SILICOFLEX
JOINT SEALING SYSTEM

R.J. Watson, Inc.
Bridge & Structural Engineered Systems

Innovative Technology

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Technology

The Silicoflex Joint Sealing System is an innovative system developed by R.J. Watson in the mid 1990's. It was designed in response to the absence of a sealing system that was both easy to install and offered a long, effective sealing life. This absence has been filled with Silicoflex and its features have made it a popular alternative to traditional sealing systems throughout the world.

The Silicoflex System consists of an inverted 'V' shaped, preformed, extruded silicone rubber seal, with a single component silicone locking adhesive and a primer. Two beads of silicone locking adhesive are used; one above and one below the silicone rubber seal to ensure a tenacious, water-tight and continuous seal.

Features

Low Stress Design
During normal cyclic movement, the Silicoflex seal is not in tension due to its folded inverted 'V' shape. This reduces stress on both the seal and adhesive and eliminates the possibility of cohesive failure typically found in field molded sealants.

Large Movement Range
Silicoflex is manufactured in three different sizes which cover the full range of movements typical of single cell joint openings.

Temperature Insensitive
Silicoflex will remain flexible in almost any environment. The material stability temperature range is -60° F to +350° F.

Ultraviolet Radiation and Ozone Resistant
The Silicoflex seal is comprised of an inorganic base silicone, which means it is highly resistant to the damaging effects of ultraviolet radiation and ozone attack. This resistance is far superior to organic rubbers commonly found in other joint sealing systems which degrade due to U.V. exposure.

Durable
Silicoflex applications installed in the mid-1990's are still performing effectively to this day.

Versatile
Silicoflex will bond equally well to steel, concrete and elastomeric or polymer concrete surfaces. Silicoflex can also be used to reseal failed strip seal joints and works well with irregular, tapered and spalled joint openings. These features make Silicoflex ideal for maintenance and retrofit projects.

Fast and Simple Installation
Silicoflex seal installation time is about 15-20 minutes per lane. 30-60 minutes after the installation is complete, the lane can be reopened to traffic.

Maintenance Friendly
In the event of a puncture, Silicoflex can be easily repaired using the silicone based locking adhesive. With more severe damage, locally damaged pieces can be removed and new pieces can be spliced in.

Debris Friendly, Self Cleaning Design
The inverted 'V' shape directs debris to the edges of the seal where it is bonded and fixed. During cycling, debris is channeled upwards thereby reducing the chance of punctures. Other systems with 'V' shaped seals direct debris towards the unsupported center, making it much more susceptible to punctures from debris.

Field Spliceable and Directional Changes
If required, the Silicoflex gland can be bonded to itself by using the same silicone locking adhesive. This permits installations lane by lane or rapid custom tailoring of the gland to go up and around curbs and parapets.

Material Properties

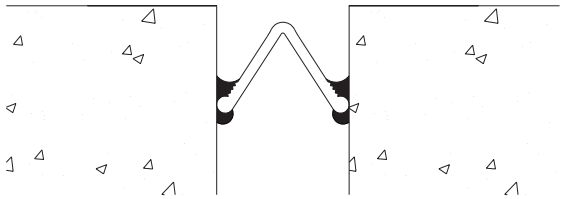
SILICOFLEX GLAND

PROPERTY VALUE	TEST METHOD	TYPICAL
Durometer (Shore A)	ASTM D 2240	55 +/- 5
Tensile Strength	ASTM D 412	1,000 psi. min. (6.89 MPa)
Elongation	ASTM D 412	400% min.
Tear Strength (Die B)	ASTM D 624	100 ppi min. (17 kN/m)
Compression Set At 212° F 70 hrs.	ASTM D 395	30% max.

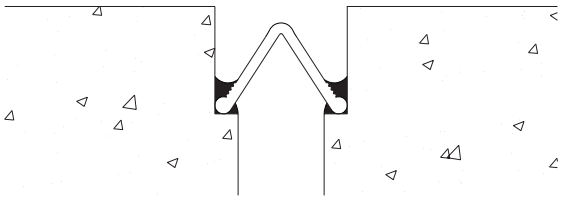
SILICOFLEX ADHESIVE

PROPERTY VALUE	TEST METHOD	TYPICAL
Tensile Strength	ASTM D 412	200 Psi min. (1.38 MPa)
Elongation	ASTM D 412	450% min.
Tack free time	ASTM C 679	20 min max.
Cure Time ¼" bead	ASTM C 679	24 hrs. max
Resistance to UV	ASTM C 793	No cracking, ozone chalking or degradation

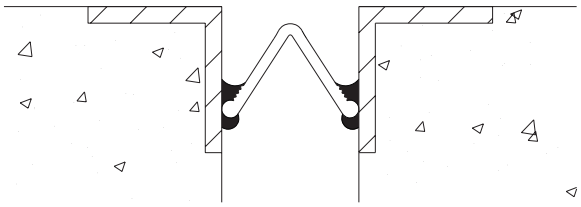
Typical Silicoflex Applications



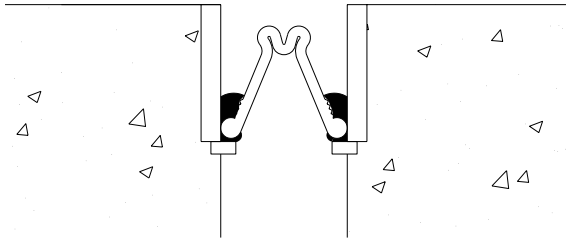
Silicoflex installed in concrete headers



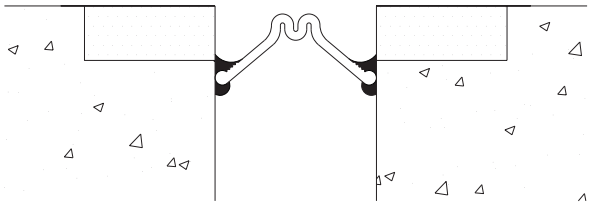
Silicoflex installed in stepped concrete headers



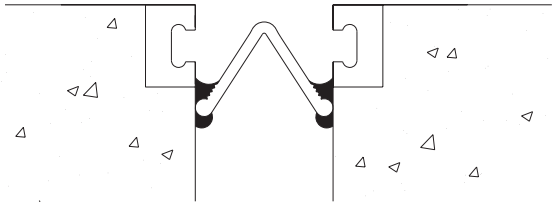
Silicoflex installed with steel armoring



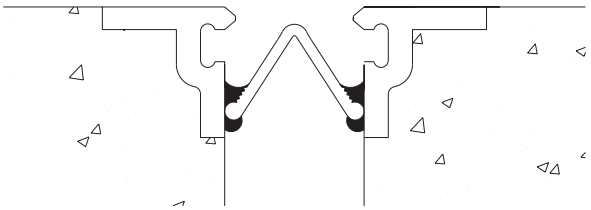
Silicoflex installed with stepped steel armoring



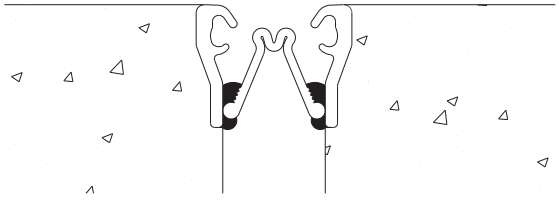
Silicoflex installed with elastomeric or polymer concrete nosing material



Silicoflex installed to repair Strip Seal Locking Mechanism Type A/E Extrusion



Silicoflex installed to repair Strip Seal Locking Mechanism Type M Extrusion



Silicoflex installed to repair Strip Steel Locking Mechanism Type R Extrusion

Installation Conditions

The recommended minimum temperature to install Silicoflex is 40° F air/surface temperature. The joint surface must be completely dry before installing Silicoflex. Silicoflex should not be installed immediately after precipitation or if precipitation is forecast for the day. Joint preparation and installation of Silicoflex must be done during the same day. Traffic must not be allowed to pass over a sandblasted and primed joint.

R.J. Watson employs qualified technical representatives who can provide hands-on training for installers of Silicoflex. It is recommended that this service be used by first time installers. Please call our office to schedule a technical representative to be at your jobsite.

Installation Steps

1. For new primed steel joint installations, wipe vertical faces of joint clean with a rag saturated in denatured alcohol - no sandblasting is necessary. For new concrete joint installations, roughen concrete surface and wipe vertical faces of joint clean with a rag saturated in denatured alcohol. Roughening can be done by sandblasting, wire brushing or other mechanical methods approved by R.J. Watson. For joint seal replacements to existing joints, sandblast the vertical faces of the joint and wipe clean with a rag saturated in denatured alcohol.

2. Mix together A and B components of Primer using a hand or drill mixer. Apply to the vertical joint interfaces.

3. Unroll Silicoflex seal, place adjacent to joint opening and clean the seal with a rag saturated with denatured alcohol.

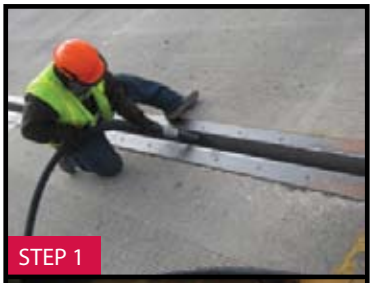
4. Using a jumbo size (29 oz) caulking gun, place a 1/2" diameter bead of Silicoflex Locking Adhesive to both sides of the vertical face of the joint. This bead of adhesive should be placed at least 1" below the top of the joint elevation.

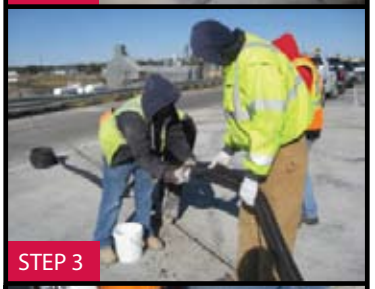
5. Insert the Silicoflex seal into the joint, initially placing it above the first bead of locking adhesive. Gently ease the Silicoflex seal downward while maintaining contact of the sides of the seal to the joint header. Position the Silicoflex seal to the proper depth, which is when the top of the seal is between 0.5" and 1.0" below the top of the road surface.

6. Apply a second bead of locking adhesive along each side of the Silicoflex seal, to the top of the serrations, and no higher. This second bead of adhesive should be in contact with the Silicoflex seal and the joint face.

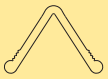
7. The locking adhesive must be 'tooled' at least twice with a tongue depressor to ensure complete contact with the joint face.

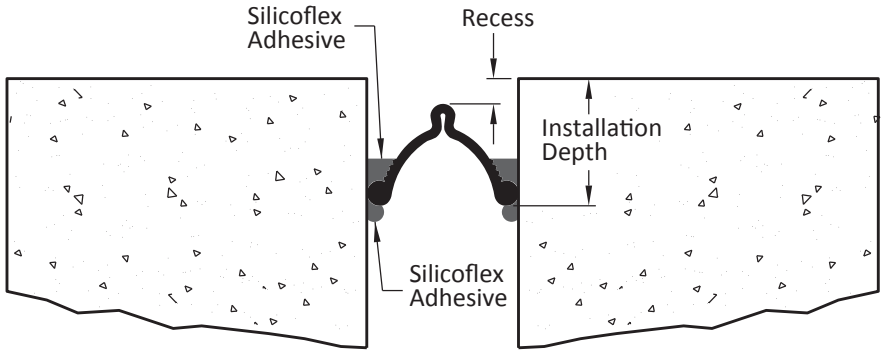
8. Allow 60 minutes before allowing traffic over a newly installed Silicoflex seal, unless directed otherwise by an approved representative. Vertical curbs, directional changes and field splices require the Locking Adhesive as a bonding agent.

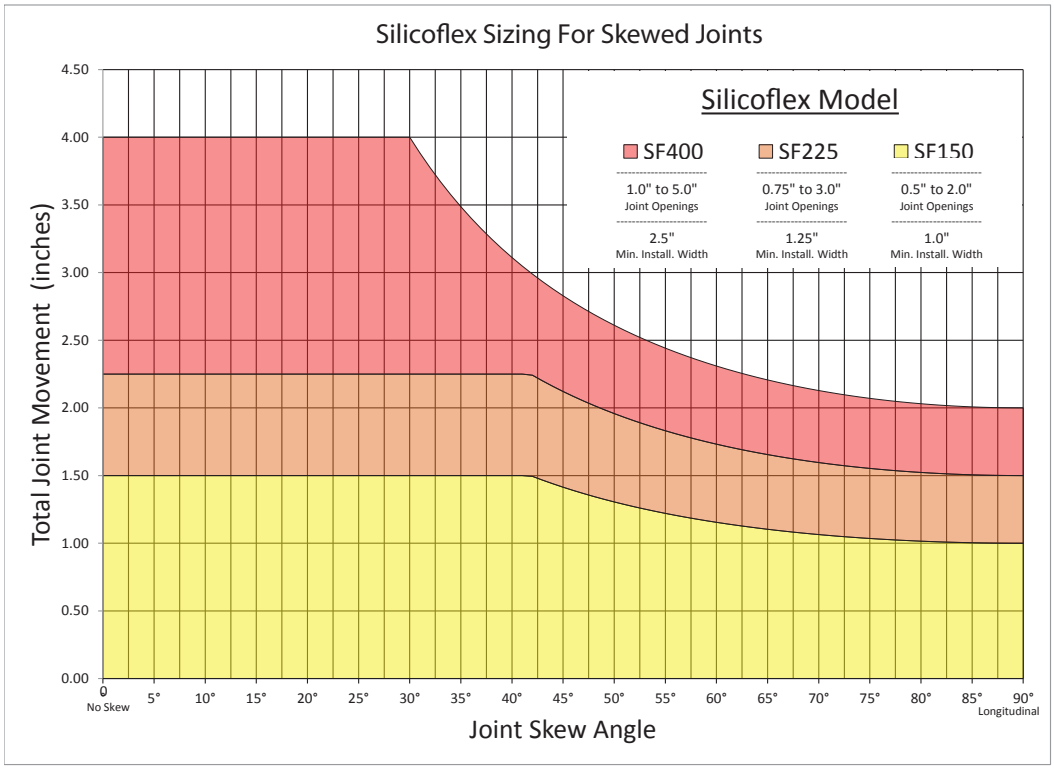




Sizing Chart

	A			B
Model	**Inst. Width**	**Max Closure**	**Max Opening**	**Installation Depth**
SF150 	1.0 - 2.0 in. (25-51mm)	0.5 in. (13mm)	2.0 in. (51mm)	1.75 - 2.5 in. (44 - 64mm)
SF225 	1.25 - 3.0 in. (31-75mm)	0.75 in. (19 mm)	3.0 in. (75 mm)	2.75 - 3.5 in. (70 - 89mm)
SF400 	2.5 - 4.0 in. (63-100mm)	1.0 in. (25mm)	5.0 in. (125 mm)	3.25 - 4.0 in. (83 - 102mm)



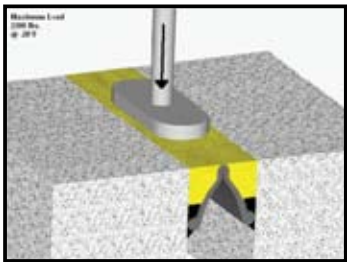


Testing

Elongation - The SF400 model of Silicoflex, rated at a 5" maximum opening, was bonded to a steel fixture and allowed to cure. It was then elongated to failure. The seal withstood a 14" opening before it failed. When it did fail, it failed at the center of the rubber seal, and not at the bonding point.

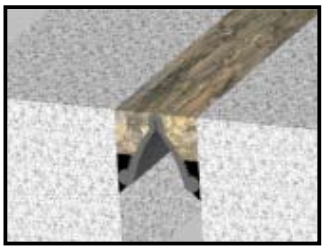
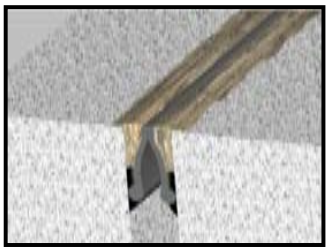


Vertical Load - Silicoflex was bonded to a concrete surface and filled with debris. A vertical load was placed on the Silicoflex seal, simulating how vehicular traffic would impact the joint. Silicoflex withstood 2,200 lbs of force without failing. It could have withstood more, but this was the capacity of the hydraulic actuator.

Joint Cycling - Silicoflex was installed in a joint cycling machine which displaces the joint seal at a 45° skew angle. 2,000 cycles were completed at -20° F without any rips, tears or bond failures.

Joint Debris - Silicoflex was installed in a joint seal testing fixture, filled with debris, and then cycled to minimum and maximum openings. The inverted 'V' shape directs debris to the seal where it is bonded and fixed. This consequently causes debris to be channeled upwards, rather than staying trapped in the joint and overstressing the seal.

Field Splice - Two SF225 Silicoflex seals were spliced together using the locking adhesive. It was then stretched to failure. 750 lbs of force was recorded just prior to failure.

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