



**Den Braven**



# Inspection, maintenance and repair of sealant joints

Technical Bulletin TB122013-007



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## Introduction

Durability of sealants under normal weather circumstances can vary from 5 to more than 30 years, depending the type. This means with good functioning and application of the sealant, replacement is only mandatory after several years. In this period, instances requiring repairs or early total replacement of sealants might occur. This can be caused by:

- Detachment of sealant from surface
- Growth of fungus on sealant joints,
- Damage by construction, mistakes or over pressure
- Degradation by chemicals
- Damage by animals like mice and birds

As the sealant mostly keeps moisture out of the building construction it is of great importance to flag and repair joints in time to prevent further damage. Although these leakages become visible during rainy periods, it is recommended to have regular inspections to prevent damage.

### Inspections

First inspection of joints must be carried out 1 year after application, followed by a bi annual inspection. This inspection should be combined with the inspection of the painting.

The most effective way is to judge the joints during the colder season as building materials shrink the most in low temperatures, resulting in the widest joints. This period is best to judge if the sealants are still able to cope with the pressure, and if detachments appear.

During inspection pay specific attention to:

- Detachment / Adhesion-loss or cracks in sealant (cohesion-detachment).
- Damages
- Afflictions / fungi
- Weathering
- General state of maintenance of surrounding materials

Where the sealant is not functioning as it should, (local) repair must take place.

### Detachments

Detachments in facades of buildings can result in leakage. When leakage is noticed but the exact cause and location is unclear, the exact spot should be found by testing. We have two methods for this test:

- Test with a (garden) hose.
- Test with a smoke pipe.

With a hose the facade can be sprayed. While doing this we work from the lowest point upwards, while the interior is checked for water entering the building. When no leakage is found, it is possible the leakage will only appear when rain and wind pressure are combined. Wind pressure causes over pressure on the outside while under pressure appears on the inside. This can cause water to be sucked inside through the smallest of openings. With taller buildings the water can be pushed up and find it's way inside.



With a smoke pipe potential leaks can be identified more easily, especially when wind pressure occurs. It is recommended to consult any available building plans as the possible cause of the leakage can be determined. These drawings will illustrate the drainage system. The drainage holes of these systems must stay open, as water will accumulate in the construction when closed, causing leakage and degradation.

Where detachment (loss of adhesion) appears and repair is needed, further investigation is required to find the cause.

There are several possible reasons:

- When the joint is detached almost everywhere, clearly visible at first inspection, the applied sealant probably does not bond with the surface of the joint. Repair should take place with a sealant which actually does bond to the surface (pre-test).
- Another possibility might be the surface and sealant do not tolerate each other. In this case repairs with a sealant which does tolerate the surface is needed.
- By overloading the sealant, joint detachment can also appear. This can be ascertained by measuring the gap between the surface and the sealant. If this is more than 25% of the original sealant joint, the joint has been overloaded, and an adjustment of the construction is needed. E.g. by grinding the joints.
- Local detachment, where sealant is securely bonded to other parts, indicates a local cause. E.g. damp spots during application of the sealant. Or insufficient primer was applied.
- Another cause can be insufficient use of sealant to close the gap, leaving the joint not entirely filled. These local detachments can be touched up provided that the same sealant is used that was originally applied.

When detachments are cohesive, in case of cracks in the sealant joint itself, this indicates over pressured joints. Before any repairs, the cause of the cohesive cracks must be determined. The cause can be too large a deformation of the joint or too low elasticity of the sealant used. In case of the too large deformations the joint can be widened to accept more activity. When the elasticity of the sealant used is the cause, the problem can be solved by using a more elastic type of sealant or a sealant which still has a high elasticity at low temperatures.

### **Damages**

Damage can have several causes. In horizontal joints like floors, corridors etc. this can be caused by mechanical stress. Also by "picking out" damages can arise which need to be touched up. Animals like birds and mice, also snails, are known to eat sealants. Generally these are defects which can be repaired locally. It is best to execute these repairs with the same sealant that was originally used.

### **Degradations / fungi**

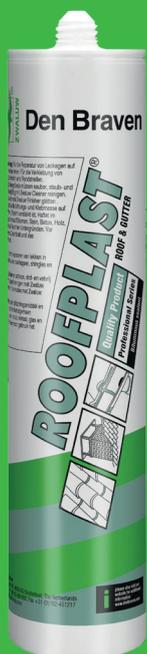
Chemicals, bacteria and the like can degrade joints, or change the visual appearance of the joint, making repairs mandatory. It needs to be established if the previously used sealant was correct, or if other sealants, more able to cope with degradation, are available. In case of fungi appearing in antifungal sealants several causes are possible:

- Extended water exposure causes the antifungal preparation to be leached out of the sealant and is therefore no longer functional.
- The use of detergents or other chemicals can cause the antifungal preparation to be degraded and this will then become inactive.

In these cases joints must be considered as maintenance joints, where regular repairs are mandatory.



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### Weathering

Weathering occurs naturally outdoors as a result of ultra violet light and water. Depending on the type of sealant used, in time the surface will become degraded. E.g.: P.U. sealants can develop a harder surface when exposed to U.V. light causing cracks in the sealant where the joint deforms. These cracks can move deeper into the joint sealant causing the sealant to tear, making repair necessary. With Polysulfide sealants the surface is also degraded, visible as "elephant skin." This is mostly limited to the surface, not moving deeper in the joint. M.S. Polymer sealants and Silicon sealants are highly U.V. and weather resistant, showing minimal weathering on the surface. With silicone sealants contamination on the joint and sometimes adjacent surfaces can appear as a result of the static type of the sealant.

### Total status of maintenance of surrounding construction parts.

This is where we monitor if the adjacent construction parts are in good shape and well maintained E.g. paint on wood, quality of concrete and brickwork, warped construction causing the sealant joint to be heavily stressed etc. Any imperfections in the construction must be repaired.

We recommend repairing with the same sealant as used before, unless the product is unsuitable, then another sealant must be used.

The old sealant must be fully removed, and the bonding surfaces need to be cleaned by degreasing and grinding etc. If the joint is to be repaired with the same sealant the cleaning of the joint becomes less critical. When residue of the old material remains in the joint it is more tolerant to the newly applied sealant. When another sealant is used, the residual sealant can be intolerant to the newly applied sealant. Therefore full removal of the old sealant is important.

### Remarks:

- Bituminous products cause yellow/brown discolouration in sealants which are in contact with bitumen. This can also change the properties of the sealants. Therefore repairs to bitumen joints are executed with bitumen products.
- Butylene sealant is not easy to remove in plastic from. The use of solvents is usually not sufficient to remove all polybutylene from the surface. A sticky layer can remain on the surface. If repairs are done with polybutylene sealant this layer will not cause problems. If repair is done with another type of sealant then bonding can be negatively affected.
- Another possibility is intolerance to the new sealant with the old residue of polybutylene sealant, possibly even causing moisture to run from the joint. A bonding test is recommended.
- Butyl-mastics are often difficult to remove, because they stick to the surface like chewing gum. Residual butyl, especially if plasticizers are present, often cause problems with tolerance to other types of sealant.
- Acrylics can usually be removed easily. The joints can be repaired with Acrylic, Silicone or Hybrid sealants.
- Polysulfide sealant can be recognised by the specific smell of sulphur released while burning. Can usually be removed with ease, and repaired with the same material or a hybrid sealant.
- Polyurethane sealants are often recognised by the hardened skin, possibly showing some cracks. As Polyurethane sealants can contain many sorts of plasticisers there is a chance of plasticiser migration when repair is made with another sealant
- Silicon sealants can be cut away easily. Material residue can prevent the use of another type of sealant, as they will not bond to the residual old silicon sealant.



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### Maintenance

The maintenance of sealant joints mainly consists of regular inspections, and when needed, local repairs. Also, maintaining the construction of material where the joint was sealed in good shape. This accounts for, amongst others, the joints in facades and glazing joints.

A group of joints in need of specific attention are the SANITARY JOINTS also called the joints in wet cells (Bathrooms, kitchens, abattoirs, food processing industries etc.). Aside from the usual inspection and maintenance as described above, these joints have other criteria playing a role: In these locations mostly a Sanitary Silicone sealant is used. These sealants contain a fungicide, making them somewhat more resistant to fungi. (Also see TB122013-006)

The fungicide used can be sensitive to strong detergents, making the fungicide ineffective. Detergents containing Chlorine can make the fungicide completely ineffective.

For joints in wet cells the follow these guidelines:

- Spaces should be well ventilated to control the air humidity.
- For cleaning joints no strong or aggressive detergents should be used.

### Repairs of connection and expansion joints

When the sealant no longer functions sufficiently, the joint must be repaired locally or as a whole.

It is best to remove the entire joint by cutting it out with a sharp knife and, if necessary, grinding it down with an angle grinder. This creates a completely clean surface on which to apply the new sealant. It is advisable to apply the same sealant to prevent differences in colour or problems with tolerance.

However, if a different material is chosen for the repair, then it is necessary to test whether both materials tolerate each other. For the correct pre-treatment of the joint sides and the possible application of a primer, or for performing an adhesion test, see Technical Bulletin TB122013-002.

For the right joint dimensions and use of a backing material, see Technical Bulletin TB122013-001.

Before applying new sealant and for information on the influence of temperature on the final result, see Technical Bulletin TB122013-003 and TB122013-004.

If the old sealant joints cannot be removed completely, as may occur at joints with old butyl-mastic or asphalt joints, using a different method is necessary. Possibilities are the use of, e.g., impregnated tape or slab joints. In this case, the best is to seek advice beforehand.

### Repairs to Sanitary joints

Remove joints as much as possible with a sharp knife. To remove residue of old sealant use Zwaluw Sili-Kill, creating a fully smooth surface again. Remove residual detergent from the surface with a degreaser, leaving no traces. To achieve optimal bonding, apply the sealant to the tile. Usually, on cutting edges of tiles, less bonding is achieved. Floor joints and eventual leakage can cause a wet surface.

When working on the tile-surface is it possible that just by cleaning, a lot of moisture can be removed.

When needed the removal of moisture can be sped up by using a hair dryer. When the surface material is a layer of humid sand / cement, the problem will still exist as this porous surface cannot not be dried instantly (moisture will re-appear after "drying").



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### Repairs of glazing joints

When dealing with the repair of a closed glazing system (As described in system B of NEN 3564. Completely fill with Butylene sealant. (Popular between 1960-1980), it is important to know whether it is single or double (insulated) glass. With single glass it is enough to cut out the old Butylene sealant at an angle of 45 degrees, after which a Top sealing of elastic sealant can be applied. Surfaces must be thoroughly cleaned and degreased.

When dealing with double glass, there is risk that water has already entered the construction. This water cannot leave the construction, and can possibly affect the sealant connecting the double glass, eventually resulting in moisture between both glass parts, causing mandatory replacement of the glass. In this case we recommend removing the lowest glazing bead from the construction, and replacing it with a new one placed away from the sill (ventilated).

Repairs in glazing systems like in NEN 3576/NPR 3577 can be made by cutting out the old sealant at an angle of 45 degrees, followed by applying a new sealant joint. We recommend slightly widening the sealant applied, providing about 3mm of bonding surface to the glazing bead or window frame.

For repairs it is important to use sealant of the same elasticity as used originally.

Although putty paint has not been used in many years, construction using putty paint still appears in older buildings in need of maintenance and repair. For maintenance it is important the putty is well covered with paint as this significantly increases the durability of the system. When repair is mandatory, the system can be replaced with new putty paint.

Another possibility is the use of Zwaluw Silstop, creating a more durable putty joint. It may also be possible to install a glass beam and seal it to the gels with elastic sealant. For more info of paint ability of sealant joints in glazing systems see Technical Bulletin TB122013-005.

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