ST-512

VARI-GEL INJECTION RESIN

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DESCRIPTION

STRATATHANE ST-512 Vari-Gel Injection Resin is an expanding hydrophilic polyurethane used to seal leaking pipe joints, for soil stabilization applications, and for stopping water leaks through cracks and expansion joints in concrete structures.

Stratathane ST-512 contains no measurable amount of TDI as performed by the *Modified Analysis for Diisocyanates*. ST-512 is non-flammable, non-carcinogenic, and non-corrosive as defined by *40 CFR* and as described in the *NIOSH Pocket Guide for Hazardous Materials.* Stratathane ST-512 is mixed with water at the work site to form a single injection material. The inert end product becomes a water barrier which is essentially unaffected by acids, gasses, and organisms usually found in soil. A minimum of water is needed for a reaction to occur, but large amounts can be accommodated through reaction or displacement.

ST-512 is often used when heavy flows of cold water must be stopped, when a water-reactive gel with a closely controlled set time is needed, and where a flexible seal is preferred or required. ST-512 mixes with and reacts with water to form a gel of varying strength depending on the ratio of prepolymer to water. The minimum concentration for usable gel formation is about 5%, or 20:1 when expressed as a ratio.

WATER: ST-512	END PRODUCT DESCRIPTION
15:1	Very Soft Gel
10:1	Strong Resilient Gel
5:1	Very Resilient Gel
1:1	Solid & Foamed Gel

Because of its low viscosity, its excellent adhesive properties, and its expansive gel reaction, ST-512 provides superior performance in controlling water, especially in fine soils, tight cracks, or long hoses. The short gel time of ST-512 may also make it more economical than grouts with longer set times.

ST-512 is injected directly from the container by blending the polymer with water in the desired ratio using twin stream pumping equipment. During injection, ST-512 mixes with water, expands slightly as it gels, and fills the leak path with a tight, impermeable, and nondegradable seal that immediately stops water entry.

PROPERTIES

The strength of the ST-512 gel is higher than many other gels and is chemically stable. The elastic nature of the seal created by ST-512 allows a structure to move at the existing crack without loss of the seal. The cured gel is resistant to attack by alkalis, gases, acids, and normal bacteria found in soil and the leak environment.

ST-512 reacts with water to gel at any temperature above freezing and will accommodate seawater and high concentrations of minerals. The resultant gel is chemically stable and is not bio-degradable. ST-512 and other members of the Stratathane family of polyurethanes are resistant to hydrogen sulfide attack. Tests have concluded that even high concentrations of hydrogen sulfide do not degrade the ST-512 gel or affect its sealing properties.

The expansive nature of ST-512 at certain water:resin ratios is a significant feature in its ability to stop water leakage. Depending on conditions at the leak site, the end product state desired for the ST-512 may vary from a soft to a very dense gel. Normally, the ratio will be about 10:1, but a range from 1:1 up to about 15:1 is usable. The following table illustrates the relationship of the water ratio to the resulting gel solid at a temperature of 20 C.

RATIO WATER ST-512	GEL TIME (SEC)	TENSILE ADHESION (kg/cm2)
15:1	75	1.0
10:1	50	1.0
5:1	30	1.0
3:1	30	2.0
1:1	25	3.0

VISCOSITY

The reaction and set time of ST-512 is also a function of both the material temperature and ambient temperature, with a somewhat different relationship holding for each ratio of water to prepolymer. The following graph shows the effect of temperature on the viscosity of the prepolymer before mixing with water.

TEMP C	TEMP F	VISCOSITY (UNMIXED)
5	41	3600 cps
10	50	3000 cps
15	59	2550 cps
20	68	2150 cps
25	77	1650 cps
30	86	1350 cps
40	104	975 cps

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Pre-mix viscosity is a factor affecting handling by the applicator but is not normally important for penetration considerations in the joint or the grout zone because the viscosity of the solution after water is added is not much greater than water itself.

GEL TIME

Gel time will vary somewhat with differences in mix ratio, water mineral content, and prepolymer age. Exact set times should be determined on site by cup tests during application. The following table, however, gives some approximate values.

TEMPERATURE		GEL TIME (SECS)	
C	F	5:1	10:1
5	41	89	125
10	50	64	95
15	59	49	60
20	68	35	52
25	77	25	45

For gel times in general, the smaller the amount of water in the mix, the faster will be the set time. To temporarily lengthen set time at a low water ratio, iced mix water may sometimes be used.

CONSTANTS

Appearance	- Light Yellow Liquid
Specific Gravity	- 1.1 at 77 F (25 C)
Viscosity cps	- 1700 cps at 25 C approx.
Bulk Density	- 9.05 lbs/gal
Coagulation Point	- -6 to -9 C
Boiling point	- 406 F (209 C)
Volatile %	- Negligible
Odor	- Very Little
Flash Point	- 390 F (199 C) ASTM D-93

EQUIPMENT

Hand pumps with ratioing capability and high production, air powered pumps for placing ST-512 are available from Strata Tech and other vendors of grouting equipment. For information on grout pumps and placement techniques, see the pumping and placement data found in other Strata Tech publications.

The low viscosity of the ST-512 Injection Resin after mixing with water allows good penetration into cavities and cracks. After the product gels, water pressure will not extrude the ST-512 resin seal at any head pressure usually encountered in crack repair work.

If the injected area contains water, ST-512 either displaces the water or incorporates it into the gel mass as it sets. Once water reaches the prepolymer, the material rapidly becomes an inert solid which will not harm plant and animal life at tested exposure levels. Without a source of water or moisture, ST-512 has no preset “pot life” and will not cure as long as moisture vapor is not available to initiate curing.

To prevent condensation from forming on the liquid or in the can, the temperature of the ST-512 should be adjusted to match the ambient temperature of the work area.

ST-512 contains methylene diisocyanate (MDI) which is potentially toxic and can create risks if handled improperly. Proper precautions, however, will substantially reduce these risks. ST-512 should not be applied as a coating or spray without special precautions.

CLEANUP

Cleanup of ST-512 is accomplished with a solvent and a cleaner used in sequence. The preferred solvent is ST-590 Kleen-Purge and the recommended cleaner is ST-522 Veri-Kleen Grout Cleaner. Use ST-590 for the liquid resin and ST-522 for solidified resin.

All persons handling ST-512 should receive proper training in recommended normal and emergency handling procedures for products containing MDI. Also read and follow the requirements given in the Material Safety Data Sheet and on the product label.

STRATATHANE ST-512 should be stored in the original container until used. After each use and until no product remains, containers must be closed and tightly sealed. Empty containers should be buried in an approved landfill and not reused for any other purpose. Development of excessive pressure inside closed containers can occur if containers become contaminated with water.

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STATEMENT

Strata Tech believes that the information herein is an accurate description of the general properties and characteristics of the product(s), but the user is responsible for obtaining current information because the body of knowledge on these subjects is constantly enlarged. Information herein is subject to change without notice. Field conditions also vary widely, so users must undertake sufficient verification and testing of the product or process herein to determine performance, safety, usefulness, and suitability for their own particular use.

Strata Tech warrants only that the product will meet Strata Tech’s then-current specification. NO WARRANTY OF SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE. Users should not assume that all safety requirements for their particular application(s) have been indicated herein and that other or additional actions and precautions are not necessary. Users are responsible for always reading and understanding the Material Safety Data Sheet, the product technical literature, and the product label before using any product or process mentioned herein and for following the instructions contained therein.

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