



Suitability and pre-treatment of surfaces. Application of bonding primers.

For optimal functioning of a sealant joint it is essential that the sealant bonds well to the surface that it is applied to. If the bonding fails, the functionality of the seal fails.

The strength of the bond between sealant and surface depends on:

- 1 Strength of surface.
- 2 Suitability of surface.
- 3 Pre-treatment of surface.
- 4 Situation of surface during application.
- 5 Tolerance of surface to the sealant applied.
- 6 Use of bonding primer.

It is important that the sealant is applied in the correct manner (See Technical Bulletin TB122013-003).

1 Strength of surface

The surface must be stronger than the tensile force.

2 Suitability of surface

▶ Bituminous surfaces

Only use bituminous sealants on these surfaces. Any other sealant types other than of bitumen may migrate. This causes some discoloration and often even changes in hardness, adhesion and durability of the silicone.

▶ Concrete

Concrete surfaces vary widely, due differences in formulation, and under which circumstances it is cured. Differentiation is made between (A: concrete which has been in contact with the mould in which it is cured, B: air-dried concrete). Most sealant joints are applied between concrete slabs which have been in contact with the moulds. Normally these surfaces are well cured and don't have a laitance. However it is possible the mould was pre-treated with shuttering oil. Oil can be left over in the concrete resulting in a negative effect on the bonding of the sealant. Air-dried concrete can contain laitance which needs to be removed by i.e. grinding, to gain a good bonding of sealant to the surface. In general "green" concrete must be aged for at least 4 weeks before applying sealant (because of drying shrinkage). The surface must be "wind-dry". (Locally drying concrete with a hair-dryer or burner is not reliable as the moisture will quickly reappear) The concrete surface must be free of dust (removed by brushing or oil-free compressor air). Most of the sealants will result in bonding well on clean and solid concrete surfaces. A bonding primer must be used on expansion joints exposed to rain. Eventual repairs to joint sides can be made with plastic mortar. With mechanically loaded joints (Floor joints) it is recommended to grind the upper side of the concrete slightly sloping downwards, to significantly prevent damages on the concrete edges and the sealant joints.

▶ Aerated concrete and cement stone

Very thoroughly remove any dust on the surface with high pressure air. Apply primer before using elastic sealant. Acrylate dispersion sealants, like Zwaluw Acryl-W, can be used without primer.

However, the porous surface must be pre-treated with a mixture of 1 part sealant to 2 parts of water.

▶ Facade brick, unglazed bricks, concrete bricks

Remove dust from the surface. Joints exposed to moisture / water must be pre-treated with primer.

▶ Natural stone (marble, granite)

Light cleaning with a degreaser will do. Use of a primer might be mandatory. Seal joints with a sealant which prevents migration with plasticizer.

(For example Zwaluw Silicone NM)

▶ Glass (glazed), ceramics, porcelain, enamel

When needed rinse surface with a clean cloth and Zwaluw Cleaner. Silicone sealants naturally bond well to these surfaces when clean and dry.

Glazed ceramic tiles can be joined with mortar before sealing. This creates a cement film on the tiles. Remove as much as of this film and pre-treat the water exposed joints (floor-joints) with primer. Cutting edges of tiles and unglazed tiles like terracotta must be pre-treated with primer.

▶ Painted or powder coated surfaces

Layers of paint must bond well to the surface. Remove loose layers of paint.

All painted or powder coated layers are seen as plastics, with a wide variety of compositions. The composition of paints between brands can be very different. Bonding of these surfaces can show very different results. Powder coatings can contain elements which make bonding impossible.

The bonding of sealants to paints/plastics can only be assured by testing on the material itself prior to use.

When sealants containing solvents or plasticizers are used, the material must be able to withstand to these.



General experience of sealants on several paints:

ZWALUW	Alkyd paint	Acrylic dispersion paint	Chlorinated Rubber Paint	PU paint	Epoxy paint	Powder coating	Natural oil paint and others
Acryl-W	X	X	X	X	X	X	2)
Elast-O-Rub	O1)	O1)	-1)	X	X	X	2)
PU kit 50 FC	X	X	X	X	X	X	2)
Silicone-BB	X	X	X	0	0	0	2)
Silicone-1001	X	X	X	X	X	X	2)
Silicone Sanitary	X	X	X	X	X	X	2)
Silicone-N	X	X	X	X	X	X	2)
Silicone-NO	X	X	X	X	X	X	2)
Window Seal Plus	X	X	X	X	X	X	2)
Monustop	X	X	X	X	X	X	2)
Hybrisal 2PS	X	X	X	X	X	X	2)

X = Suitable
 O = Limited suitability
 - = Not suitable

1) Solvent of the sealant can affect the layer of paint
 2) Test before use

Synthetic rubber

Many different types of rubber are used, and natural and synthetic mould or foils are applied. The bonding of sealants to paints/plastics/rubbers can only be assured by testing on the material itself prior to use.

There is a risk, depending on the composition of the material, that the rubber can migrate through the sealant, causing discolouring or weakening (for instance: Neoprene rubber or EPDM rubber). These effects must be tested prior to use.

Metal (unpainted), lead, aluminium, copper, sink, INOX, iron, galvanised iron

Most metals weather through time due to environmental influences, for instance, they oxidize. This changes the property of the surfaces, therefore testing is required prior to application. Polyurethane sealants, hybrid sealants and neutrally curing silicone sealants like Silicone N and NO can be applied to metal (with or without the use of a primer). Acetic curing silicone sealants are less useful on corrosion-sensitive metals, as during curing they release acetic acid vapour. If moisture is present on the metal, the acetic acid will dissolve and have a strongly corrosive effect on the metal.

Plastics

Plastics have a broad range of compositions, PVC from producer A or B can contain differences, influencing the bonding of sealants.

As a rule of thumb the following can be stated:

- Zwaluw Hybrid sealants: No primer required.
- Zwaluw Silicone NO: Usually No primer required.
- Zwaluw Silicone BB, 1001: A bonding primer is necessary

A bonding test is recommended.

Important to know:

- Polyethylene / Polypropylene / PTFE**
On these plastics virtually no bonding is possible. Also, primers are not applicable.
- Soft PVC**

This plastic contains weakening agents which can migrate, causing a stick layer between the PVC and sealant within weeks. Usually Silicone NO offers the best result.

Polystyrene

Very sensitive to solvents (careful with primers and solvent-based sealants). Best to be cleaned with alcohol.

Polyacrylate, PMMA and Polycarbonate

In certain circumstances incorrect sealants can cause cracks (stress cracking) in the plastic. Most sealants will not bond to these plastics. Zwaluw Silicone N does not affect the plastics and usually bonds well.

Plastics can be very sensitive to temperature differences, with relatively high extraction (expansion) rates. Deciding on the correct dimensions of the joint is important.

3 Pre-treatment of the surface

The surface must be clean. All dust, dirt, loose paint and rust must be removed. This can be done with a brush, steel brush, grinder or sanding machine. Oil, grease and fat can be removed with Zwaluw Cleaner, spirits or benzene, directly followed by polishing with a dry cloth. Make sure to replace the cloth for a new one when required, to prevent spreading of oil and fat. If sanding is not mandatory for cleaning, then do not sand as this creates scratches in the surface. For painting this is an advantage. (Paint is thin, filling the scratches). With sealant this can be a disadvantage as sealant is not smooth enough (viscous) to fill the scratches, causing a smaller bonding surface.

4 State of surface during application

When sealant is applied the surface must be dry and free of frost (min. temperature + 5°C). Only acrylic sealants like Zwaluw Acryl W, and some bituminous sealants - like Zwaluw Roofplast and Zwaluw Tixoplast, or sealants based on synthetic rubbers like Zwaluw Elast-O-Rub can be applied to wet surfaces.

When drying porous surfaces with, for instance a hair-dryer before application of the sealant, the intended result will not be reached, as the moisture will return to the surface.

With non-porous surfaces this method can be used. The surface can be dried with clean and dry cloth.



5 Tolerance of surface with sealant applied

This is important with solvent based sealants (surface must tolerate, and be compatible with solvents). Surface contents must not migrate into the sealant or vice versa. Well-known examples of this phenomenon are bitumen, neoprene rubber, and EPDM rubber.

Elements within these surfaces can migrate into the sealant, causing discoloration, and therefore decrease bonding.

For this reason bitumen surfaces (roof applications) are treated with a bitumen sealant.

Another example is the combination of a polysulfide sealant with a acrylate dispersion paint, where weakening agents migrate from one product into another.

6 Compatibility

The mutual compatibility of all materials used (such as support and setting blocks, films, tapes, coatings, paints and edge sealants) should be tested in advance. Any intolerance of the materials used are excluded from warranty and/or liability by Den Braven.

7 Application of bonding primer

Porous surfaces like wood, stone, concrete, which are exposed to water regularly, require a bonding primer. Joints with wide expansion require bonding primer. Non-porous surfaces like glass, ceramics, metal and plastics require a sealant that directly bonds to the surfaces. Read The supplied product info.

Plastic, painted surfaces, coatings, powder coatings, etcetera can have several compositions, making a bonding test before use very recommendable. A bonding test can be easily executed by applying a bead of the sealant to the surface, and judge the bonding after curing.

When working with bonding primers, always follow the instructions from the manufacturer, especially where it concerns minimum and maximum drying times of the primer.

The table on the next page illustrates the required application of the most common sealants on a wide range of surfaces.



The following indications are used:

- X** = Suitable application, mostly without primer
- XP** = Suitable applications, mostly with primer mandatory.
- O** = Application with limited suitability (footnotes do explain limitations)
- P** = Primer mandatory.
- = Not Suitable.

	Zwaluw Roofplast Tixoplast	Zwaluw Acryl-W Acryl-LM Acryl 1001U Acryl Anti-Crack	Zwaluw PU 50 FC	Zwaluw Monustop Hybriseal 2PS	Zwaluw Sil kit BB 1001 Sanitair	Zwaluw Sil N Sil NO Sil NM Window-Seal Plus
POROUS						
Pinewood untreated	-	X	P	P	P	P
Hardwood	-	X	P	P	P	XP
Stone	X	X	XP	XP	P	XP
Concrete	X	X	XP	XP	O(01)	XP
Concrete blocks	X	X	XP	XP	O(01)	XP
Aerated concrete	X	X	P	P	O(01)	P
Limestone	-	X	p	P	O(01)	P
Gypsum	-	X	P	P	O(01)	P
Natural stone	-	-	-	X	-	O(4)
Marble	-	-	-	X	-	O(4)
NON-POROUS						
Glass	X	O(2)	O(3)	X	X	X
Ceramic	X	O(2)	X	X	X	X
Enamel	X	O(2)	X	X	X	X
Porcelain	X	O(2)	X	X	X	X
Iron	X	O(2)	XP	X	-(5)	XP
Sink	X	O(2)	XP	X	-(5)	X
Lead	X	O(2)	XP	XP	-(5)	XP
Copper	X	O(2)	XP	XP	O(5)	XP
INOX	X	O(2)	X	X	XP	X
Aluminium	X	O(2)	X	X	O(5)	X
Aluminium(coated)	X	O(2)	XP	XP	XP	XP
Polyethylene	-	-	-	-	-	-
Polypropylene	-	-	-	-	-	-
PTFE	-	-	-	-	-	-
Polyester	X	X	X	X	XP	X
PVC	X	X	X	X	XP	X
Polystyrene	X	X	X	X	XP	X
Polystyrene foam	-	X	X	X	X	X
Polycrylate	-	-	-	-	-	X(7)
Polycarbonate	-	-	-	-	-	X(7)
Wood + Alkyd paints	X	X	X	X	X	X
Wood + Dispersion paint	X	X	X	X	X	X
Neoprene rubber	X	-	O(6)	O(6)	-	O(6)
Bitumen / Tar	X	-	-	-	-	-

- 1) On fresh concrete the acids from the sealant can react with the alkalis in the concrete.
- 2) With water the loss of bonding power can occur.
- 3) With exposure to U.V. light the bonding can release.
- 4) Use only special types not causing discolouration. (for example Silicone NM)
- 5) The acids released during the curing of the sealant can have a corrosive effect on the metal.
- 6) Discolouration can occur when elements of the rubber migrate through the sealant.
- 7) Zwaluw Silicone N is preferred due to possible stress-cracking.

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