

PROKEM

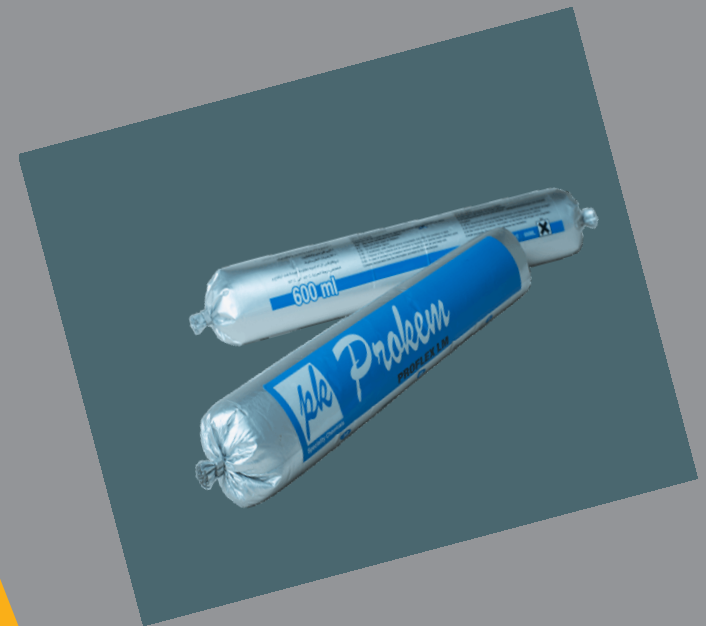
QUALITY NEED QUALITY.



Prokem
SPECIALITY CHEMICALS

**Strong,
durable bonds
that flex and seal.**

PK Adhesives & Sealants



The economical choice for high strength, long lasting elastomeric bonding and sealing.

PROKEM Adhesive Sealants are suitable for bonding and sealing a wide variety of substrates including: glass, wood, composites and plastics.



Gap Filling Bonds



Strength



Durability
for long term performance



Flexibility
to allow joint movement



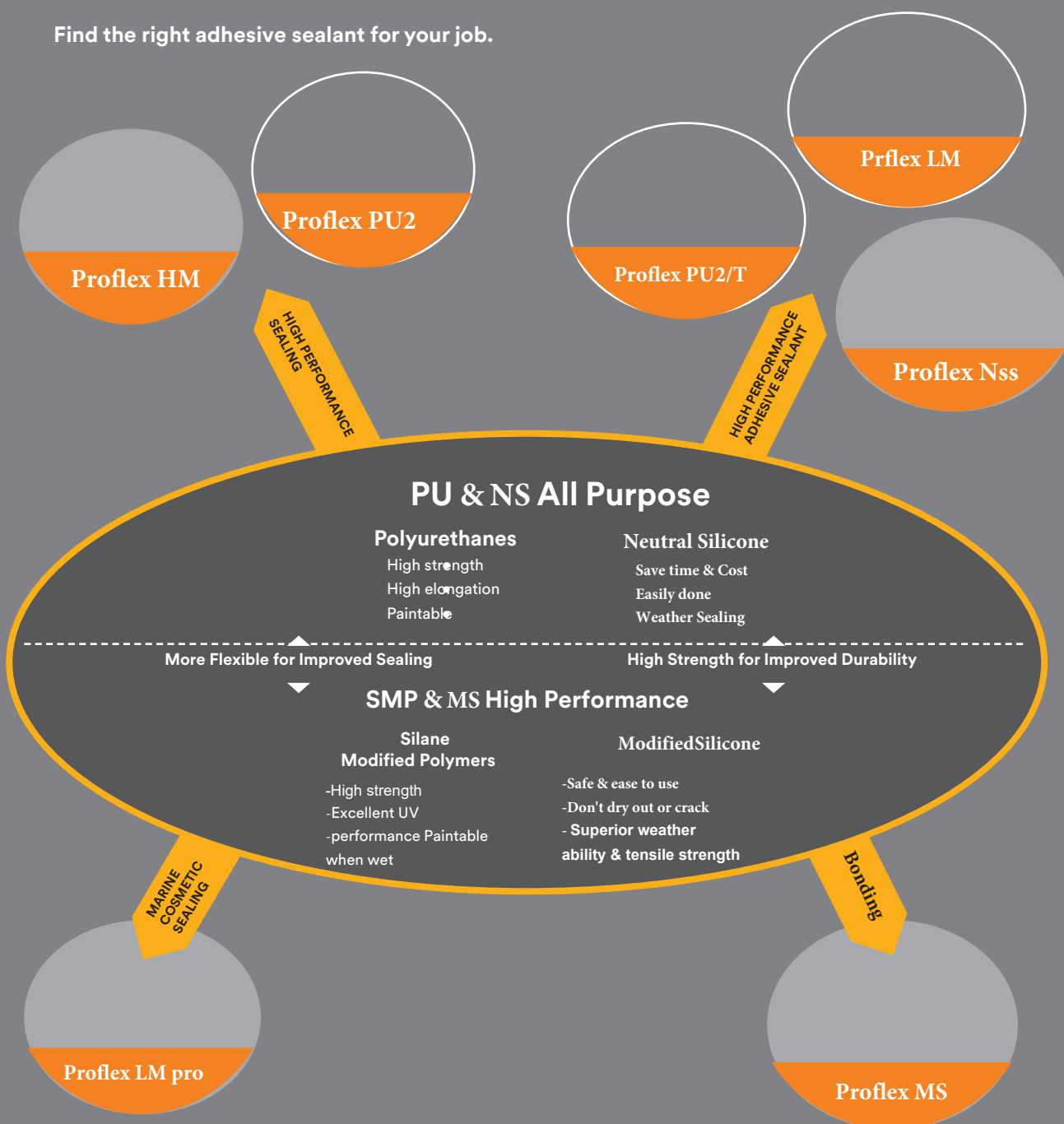
Excellent Value
low cost, durable bonding



Sealing

Durable, flexible bonding and sealing.

Find the right adhesive sealant for your job.





Prokem Sealants And Adhesives Properties & Application Chart

| Products | BituJoint | FlexiJoint | ProFlex LM | ProFlex HM | ProFlex PU2 |
|----------------------------|--|---|--|---|--|
| Type | Bitumen Base | Epoxy Base | Polyurathane Base | Polyurathane Base | Polyurathane Base |
| Product Description | BituJoint is a cold applied elastomeric joint sealant which is well proven and offers outstanding surface performance ,after application it coverts to a tough resilient elastomer with a durable and lasting seal .it requires heating to make it workable | FlexiJoint is a two components joint sealant based on a modified combination of coal tar -pitch epoxy system and special filler .its flexible ,cold curing ,fuel resistant and non - toxic joint sealing compound | it is a versatile one component, polyurethane sealant with a low modulus for sealing building joints. It cures with atmospheric moisture to form a durable rubber seal. Dosage: it has Joint configuration & Coverage: Min. width 4 mm,Max. width 25 mm, (W : D) (1:1) to (2:1) ,Application rate: 150gm/min , Application rate:150gm/min,Application rate: 150 gm/min,Various joint sizes (width × depth) Meters,of joint per cartridge 600 ml ,4 × 6 mm 25 ,6 × 6 mm 16.67 , 8 × 6 mm 12.5 , 12 × 8 mm 6.25 ,16 × 10 mm 3.75 ,20 × 12 mm 2.5 | is a high quality, one component,polyurethane sealant with high modulus for a wide range of sealing and bonding applications . | it's a two component polyurthane sealant . It is pourable ,cold applied &contains no pitch or tar . It complies with U.S .Federal specs . TT-S-0027 Eclass A type I (Grade 1) SS-S-200 Type M (Grade 2) ASTM C920 Type M (Grade P) Class 25. |
| Substrates | Concrete ,Brick ,Fiber .Cement ,Wood & Metals | Concrete ,Brick ,Fiber .Cement ,Wood & Metals | Wide range of substrates including wood ,primed metal and composites | Concrete ,Brick ,Fiber .Cement ,Wood & Metals | Concrete ,Brick ,Fiber .Cement ,Wood & Metals |
| Applications | Bitujoint is used to provide watertight joint in conditions of permanent immersion water retaining horizontal and vertical construction structure and expansion joints . Tunnel canals & marine works basement and irrigation channels ,retaining walls ,roofing ,cladding ,box culverts and concrete or asphalt roads . | FlexiJoint is used for horizontal joint exposed to fuel spillage ,sea water,acids and alkaliks such as factory floors ,stores ,and stations . | expansion and joint sealing to precast concrete ,brick work and masonry . Parameter and curtain wall sealing . Glass ,glazed surfaces ,aluminum ,steel & plastics rubber seal . UPVC and painted wood sealants . Concrete flooring . Air ports runways ,terminal ramps and hangers . Transportation storage and other areas where the various fuels and come into contact with the sealant after curing . | All sealing and bonding applications in : - Marine and automotive industries . -Metals , Metal primers & paint coatings. Ceramic . -Wood . -Plastic | it is to seal induced and movement joint to withstand traffic ,chemical attack heat at the following: - Food & Metal processing industries . - Engineering industries . - Chemical and pharmaceutical plants . -Airports ,petrol stations ,bridge joints |

Prokem Sealants And Adhesives Properties & Application Chart

| Products Type | ProFlex PU2/T Polyurathane Base | ProFlex NS Neutral Silicone | ProFlex NSS Neutral Silicone | ProFlex LM/PRO Silyl terminated polyurethane | ProFlex MS Modified Silicone |
|----------------------------|---|--|---|--|--|
| Product Description | A two component polyurthane Tar sealant which cures to produce long lasting elastomeric seals with excellent extension recovery ,adhesion and U.V. resistance properties . It can be pourable & self leveled or non-sag .it complies with US Federal specifiction SS-S 200E ,ASTM C-920 Type M grade P class 25 and TT-S-00227E Type I ,Class A | is a one component netural curing (oxime) silicone rubber based sealant with outstanding adhesion to general exterior materials of the building without primed . | it's a single -component ,netural silicone ,low -modulus ,non-slumping intumescent silicone sealant . It is designed to seal combustibile service penetrations is fire rated walls and floors . Silicone sealant with excellent with excellent adhesion to a wide range of porous & non-porous substrates | it's a versatile one component ,Silyl terminated polyurethane sealant with a low modulus for sealing building joints .it cures with atmospheric moisture to form a durable rubber seal.PRFLEX LM/PRO special grade is designed for sealing joints in airports runways ,terminal ramps ,hangers ,transportation storage areas and other areas where the various fuels and liquids may come into contact with sealant after curing . | It is a tough a durable ,adhesive and sealant used for internal & external building applications . It is base on SMP technology . It is excellent primerless adhesion to a wide range of surfaces ,it does not stain concrete & marble . Colours are white Black ,Grey |
| Substrates | a wide variety of non- porous substrates such as glass ,glazes ceramic tiles and aluminum | a wide variety of non- porous substrates such as glass ,glazes ceramic tiles and aluminum | a wide variety of non- porous substrates such as glass ,glazes ceramic tiles and aluminum | Wide range of substrates including wood ,primed metal and paint coatings ceramic materials and plastics . | a wide variety of non- porous substrates such as glass ,glazes ceramic tiles and aluminum |
| Applications | Expansion joint in industrial floors: - Horizontal tile joints & Floor cracks . -Horizontal joints in warehouses ,factories ,parking ,roofs ,road works and airports . -Pre-cast panels ,glazing and metal walls -Around doors and windows | Sealing of aluminum curtain wall joint (Floor polymer coated ,anodized)joint of aluminum complex panel . Sealing in constructions work such as windows and doors . Sealing of assembly panel construction for PCN steel . | it is suitable for all types of joints and seals in fire compartments such as : - Fire doors . - Chimneys . - Safes . - Stove Pipes . - Pipe Inlets . - PVC,PEX,FRPP & CPVC | expansion and joint sealing to precast concrete ,brick work and masonry . Parameter and curtain wall sealing . Glass ,glazed surfaces ,aluminum ,steel & plastics rubber seal . UPVC and painted wood sealants . Concrete flooring . Tranportation storage areas. | - Concrete & Masonry - Cement Plaster - Aluminum ,Copper ,Brass & Zinc - Stainless & galvanized steel - Glass & Ceramics - GRP & FRP sheets -Wood & Rubber |

Prokem Sealants And Adhesives Properties & Application Chart

| Product | BituJoint | FlexiJoint | ProFlex LM | ProFlex HM | ProFlex PU2 |
|------------------------------------|--------------|------------|-------------------|-------------------|-------------------|
| Properties | Bitumen Base | Epoxy Base | Polyurathane Base | Polyurathane Base | Polyurathane Base |
| Application Temperature -°C | 5-30 | 5-30 | +5 /+30 | +5 /+30 | 10-30 |
| Density gm/ml | 1.3 | 1.4 | 1.6 | 1.6 | 1.30±0.01 |
| Movement capacity | ±10 | ±10 | ±20 | ±20 | ±10 |
| Shore A hardness | N.A. | 65 | 25±5 | 40±5 | 50 |
| Elongation % | 100 | 100 | 10 | 438 | >150% |
| Tensile Strength N/mm ² | 1.1 | 2.5 | 1.74 | 1.28 | 1.6-2 |
| Take Free Time - hours | 24 | 24 | 3 | 2 | 24 |
| Service Temperature -°C | 0-80 | 0-80 | -30 -90 | -30 -80 | -30 -80 |
| Ahesion Strength N/mm ² | 0.6 | 2 | 0.97 | 1.27 | 1.9 |
| Final Cure - Day | 14 | 7 | 7 | 7 | 3 |



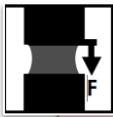
Prokem Sealants And Adhesives Properties & Application Chart

| Products | ProFlex PU2/T | ProFlex NS | ProFlex NSS | ProFlex LM/PRO | ProFlex MS |
|------------------------------------|-------------------|------------------|------------------|-------------------------------|-------------------|
| Properties | Polyurathane Base | Neutral Silicone | Neutral Silicone | Silyl terminated polyurethane | Modified Silicone |
| Application Temperature -C | 10-30 | 5-40 | 5-40 | 5-30 | 5-40 |
| Density g/ml | 1.5 | 1.5 | 1.2 | 1.6 | 1.4 |
| Movement capacity | 10% | ± 20% | ±25% | ±20 % | ± 25% |
| Shore A hardness | 45 | 30±5 | 25 ± 5 | 25±5 | 25±5 |
| Elongation % | 550% | 350% | 280% | 800% | 800% |
| Tensile Strength N/mm ² | 1.1 | 14-15 | 1.2 | 1.74 | 1.9 |
| Service Temperature | -30 -80 | -40 -140 | -40 -140 | -40 -140 | -30 -90 |
| Tack Free Time - hours | 24 | 10 mins | 1 | 1 | 3 |
| Ahesion Strength N/mm ² | 1.1 | 0.7 -0.9 | 0.9 | 0.97 | 0.8 |
| Final Cure - Day | 3 | 7 | 7 | 7 | 7 |



Project-Driven Performance Requirements:

Joint sealants must fulfill stringent prerequisites specific for each application and project. In order to meet these requirements *Prokem* has designed sealants which address several of below mentioned criteria and combined them in dedicated products ideally fit for their respective purpose.



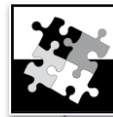
Excellent Adhesion

- Adhesion to commonly used construction substrates such as concrete is a prerequisite for a sealant to maintain its functionality over time. High-performance sealants have the advantage that they bond well also to difficult-to-adhere substrates such as certain powder-coated aluminium profiles and keep their grip even under the most contrarious conditions. For sealing glass units UV-resistant adhesion is mandatory.



Fire and Smoke Resistance

- Sealants are often part of constructions used to prevent spreading of fire and smoke from one room to the other, from one floor to the other or even to another building. They must thus be able to withstand fire for at least a certain period of time without failing. The exact requirements are usually defined in local regulations and standards which the sealant has to meet.



Compatibility

- Sealants must be designed specifically for compatibility with adjacent materials such as gaskets, backing rods, coatings and paints, other sealants and adhesives, roofing membranes, floor coverings etc. Only a confirmed system compatibility ensures a long term functionality of all building materials.



Weathering Resistance

- Outdoor joints are the first barrier against environmental influences such as sunlight, rain, temperature variations etc. Superior Weatherability is thus one of the major requirements for a sealant.



Tear Resistance and Flexibility

- Joint sealants especially in floor joints are exposed to various mechanical loads which may lead to damages. In order to ensure the tightness sealants with high tear and tear propagation resistance are clearly advantageous.



Traffic and Mechanical Wear

- Especially for floor joints mechanical and abrasion resistance is mandatory to resist stress caused by traffic, pedestrians and cleaning equipment.



Chemical Resistance

- Resistance to chemical attack is a general requirement for basically all sealants (acid rain, cleaning agents). For specific applications such as joints in containment bunds (water polluting liquids, solvents, fuels) or swimming pools (chlorine containing substances) the demands are even higher.



UV-Resistance

- Especially facade and roof joints are exposed to direct sunlight. Due to UV radiation sealants age faster and may develop cracks on the surface. Sealants with good UV stability on the other hand will not change significantly when exposed to sunlight.



Colour Stability

- Especially light-coloured sealants may discolour and become yellow when exposed to sunlight (UV radiation). In order to maintain its original visual appearance colour stability is an important property of a sealant and something that is expected by building owners and architects.



Bubble-free and Deepsection Curing

- Sealants which form bubbles during cure or do not harden uniformly throughout the whole joint have a significantly reduced mechanical performance, i.e. lower elongation and tear resistance. Bubble-free curing largely independent from environmental conditions is therefore of great importance.



Non-staining Properties

- Most elastic sealants contain plasticizers which can migrate into adjacent substrates leading to discolouration of the areas next to the joint. Especially natural stone such as marble is prone to this effect called staining. For projects where natural stone is used non-staining sealants with plasticizers having no or a very low tendency to migrate are mandatory.



Accordance with Approvals

- Besides specific regulations for particular applications high-quality sealants commonly have to meet international ISO and EN as well as local ASTM, DIN, JIS or other standards to be accepted by building authorities or specifiers. Important sealant standards are ISO 11600, EN 15464, ASTM C 920, DIN 18540 and 18545 as well as JIS A 5758.



Low Odour and Low VOC

- Especially for indoor applications sealants should not release strong and unpleasant odours. VOC (volatile organic compound) emissions should also be as low as possible to minimise health risks.



Resistance to Water Diffusion

- Diffusion resistant sealants are required in cases where the penetration of water through a joint must be prevented. Especially in the case of window connection joints it's necessary to have inside and outside a certain level of water vapour diffusion resistance of the sealing system to avoid water condensation within insulation material



Potable Water Suitability

- Sealants used in drinking water reservoirs or other potable water bearing areas are strictly regulated as to not contaminate the water. Local approvals by authorities are required and only certified sealants can be applied.



Resistance to Fungi

- Sealants used in wet rooms such as kitchens and bathrooms must be able to resist fungigrowth in order to maintain their visual appearance and not develop a health risk for people. Such products therefore must be equipped with fungicides.



Resistance to Microorganisms

- Joint sealants in sewage plants but also regular construction joint sealants in tropical zones are attacked by bacteria and other kinds of microorganisms. Sealants must therefore be designed to withstand these attacks without being destroyed.



Food Contact Suitability

- Sealants for joints in the food and beverage industry must neither exhibit any risk for human health nor adversely affect foodstuff or beverages. Usually, foodstuff compatibility must be externally certified.



Multiple Colour Shades

- Sealants often have an optical function and
- enhance the visual appearance of a construction and
- help to underline the intentions of the architect.
- This requires in many cases sealants
- in particular colours or a sealant manufacturer
- able to do colour matching.



Clean Room Suitability

- Sealants used in production plants of the pharmaceutical,
- semiconductor, solar and other
- industries
- working under clean room conditions
- are required to have very low particle
- emissions in order not to adversely affect the
- processes and quality.



Paintability

- Although elastic sealants are significantly more
- flexible than paints they are often painted over.
- Sealants must therefore in many cases be
- compatible with the used paints, i.e. cure fully
- even when painted over and do not adversely
- affect the drying or visual appearance of the
- paint.



Resistance to Water Pressure

- Water flow and water pressure in drinking water reservoirs, sewage plants, swimming pools and similar structures can wear a joint sealant severely. To withstand these forces special products with high mechanical resistance and excellent adhesion even if constantly immersed in water are mandatory.



Large Service Temperature Range

- Since sealants are used outside in all climates they must perform their basic functions under the most severe temperature conditions for extended periods of time. Only sealants with a large service temperature range are suitable to withstand temperature extremes.



Cleaning and Maintenance

- Facades, floors and other areas where joint sealants are used are frequently cleaned. Sealants used in such zones exposed to intense cleaning regimes and aggressive cleaning agents must therefore be able to withstand chemical attacks as well as mechanical stress caused by the used equipment.

Joint Design Principles:

General Design Considerations

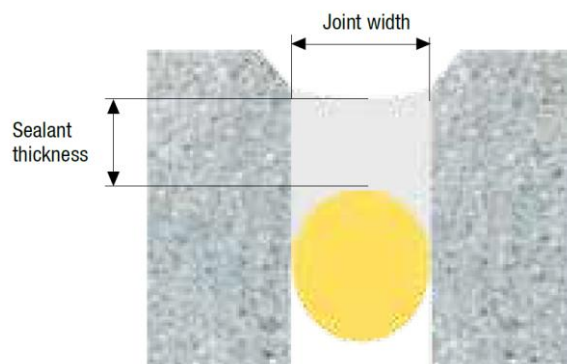
The design of a sealing system involves more than just the selection of a sealant with suitable physical and chemical characteristics. In order to obtain a long-term optimal performance the following considerations are essential as well:

- Proper joint design, including correct dimensioning and backup
- Type and nature of substrates
- Application process and ambient conditions at the time of the installation

Movement capability of the sealant and joint width must fit to the expected movement of the adjacent building elements. To illustrate this context a calculation example is given below.

In general

- The joint edges must run parallel to a depth of twice the joint width, but at least 30 mm.
- This gives the backing material sufficient grip.
- For most sealants, the joint width must be at least 4 times the expected joint movement, which results from 25% movement capability.
- The optimal ratio of joint width to depth (sealant thickness) is 2:1 for facade joints and 1:1 for floor joints (see also tables below)



Accordingly, the recommended joint dimensions for concrete elements and a sealant with 25% movement capability are as follows:

Facade Joints

| | | | | | |
|------------------------|----|----|----|----|----|
| Joint distance (m) | 2 | 4 | 6 | 8 | 10 |
| Minimum joint (mm) | 15 | 20 | 25 | 30 | 35 |
| Sealant thickness (mm) | 8 | 10 | 12 | 15 | 15 |

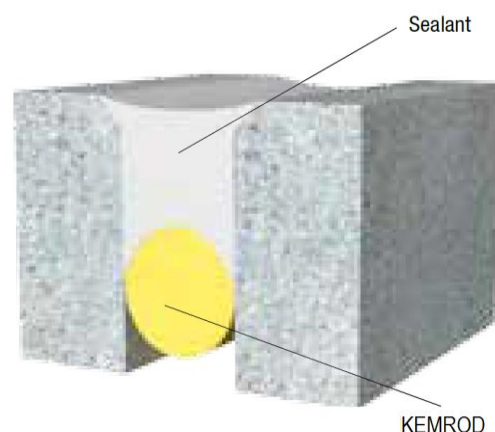
Interior Floor Joints

| | | | | | | |
|------------------------|----|----|----|----|----|----|
| Joint distance (m) | 2 | 3 | 4 | 5 | 6 | 8 |
| Minimum joint (mm) | 12 | 12 | 12 | 12 | 12 | 12 |
| Sealant thickness (mm) | 12 | 12 | 12 | 12 | 12 | 12 |

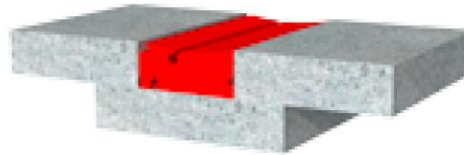
Exterior Floor Joints

| | | | | | | |
|------------------------|----|----|-------|----|----|----|
| Joint distance (m) | 2 | 3 | 4 | 5 | 6 | 8 |
| Minimum joint (mm) | 12 | 12 | 15 | 18 | 20 | 30 |
| Sealant thickness (mm) | 12 | 12 | 12-15 | 15 | 17 | 25 |

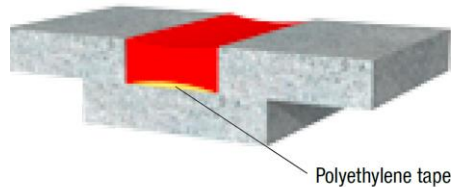
- Low stress at the sealant/substrate interface even at low temperatures joints that are too deep may either cause severe stresses or take very long to cure and should be avoided. The joint depth (sealant thickness) can be limited by using **KEMROD** made of closed-cell polyethylene or open-cell polyurethane foam.
- The latter are easier to compress and to install, but may take up water and moisture which eventually will have a negative influence on the long-term performance of the sealant.
- Therefore, especially for floor joints polyethylene (PE) foam **KEMROD** are preferable. When installing such backing materials made out of closed-cell PE care must be taken not to damage the rod, because gas released from the foam may lead to bubble formation within the sealant.



- In many cases a compressible backup material – which must be constantly under compression even at maximum joint volume – is also used to prevent adhesion to 3 sides.
- The sealant must be capable of extending and contracting along with the building elements to which it is joined. If adhesion to 3 flanks is not avoided, this free movement is not possible leading eventually to adhesive and/or cohesive failure as illustrated in the drawing below:



- To prevent 3-sided adhesion a release agent or polyethylene tape can be used as shown here:



Floor Joint Design:

Depending on the loads and location special design considerations for floor joints are necessary. Joints in areas with a lot of car and/or equipment traffic should be recessed to reduce wear and tear. On the other hand, joints in pedestrian areas should be flush with the surface to prevent injury of people.

High traffic joints



Pedestrian area joints





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Surface Pre-Treatment Products for Sealants:



General Description & Main Requirements:

Many *Prokem* sealants exhibit excellent adhesion to a great variety of substrates. In order to build up sufficient adhesion the substrate surface must be clean, dry and free from any grease, oil, dust, release agents and any other substances that potentially could have a negative influence on the adhesion. *Prokem's* cleaners and activators are products that help to achieve such an ideal surface for perfect adhesion results. Primers enhance the adhesion on difficult to adhere substrates such as certain plastics and significantly improve the long-term adhesion especially under severe conditions.

Pre-treatment Solutions:

SEALER E43

Is a 2-components epoxy based primer that improves the long-term adhesion of sealants on porous, absorbent materials such as concrete, but also on metals.

BONDING PRIMER

Is a 2-component water based primer that improves the long-term adhesion of sealants on porous, absorbent materials such as concrete, but also on metals, plastics, glazed ceramics and various painted surfaces.

WETSEAL PU

Is a 2-component polyurethane based primer that improves long-term sealant adhesion to plastics, varnishes lacquers and even porous materials. A typical application where **WETSEAL PU** would be used for substrate pre-treatment is perimeter sealing between vinyl or powder-coated aluminum window frames and brickwork.





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How to use:

Surface preparation:

-To create visually appealing and durable joints, you have to consider several points. Below is a description

for the procedure valid for porous substrates such as precast concrete.

In the case of non-porous substrates the surface preparation is usually different

-Grind the substrate with a wire brush or other equipment, and clean the dust and friable particles away.



Application:

Insert a fitting **KEMROD** to the required depth

The width of the backing rods should be 20 - 30% larger than the joint width.

If using a closed cell polyethylene backer rod pay attention when inserting the rod so that it is not damaged by a sharp tool like a screwdriver

It is generally better to use a blunt tool.

Apply primer to the bonding area.

Use a masking tape if you need sharp and exact joint lines.

Fill the joint avoiding air entrapment.

Remove any material excess





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Press the sealant against the joint flanks to ensure good adhesion and smooth the joint with fresh clean water for a perfect sealant surface.

When using masking tape, remove it before skin formation of the sealant.



Cleaning:

Clean all tools & equipment with *Prokem* special solvent immediately after use.

Key Application Advantages of *Prokem* sealing Solutions

Application properties of sealants are very important mainly for two reasons. Firstly, they have a direct impact on costs and compliance with project time lines because the application rate, extra labor and other factors mainly depend on the sealant properties. Secondly, the easier and the more hassle-free the application of a sealant the lower is the risk for errors during the installation which might lead to failures on the long run. Excellent working properties have therefore always been a core element in the design of sealants within *Prokem*. The combination of – sometimes opposed – application properties are the fine art of sealant development and requires a good knowledge of the on-site requirements and experience to translate these requirements into a final product. All *Prokem* sealants are optimized for superior workability.



Low extrusion force:

To ensure a sufficient speed of application mandatory to meet project completion deadlines and not to exceed cost limits a sealant must be easy to extrude – even at low temperatures. *Prokem's* sealant range has been formulated specifically to meet exactly this goal.





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