement-based floating	X		
	Sanded anhydrite subfloor	With Primer P4 Ardex*	With Primer P4 Ardex*	
	Existing substrates consisting of ceramic, mosaic or stone	With Primer P4 Ardex*	With Primer P4 Ardex*	
	Wooden or metallic surface	On request*		
	WET ROOMS / COVERED POOL AREAS			
	Waterproof substrates	On request*		

** For use on floors, check coating manufacturer's guidelines*

For correct adhesion, substrates must always be clean and free from grease, oil, contaminants and dust.

11. Installation with **double-sided tape** and **structural silicone**

Installation with double-sided tape and silicone is only suitable for walls, it should not be done for floors. This type of installation is cleaner and faster and may be necessary in some cases.

For this type of installation of Opaque CORSTONE boards on walls, the double-sided tape and structural silicone must be applied only on the back surface of the CORSTONE. For greater efficiency of double-sided tape application and silicone should be applied as follows:

Double-sided tape: The double-sided tape indicated is 3M™ VHB™ (tapes used in installation of glazing facades) with a minimum of 2mm and a maximum thickness of 3mm, place 15cm strips in the vertical direction of application of the piece to be installed, also with 15cm spacing between the strips, both vertically and horizontally.

Structural Silicon: the structural silicone must be applied in the vertical direction of application of the part to be installed, the length of the silicone cord must be made along the entire length of the piece, always between the double-sided tape strips.

The double-sided tape performs two functions in this process, the first is the pre-gluing until the silicone is fully seasoning (between 72h and 168h) and the second is to make the minimum necessary distance between the CORSTONE and the surface where it will be applied. This clearance is necessary so that the structural silicone has enough mass to have maximum strength.

In installation with double-sided tape and silicone we have the advantage of quick and clean installation, but on the other hand we will have "hollow or empty space" areas behind the piece and with this the piece can become less resistant to impacts in these areas.

12. Installation on **roofs** or as a **ceiling covering**

For glass roofing or ceiling cladding, there is no ABNT technical standard that specifically addresses these applications. However, these applications are mentioned in the regulation NBR 7199 - Glass in civil construction - Design, execution and applications. According to 7199, roofs are classified as special installations. For all these cases this standard determines the use of laminated safety glass, this includes its variations.

As there is still no specific technical regulation for coverage ceiling coating, we must follow what the NBR determines 7199 of glazing, with regard to use on roofs/covers.

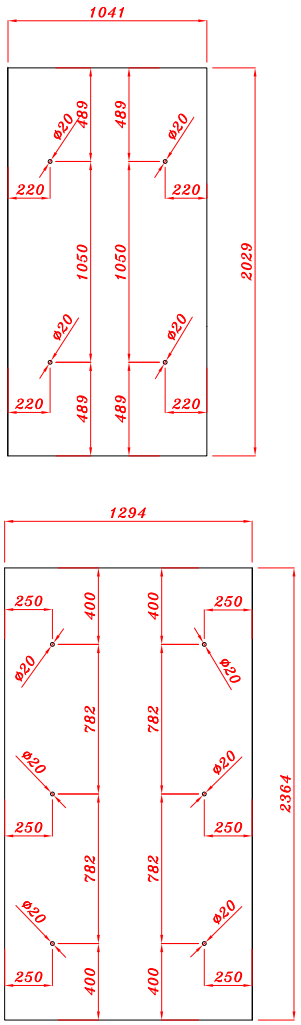
Following the terms of the regulation, we already have some basic principles, but not, specifically for covers and ceiling cladding. Therefore, the installation and fabrication work of the structures must be done based on experience in installations like this.

CORSTONE is in essence a laminated safety glass and therefore, can be used on roofs, roofing and ceiling coverings.

In cover/roof installations with aluminum or carbon steel structures with anti-rust treatment under the CORSTONE pieces, properly planned for this purpose, CORSTONE pieces can be fixed with double-sided tapes and structural silicone (analyze the resistance of these materials against actions of time).

In installations where a ceiling covering will be made, or that is, the structure will be above the CORSTONE pieces, the fixing of the pieces must be done mechanically. This type of installation can be done in two ways:

- Support on all sides, small pieces only. Pieces with maximum size up to 1200 X 1200 mm, support the four sides of at least 1.5 times the thickness of the CORSTONE being used.
- Fixing by screws, pieces of all sizes. Must be installed a structure with threaded supports that later will receive the screws that will support the CORSTONE pieces. The parts must be drilled with glass drills with a diameter of 15 to 20mm. These holes cannot be more than 500mm from the edges and cannot be more than 1000mm apart, with a tolerance of 50mm or more (see example in the drawing below). To support the pieces, special stainless steel ferrule must be used, with recess for stainless steel Allen screws and a sealing ferrule, designed to support and protect the piece against contact with metal items.



Distribution example of holes in parts

This installation model is also suitable for covering backlit ceilings. The lighting will then be installed between the structure where the supports are and the CORSTONE piece (details about backlighting will be clarified later).

IMPORTANT: structures for covers, roofs and ceiling coverings must have the correct dimensioning, and must be strong and resistant to support the weight of the parts to be installed.

13. **Expansion** joints

When the surface on which CORSTONE is placed undergoes relevant amounts of vibration, movements due to moisture, movement of installation bases, heaters installed below or behind the surface, etc., elastic expansion joints must be provided to compensate for the expansion /contraction of the underlying surface. Even when installing CORSTONE next to materials with different coefficients of thermal expansion (steel, brass, aluminum, etc.), adequate expansion joints must be provided.

Check that all expansion joints, which are intended to absorb any movement/vibration of the wall, have been properly planned and organized. For installation of CORSTONE, a minimum expansion joint of 2mm is recommended.

The expansion joint may be larger, depending on the analysis of the factors below:
1. Mechanical characteristics of the surface (substrate) – expansion, contraction, vibration, etc.;
2. Atmospheric/climatic conditions, sudden changes in temperature, for example, of the area where the coatings will be installed.

These joints are generally sealed with a colorless or colored neutral silicone, especially on walls. For floors, other types of grouts found on the market can also be used, such as cementitious, acrylic and epoxy types.

CORSTONE cladding cannot be installed without joints. All plastic spacers must be removed before grouting.
To ensure that large format clad walls are perfectly flat and to facilitate alignment of the joints, we recommend the use of a 2mm floor spacer and leveler.

Sealing the joints

Before sealing the joints, make sure they are perfectly clean. Be aware that any residue will be visible once the CORSTONE has been placed.

Be sure to remove the following residues:
1. Grout residues used for placing CORSTONE;
2. Any other residue from operations coming from the construction site that may have fallen into the joints (for example: wood residues, steel residues that may oxidize over time and lead to iridescence, etc.).

The grouting operations must be done within a limited period of time from the placement of CORSTONE. The exact amount of time before which the grout must be done depends on the placement materials used and the environment of the construction site. In other words, we advise, on the one hand, to comply with the time required for the adhesive to harden as indicated by the grout manufacturer (in most cases will be at least 48 h) or by the structural silicone manufacturer, on the other hand, perform the cementing operations within 5 days of CORSTONE placement is usually the ideal time period. In applications such as roofs and roof coverings, it is not necessary wait for this period, as they are mostly applications with mechanical fixation and do not depend on the curing of other materials.
In the case of CORSTONE used as a floor, consider that any residue from operations carried out at the construction site will fall onto the floor and may penetrate between the pieces (where the Corstone is not yet grouted). These residues must be immediately and carefully removed after coming into contact with the edges and surfaces of the pieces as some types of residues may contain compositions that can attack the CORSTONE, and also make quality grouting difficult.

The above considerations highlight the importance of grouting CORSTONE, especially when placed on the floor.
It is suggested to apply acrylic or epoxy grouting, because if it is more elastic and smoot, the finish is better. We suggest, for example, grouts from Ceramfix (www.ceramfix.com.br/tag/rejuntamentos/). Before grouting, try the grout material on a limited surface area to verify the combination of grout and CORSTONE coating.
Another practical alternative that allows for a great finish is silicone, which must be NEUTRAL so as not to damage the CORSTONE coating. We suggest Dow Corning 791 silicone (www.dow.com/pt-br/pdp.dowsil-791-weatherproofing-sealant.04082594h.html) and Würth MS Polymer 40 (www.wurth.com.br/produto/ ms-polymer-40-grey-230ml-400g--cartridge/).

14. Exposure to **heat**

In places that the CORSTONE boards are exposed to heat, it is always suggested, when planning the installation of CORSTONE, to keep in mind its composition: polymers and glasses. We advise not to let a heat source directly affect the surface of the Corstone.

Glass is considered to be a poor thermal conductor. When processing CORSTONE, or once CORSTONE has been installed, it is important to know this and avoid any significant thermal shock. In the improvement of Corstone (cutting, holes, polishing edges, removal of surface scratches, etc.) the use of tools that were not properly cooled during the process (using sufficient water) can cause thermal shock which, in turn, can cause parts to crack.

Thermal shock occurs after glass expansion, due to a significant variation in temperature. When two different areas on the same glass surface reach different temperatures, the heated area tends to expand, while the area that remains cold, it does not happen. The surface expansion area is resisted by the unexpanded area. Such resistance leads to stresses that can result in thermal shock induced glass breakage. Thermal shock can occur on a glass surface even after relatively small changes in temperature, especially when defects (such as micro cracks) from mishandling are present on the glass surface.

Heat sources

1. High degree of solar radiation: Relevant changes in temperature tend to occur in glass by a high degree of energy absorption, especially dark colored products. For this type of glass, the probability of thermal shock-induced breakage is greater, and we suggest remembering this when planning the installation.

2. External sources: such as flames, radiators and convection heaters can radiate the glass with heat, increasing the likelihood of thermal shock. This occurs especially when heat directly hits the glass surface.

Undesired consequences of heat

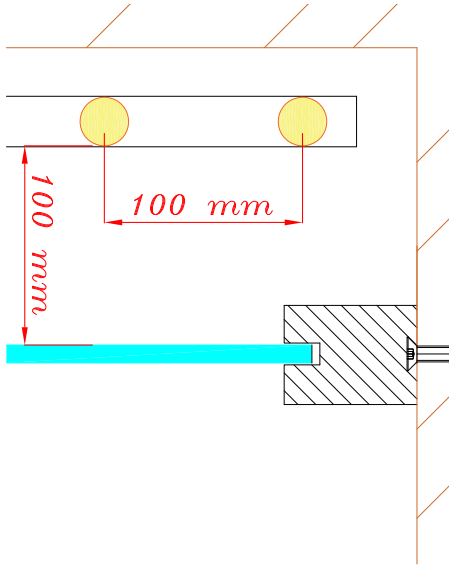
Some materials (stainless steel, aluminum or brass profiles, etc.) often installed together with CORSTONE have a higher coefficient of linear thermal expansion than glass. This means that when installing CORSTONE close to heat sources (this can be the case in kitchens, elevators, hot areas inside bathrooms, etc.), it is necessary to take the heat factor into account. To avoid breaks due to thermal variations, it is necessary to provide expansion joints that compensate for the thermal expansion that materials may have.

In order to further reduce the risk of breaks induced by the expansion or shrinkage of CORSTONE, it is suggested to use flexible grout, such as Argalastic from Ceramfix, or structural silicone for installation.

15. Installation of the **backlit** Corstone

The CORSTONE product collection is also made up of translucent products, which were specially developed to receive the backlight without losing the product's original look.

In installations with backlighting, some care must be taken with the installation of lighting brackets, power supply wires for the luminaires, in addition to the brackets for CORSTONE pieces, as these items may present, if placed in incorrect locations or positions, interferences with lighting will be visible through shadows on the outside of the installation. Not least, if something has been written on the back of the pieces (this may be the case of writings for the purpose of identifying the parts during installation) or the factory identification stickers themselves, remember to erase or remove before installing the translucent pieces.



Example of luminaire distancing

The translucent products are designed to be illuminated with white light (6,000 to 6,500K). Other lighting color temperatures can be used, but these can mischaracterize the installed product.

Types of luminaires that can be used:

• **Tube Led Lamps 6.500K:** with measures generally 600mm, 1200mm and 2400mm can be interspersed to make all the coverage of the area to be illuminated;

• **Imbed luminaires, model Antera SL 6,000K, Intral brand:** which increase the opening angle of the light beam, which helps to reduce the distance to the part to be illuminated - Normally for use in backlighting, the luminaire is disassembled and only the back is used with the Led bars;

• **Led tapes:** usually found in commerce in meters or rolls with 5m - In this case, they must be made as splices until reaching the ideal coverage of the area to be illuminated.

The light source (lighting) must have the same distance between the center of one source and the center of another as it has to the piece that will be illuminated. In this way, we will always have uniform lighting throughout the entire dimension of the piece. The lighting intensity may vary depending on the distance and number of luminaires used in the installation.

Points to note before installation

• **Lighting maintenance:** as we are talking about lighting, these have some useful life that is usually quite long, but unforeseen events may occur, requiring the replacement of some of them. With this, it is necessary that in all the project, a study must be done on how access to the luminaires will be made in case of need. For example: it can be defined that for maintenance it is necessary to remove the installed part or make a "drawer" system so that the lighting can be removed from the sides when there is space, etc., but this analysis is extremely important before the project execution.

• **Air Circulation:** the lighting will generate heat and for a longer lighting life it is important that in cases of lighting enclosure, a system is designed of circulation and exchange of air. This system can be done through forced ventilation ducts or not, it will depend on the need for each application. Lightings normally work well at temperatures between 5° and 40°C, the peak of service life is usually calculated with an average temperature of 25°C.

The above points should always be the first items to consider when designing a backlit CORSTONE installation. The issue of air circulation is not an item considered vital when the lighting is not fully enclosed and there are heat sinks.

Installations with backlit products, on walls, ceilings or floors do not have regulated instructions and standards. The installation and fabrication work of the fastening structures must be done based on experience in installations of this nature and according to the need or feasibility of each project, as the conditions (space, structure, access) are different in each work.

Vertical installation (walls)

Needed material:

- LED tube lamps or 6500K LED boards and material for electrical installation;
- Cooler/Fan for forced ventilation (if there is no natural air circulation);
- Aluminum U-profiles for glass installation, used for 10mm tempered glass;
- Reinforcement/support of clear acrylic for fixation (depends on the size of the piece);
- Neutral clear silicone;
- Neutral silicone for grouting and finishing parts;
- Floor leveler with base – 2mm thick.

Installation step by step

1. Do electrical installation with distributed LED tube lamps with an average distance of 15cm between their centers (if you want more intense light, bring the lamps closer and the distance between them and the Corstone board). The ventilation/ air circulation system must also be installed in this step.

2. Install the aluminum U-profiles so that the part of CORSTONE has the same distance as defined between the centers of the lamps, in this case 15cm.

3. Install acrylic brackets at the junction areas of Corstone pieces, in cases of installations where pieces only correct at two points. They are the ones who will reinforce and go structure the pieces.

4. Place the CORSTONE pieces on the profiles with the help of suction cups if necessary. At this point, it is appropriate to test the lamps on to verify that the distance between them does not cause shadows, impairing the translucent appearance.

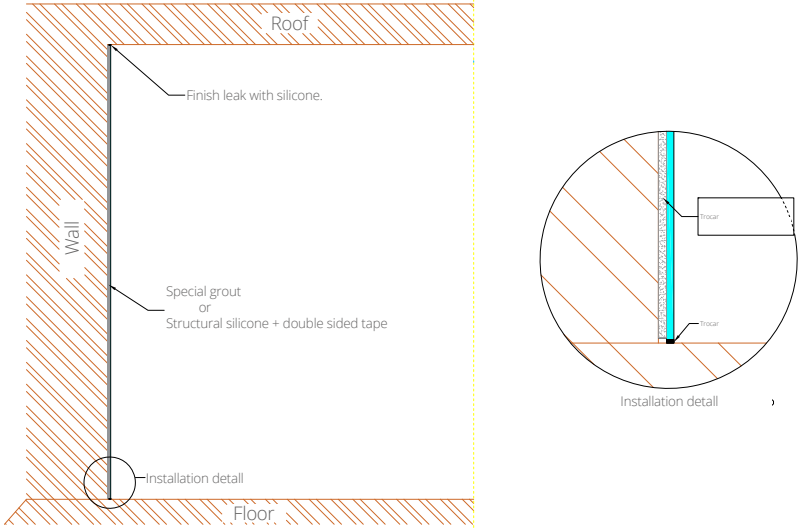
5. Continue with positioning all CORSTONE parts. From the second part on, use the 2mm floor-level spacers to help to have a correct expansion joint and the alignment of the parts (in cases of large formats).

6. Make the grout with neutral silicone in the approximate color of the pieces CORSTONE. Wait for it to dry for 24h. Remove the floor levelers and finish the grouting in the areas where the floor levelers were.

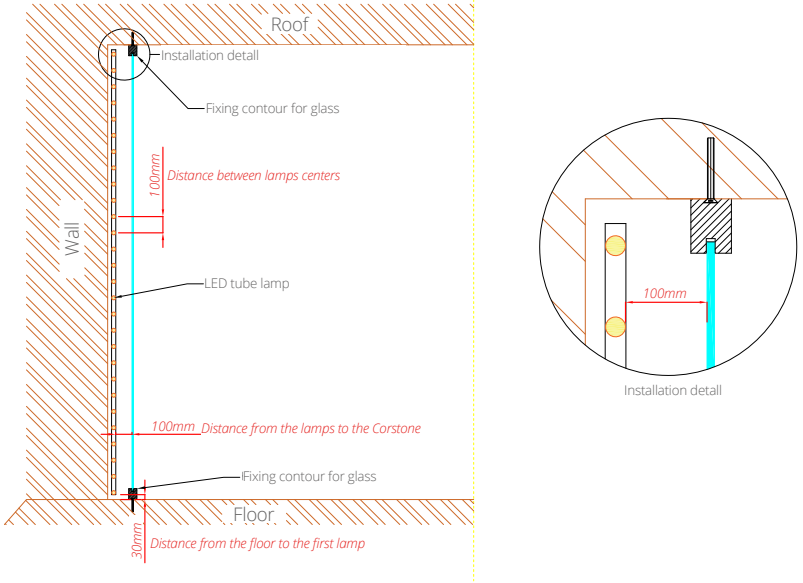
7. After complete drying, clean the area with a damp cloth free from abrasives and never use aggressive cleaning products.

16. Corstone wall installation diagram

Installation of Corstone on the Wall

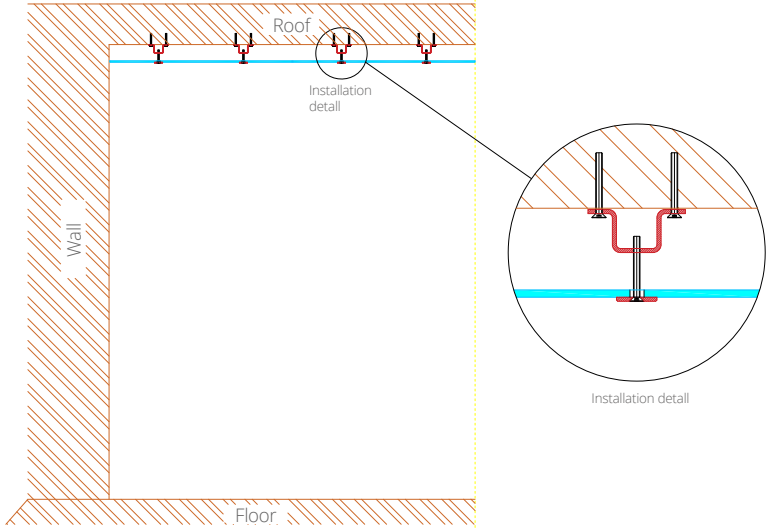


Backlight installation
Installation of Corstone on the wall

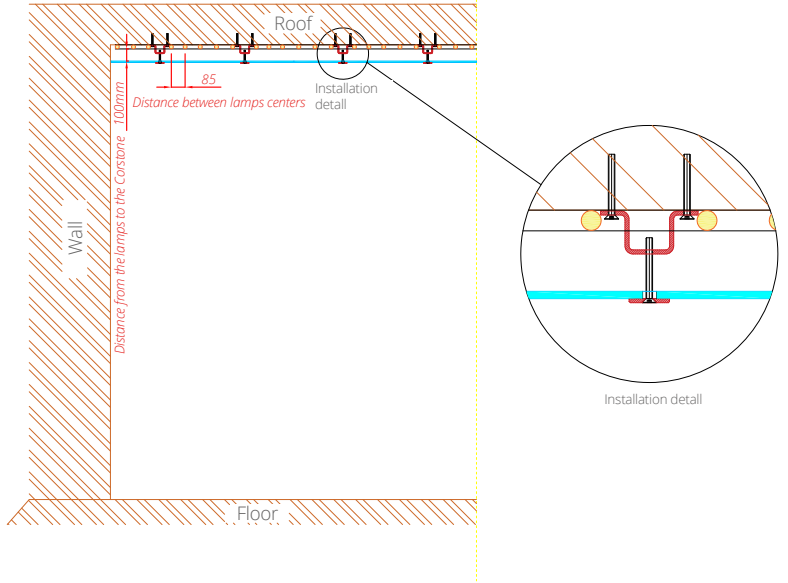


17. Corstone roof installation diagram

Installation of Corstone on the Ceiling



Backlinght installation
Installation of Corstone on the wall



18. **Horizontal** installation

Needed material:

- LED tube lamps or 6500K LED boards and material for electrical installation;
- Cooler/Fan for forced ventilation (if there is no natural air circulation);
- Aluminum U-profiles for glass installation, used for 10mm tempered glass or aluminum angles – Will be used for finishing;
- Neutral silicone for grouting and finishing parts;
- Floor leveler with base – 2mm thickness;
- 10mm glass installation profiles (Aluminum or PVC);
- Metal supports for fixing to the ceiling, with M8 thread at the bottom.

Note: If the construction does not have a structure to support the weight of the CORSTONE parts, use carbon steel bars with fixation on the walls and anchorage on the ceiling and fix the threaded metallic supports to these bars;

- M8 flat head Allen screws;
- Special stainless steel ferrule with recess for flat head Allen screws (supplied by Corstone);
- Sealing ferrules, developed to support and protect the part against contact with metal items (supplied by Corstone).

Installation step by step

1. Drill CORSTONE pieces, according to information about the drilling measures that are in the item INSTALLATION OF CORSTONE IN COVERINGS OR AS A CEILING COATING. In this way, the weight of the pieces will be well distributed after being installed in the desired location.

2. Install the metal supports in the space to receive the Corstone piece, the distance between the supports will be defined by the drilling of the CORSTONE pieces.

3. Make the electrical installation so that the lamps do not come into contact with the metallic supports already installed. Remember to keep the same distance between the centers of the lamps and the lamps to CORSTONE parts. The ventilation/air circulation system must also be installed in this step;

4. Place the CORSTONE pieces, suspending them with the screws and ferrules, also use the 2mm floor levelers between the parts to facilitate the subsequent alignment. The ideal is to use liquid locks threads on screws to prevent them from loosening due to vibrations over time.

5. Level and align all parts using Allen screws. Care must be taken not to loosen the screws too much, as the pieces may fall off;

6. Grout the pieces with silicone in the approximate color of the Corstone piece and allow it to dry for 24 hours. Remove the floor levelers and finish the grouting in the areas where the floor levelers were.

7. After complete drying, clean the area with a damp cloth free from abrasives and never use aggressive cleaning products.

19. Installation on **raised floors**

IMPORTANT: for floors, the Corstone boards must be ordered in tempered glass and already in the final measure for greater resistance to weight and impact.

Needed material:

- LED tube lamps or 6500K LED boards and material for electrical installation;
- Cooler/Fan for forced ventilation (if there is no natural air circulation);
- Steel angles or T-profiles to support the parts Corstone;
- 6mm compact acrylic / polycarbonate plates for even weight distribution between the steel supports and the workpiece Corstone;
- Angled aluminum profiles – They will be used for finishing;
- Neutral silicone for grouting and finishing of pieces;
- Floor leveler with base – thickness from 2mm to 4mm;

Installation step by step:

1. Install the structure in the space to be received as CORSTONE pieces;

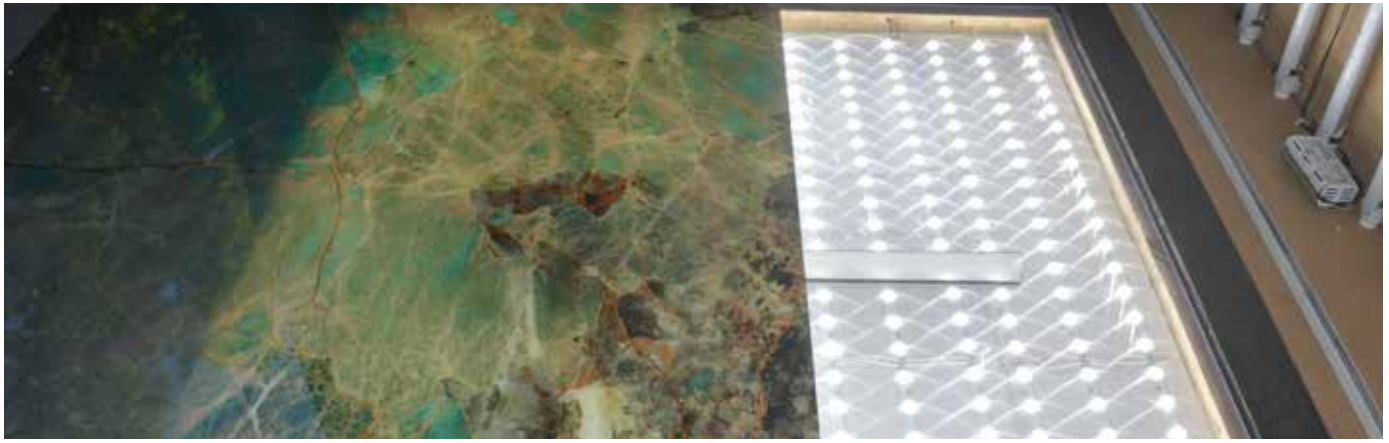
2. Do the electrical installation by distributing the lamps or Led boards in the area. Remembering to respect the distance between lamps and Corstone pieces. The standards system/ airflow must also be installed in this step;

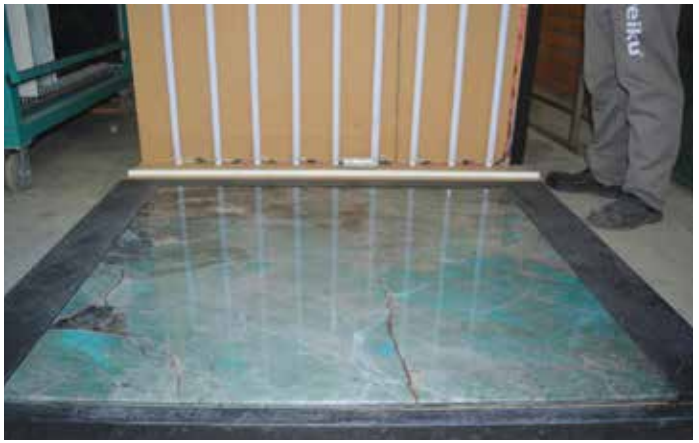
3. Place the acrylic / polycarbonate boards, these plates should preferably have the same size as the CORSTONE pieces, to facilitate removal in case of need for maintenance;

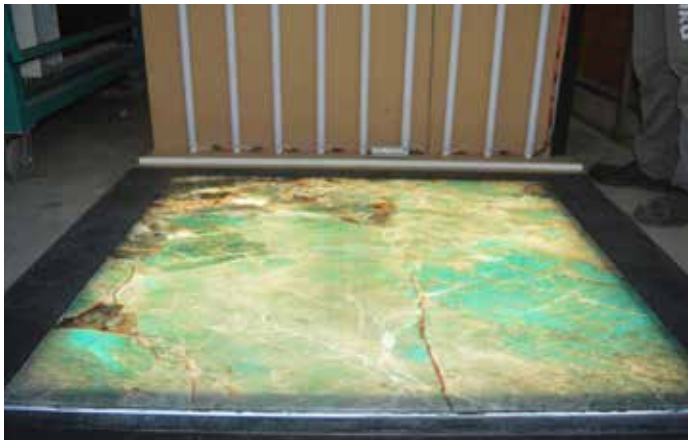
4. Place all CORSTONE pieces with the help of floor leveler, to ensure the alignment of the pieces;

5. Grout the pieces with silicone in the approximate color of the Corstone piece and allow it to dry for 24 hours. Remove the floor levelers and finish the grouting in the areas where the floor leveler. Be sure to make a good seal to avoid the entry of water in cases of accidents in the electrical system;

6. After complete drying, clean the area with a damp, abrasive-free cloth and never use aggressive cleaning products.







20. Cleaning and **maintenance**

Cleaning areas with CORSTONE application should be manual and done regularly. Once installed, it must be periodically sanitized, removing dust and particles that may harm the part evenly. The process is essential to preserve the quality of the product, avoiding stains or surface degradation.

For cleaning, use a soft cloth, free of abrasive products, and water with neutral detergent. Do not use abrasive and aggressive detergents. Avoid detergents, cleaning products or chemical compounds that contain alkaline properties, hydrofluoric acid or sulfuric acid. Make sure you only use neutral detergents.

After CORSTONE is installed and also during the surface cleaning, care must be taken with materials that may end up contaminating or attacking the surface of the pieces.

Contamination of the surface of CORSTONE can occur with the contaminating substance staying or coming into contact for a certain period with the surface of CORSTONE, causing this surface to become, depending on the substance, oxidized (showing colored spots) or become dull and even slightly opaque.

Substances that can alter CORSTONE

Sulfur: The bitumen coating used for waterproofing purposes has relevant percentages of sulfur and can cause matte stains on the surface of the piece.

Sulfuric Acid: Sulfuric acid can be used in detergents. It causes surface contamination as sulfuric acid can make the surface matte or slightly opaque.

Hydrofluoric Acid: Hydrofluoric acid is used in detergents and stain removers. It causes surface contamination as hydrofluoric acid can make the surface matte or slightly opaque.

Iron: Iron is a commonly used element in construction. The main possible causes of iron contamination are:

- Iron residues resulting from work done at the construction site (welds, roughing, cuts, etc.), when this type of contact happens with the surface of the part, it usually causes irreversible damage to it, welding spatter or iron cutting penetrates into the CORSTONE surface and cannot be removed;
- On the construction site, it is often necessary to use water for various purposes. This water in contact with iron can form rust. If this water with rust stays in contact for a long time with the surface of the piece, it can also cause oxidation of the piece.

There are many possible scenarios involving CORSTONE and we understand that it is not possible, with this manual, to have full coverage of all these scenarios.

For any details and information about handling, processing and installing the CORSTONE that is not explicitly described in this manual, please consult our website www.corstone.info, our sales team or our technical department.

All instructions contained in this manual are given in good faith and based on extensive testing and research carried out by CORSTONE with its partners and technicians. However, as the conditions of the workplace and installation, as well as the methods of use are beyond our control, this guideline should not be intended as a replacement for the necessary preliminary analysis. It is vitally important to ensure that all the materials to be used for the job and installation are the most suitable for each situation and specifically needed to carry out the services.

The partial or total use of different and/or alternative products, considered equivalent to those suggested above, as well as different application and/or installation processes than those described above, exempt CORSTONE and CERAMFIX from any responsibility, if the final result does not meet the minimum aesthetic requirement.

CORSTONE is not responsible for the results obtained using methods beyond our control. It is the responsibility of the CORSTONE qualified installation team or technician to determine the suitability of materials for the desired application and take all precautions for the safety of the project execution and people against any risks that may be associated with the use and installation of the product.

We recommend that each team or technical installation enabled CORSTONE perform your own installation test before perform the installation on a job site at the end customer. To obtain all data and results have been tested on materials produced and preserved in good condition and free from defects of any kind.

All information contained in this document is subject to changes without notice.

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