LINABOND®

Permanil™ Ureapoxy™

High Performance Coating

PRODUCT DESCRIPTION

Permanil Ureapoxy™ is a 100% solids high-strength, extremely chemical resistant hybrid polyurea/epoxy. It is primarily intended for protection of concrete and steel in corrosive environments as well as for containment of liquids and gases. It is unique in its ability to wet a surface like an epoxy, but set extremely fast like a polyurea. This eliminates a great deal of the potential for pinhole formation and permeability, since the reaction time is extremely short - with the material "setting" in a matter of seconds. This highly reduced permeability in field application conditions allows this material to perform exceptionally well under conditions that would riddle other materials with voids and pinholes, since it sets before any unwanted reactions can take place with water or other contaminants. Adhesion is largely a function of wetting ability. Permanil Ureapoxy™ is designed with an epoxy formulation as a subset of the main polyurea formula, which allows outstanding wetting of substrates, and resultant excellent adhesion. Density is nearly 100% of theoretical mass, even in field conditions.

It is easy to apply, sets very quickly and has excellent resistance to acid and sulfides. It is very strong and tough with good elongation and it will cure under water. Both set time and cure time are relatively short, allowing structures to be returned to service almost immediately. It becomes tack-free in less than one minute and becomes extremely tough in 36 hours at room temperature. This material may go through a slight "brittle" stage while curing. Keeping the structure warm for several hours will eliminate this phenomenon, if desired. Heating for a few hours is recommended in cold environments.

This material is very useful in wastewater conditions where hydrostatic pressure is a problem, since it both penetrates quickly and cures quickly, preventing damage by water vapor transmission and resulting in a dense cured film which will hold considerable water pressure. While no liquid-applied coating will ever have the reliably impermeable nature of an extruded lining in the field, this material comes as close as we believe technology will allow, and will serve exceptionally well where an extruded liner cannot be used.

MIXING INSTRUCTIONS

Permanil Ureapoxy™ can be applied by 1:1 plural component pump equipment designed specifically for heated application of 2 component materials and approved by Linabond. The 1 to 1 ratio makes application extremely forgiving. However, Digital Ratio Monitoring should be required in the project specification to assure proper application ratio. Spray guns should be of the impingement mixer type and should be self-cleaning, due to the extremely fast set time of this material. This material can be dispensed through a two part caulking gun with disposable "static mixers" for very small jobs, like joint filling, and has a work life of 15 to 45 seconds. It cannot be hand mixed and trowelled, because set time is extremely short. Please remember that this material is designed to allow the return of the structure to service in a matter of minutes, and minimize environmental application difficulties during application. It is essential to have a material which sets quickly, and which has been tested in the most adverse environments - DURING the formulation process.

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(U.S. Patents #4,792,493 #5,268,392 & #5,389,692 with others pending - U.S. and

USES

Use Permanil for manholes, wet wells, tanks, tank cars, reservoirs, dams, containment, penstocks and many other uses where a tough, low permeability, high performance coating is desired.

PRECAUTIONS

Please read MSDS sheet before use. This material is intended for professional use only. Use with adequate eye, skin and respiratory protection and always provide ventilation in closed areas. Respirators should be approved for organic vapors. Keep vapor concentration below TLV limits. Overexposure may lead to skin, eye or respiratory irritation. It is toxic by ingestion. Avoid contact of this material with open flame. Chemical resistant gloves and eye protection are recommended.

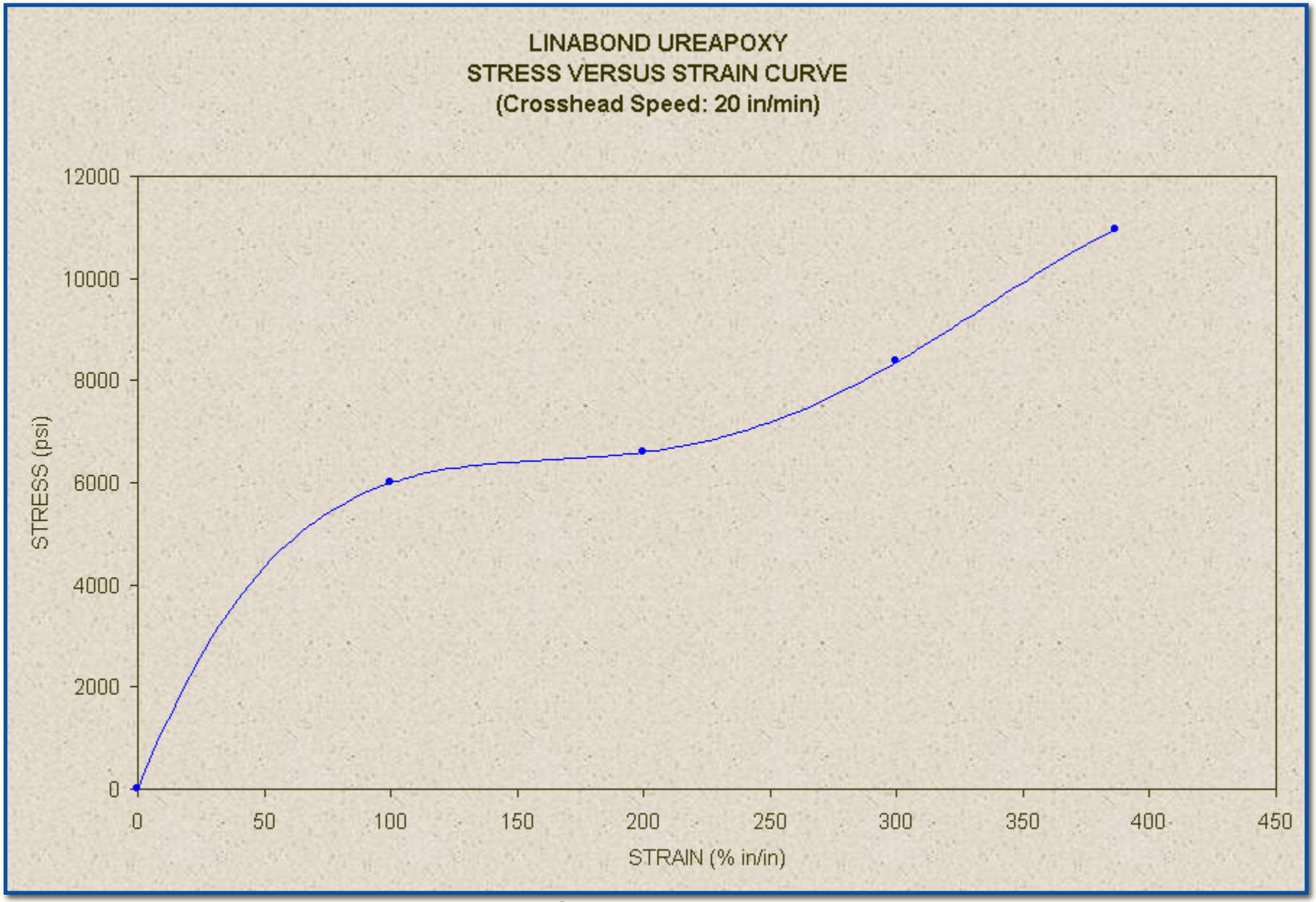
STORAGE and TRANSPORTATION

Avoid freezing temperatures. Keep away from open flame and store at temperatures of approximately 40 to 90 degrees F.

During transportation, care should be exercised to avoid puncturing the product containers. Also, storage containers and/or trailers should not be left in desert heat above 120 degrees Fahrenheit for more than 3 months during shipment, nor should it be exposed to temperatures below freezing for more than 3 months.

These materials are intended for use only by applicators trained and competent in the use of plural component materials and equipment.

Permanil™ Ureapoxy™



Tensile Strength and Elongation

Tensile and elongation (Stress VS Strain) showed that the Permanil™ Ureapoxy™ gains modulus as it elongates. As you can see, the numbers are quite high for a material with 400% elongation.

These tests were conducted on an Instron Corporation Series IX Automated Materials Testing System.

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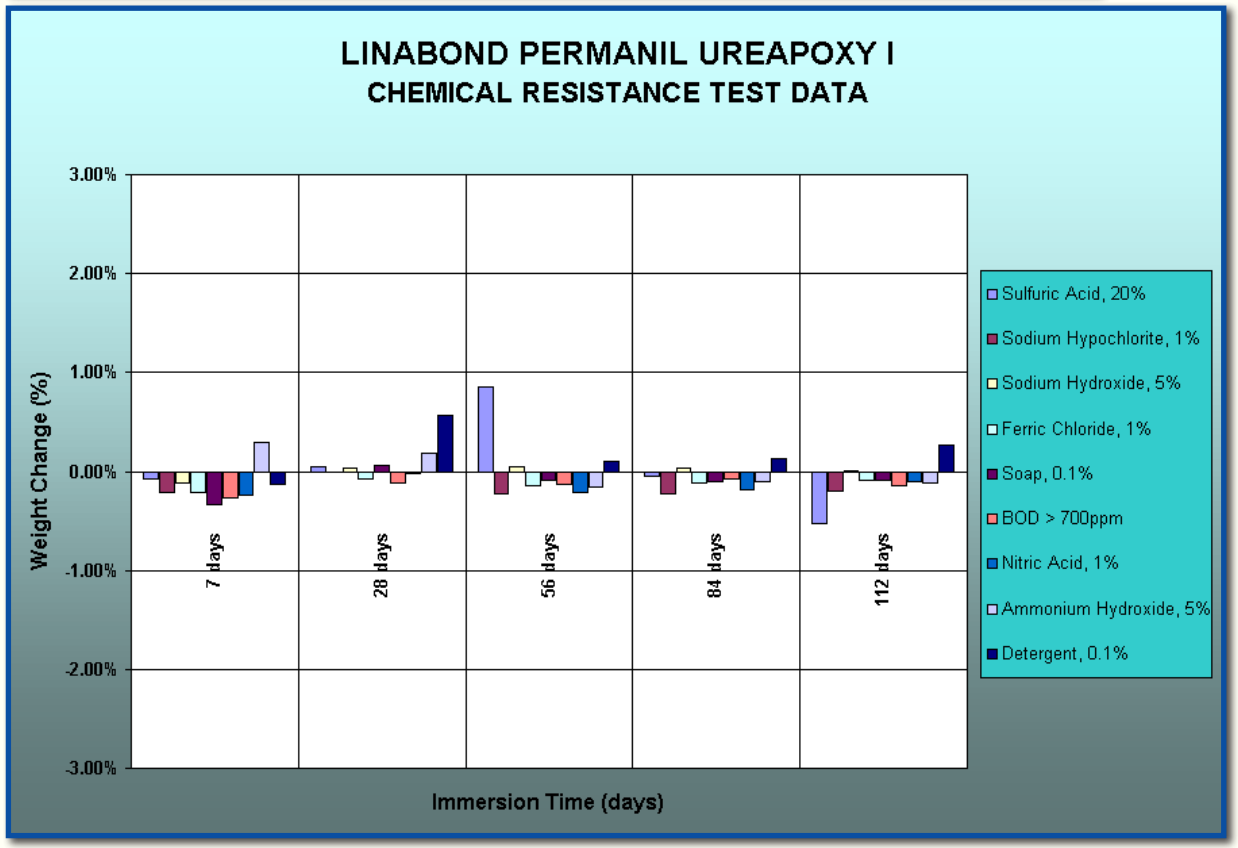
CHEMICAL RESISTANCE TEST DATA - PERCENT WEIGHT CHANGE

CHEMICAL BATH	DAYS IMMERSED					
	7	28	56	84	112	Requirements*
Sulfuric Acid, 20%	-0.08%	0.05%	0.85%	-0.05%	-0.53%	(+/-) 1.5 %
Sodium Hypochlorite, 1%	-0.21%	-0.01%	-0.22%	-0.23%	-0.20%	(+/-) 1.5 %
Sodium Hydroxide, 5%	-0.11%	0.03%	0.05%	0.04%	0.01%	(+/-) 1.5 %
Ferric Chloride, 1%	-0.21%	-0.07%	-0.14%	-0.12%	-0.09%	(+/-) 1.5 %
Soap, 0.1%	-0.34%	0.06%	-0.09%	-0.11%	-0.09%	(+/-) 1.5 %
BOD > 700ppm	-0.27%	-0.11%	-0.13%	-0.07%	-0.14%	(+/-) 1.5 %
Nitric Acid, 1%	-0.24%	-0.02%	-0.21%	-0.18%	-0.11%	(+/-) 1.5 %
Ammonium Hydroxide, 5%	0.30%	0.18%	-0.16%	-0.10%	-0.11%	(+/-) 1.5 %
Detergent, 0.1%	-0.13%	0.57%	0.10%	0.13%	0.27%	(+/-) 1.5 %

Notes: * As per Standard Specifications for Public Construction (Greenbook), Section 210-2, Requirements for Protective Plastic Liners.



Chemical Resistance

Permanil Ureapoxy™ surpasses the requirements for PVC Liner materials per the Standard Specifications for Public Construction. Here you can see the results of the 112 day accelerated chemical bath test showing weight gain/weight loss. In all cases it was well under the requirements for PVC Liners in wastewater construction. The entire white area of the lower graph is the allowable weight-gain/weight-loss for extruded PVC lining materials. This is a very high-performance material with unequaled performance, application properties and mosture tolerance. It will cure just as fast under water as it does in the atmosphere. Initial cure is roughly 10 to 20 seconds.