

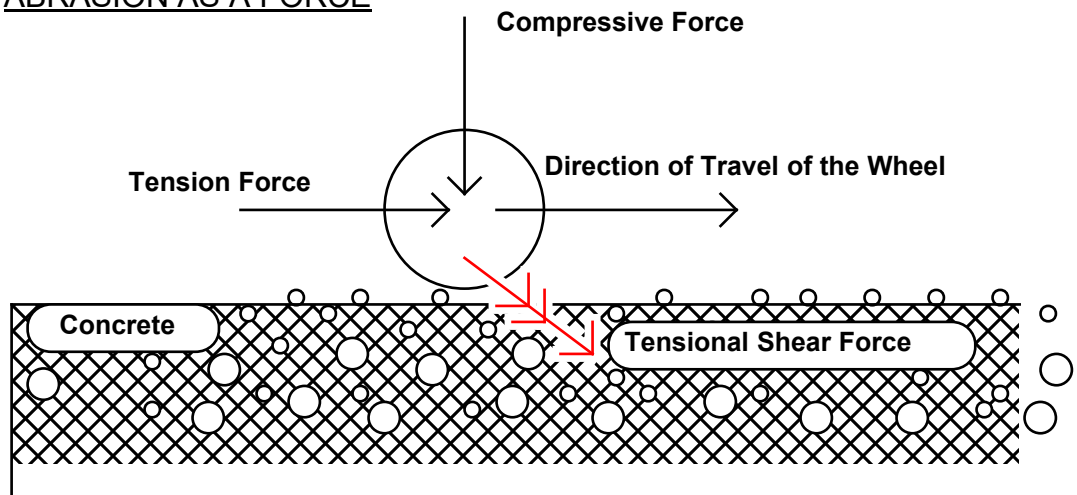
HARDENING, DENSIFYING, CURING, STAIN RESISTANCE

Protec III: Acrylic Membrane

The Complete Strength Gain Material for Concrete Floors

Protec III: Acrylic Membrane is the highest performing curing compound, hardener, shrinkage controller and overall strength gain material on the market today for new concrete floors. Overall strength is a combination of compressive strength, hardness, elimination of shrinkage to its lowest degree and the often overlooked, tensional strength.

ABRASION AS A FORCE



Abrasion resistance in simplified form is a combination of compressive force and tension force. Together these two forces produce a third force, tensional shear (or shear). Tensional shear is a force measured by movement of an object over a stationary (unmovable) object (ie. a wheel moving over a concrete surface). Together the downward force or compression and the horizontal force, tension, create a third force which is not horizontal or vertical, but diagonal and is a combination of these two forces. Tensile strength unlike compressive strength is highly influenced by curing and hydration levels. Plastic shrinkage cracking is a sign that some tensional strength has been lowered and commonly occurs on untreated or ineffectively cured concrete surfaces.

Protec III: Acrylic Membrane increases strengths, especially tensile with its Liquid Silica Fume Technology. This Technology produces very high hydration densities in the top wear layer of a concrete floor.

It is generally known in the industry due to the number of increasing failures that dry shake hardeners are essentially incompatible with modern mix designs. They still produce higher compressive strengths and hardness but now with low water to cement ratios and fly ash they generally do not chemically (and mechanically) combine properly. Tensile strength is often lowered dramatically by using dry-shake hardeners in modern mix designs. This is due to the fact that dry shake hardeners have never increased micro density but used hardness only to increase strength. De-laminations are typically the result of almost total loss of tensile strength (peeling of concrete floors).

Concrete containing fly ash or silica fume requires proper curing, along with the secondary hydration product (Protec III's Liquid Silica Fume Technology), so that its low shrinkage and strength producing properties are fully utilized.

Penetrating sealers that react with the concrete such as silicates, siliconates, and the special formula products that are marketed as liquid hardeners have also been used for curing. Although these products produce denser surfaces, they generally will not eliminate dry shrinkage and plastic shrinkage cracking because of their inability to effectively retain sufficient moisture when curing. This may result in decreased tensile strength and in some instances carbonation, dusting and curling of the concrete.

Acrylic cure and seals do retain moisture adequately, but they do not have strength (either compression or tensile) enhancing properties.

ASTM C157 Shrinkage Test Comparison (by curing type)

<u>Curing Type</u>	<u>% of shrinkage from Control (28 days)</u>	<u>3000 mm Beam Shrinkage</u>
Protec III: Acrylic	0 - 8%	1.235 mm
membrane Water (ponded)	0 - 8%	1.286 mm
Acrylic Cure and Seals	30 - 46%	1.732 mm
Silicate and Siliconate	54 - 72%	1.97 mm
Sealers Air (non-cured)	200 - 340%	3.25 mm

Protec III: Acrylic Membrane when properly applied (within 4 - 8 hours after the new concrete floor has set) can eliminate plastic shrinkage cracking, carbonation, and dusting.

In ASTM C157 Protec III: Acrylic Membrane has been found to reduce shrinkage cracks equal to that of water curing. Water curing in many instances can carbonate the new slab because water easily takes on carbon dioxide from the environment. Carbon dioxide levels are much higher indoors and in winter heating conditions. Carbonation, caused by the acidic reaction of fresh concrete and CO₂, breaks down the chemical bonds of the hydrated cement resulting in dusting and an unsound, weak concrete surface. Protec III: Acrylic Membrane when properly applied virtually eliminates carbonation.

Protec III: Acrylic Membrane is overall the highest performing strength enhancing material for concrete floors. In fact it can help eliminate the problems that are often experienced in new concrete floors and produces greater chemical resistance. Protec III: Acrylic Membrane works by retaining moisture to the highest level along with adding an extra hydration product using liquid silica fume technology. This allows for a more controlled cure of the concrete, increases the micro density and produces higher strength concrete with the lowest level of shrinkage.

ASTM TESTS

ASTM	NAME OF TEST	USES OF TEST	RESULTS
ASTM C157	Length Change of Hardened Hydraulic Cement Mortar or Concrete Beam	Determination of length change by curing type.	Shrinkage decrease of 30% - 60% from other curing types. See chart on page 2
	Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.	Evaluates membrane forming compounds for use as curing compounds for fresh concrete. These membranes also have special properties.	In compliance with ASTM specifications with exception to slower drying time in cold temperatures
ASTM C309	Liquid Membrane Forming Compounds for Curing Concrete	This specification evaluates membrane forming compounds for use as curing compounds for fresh concrete. Results include retention properties reflectance, drying time, non-volatile content, flashpoint, and VOC content.	Type I, Class A. In compliance with ASTM specifications
ASTM C418	Standard Test Method for Abrasion Resistance of Concrete.	Increase hardness	67% increase in hardness
ASTM C1353	Taber Abrasion	Abrasion resistance	Increase of abrasion resistance by 46% at 1000 cycles
ASTM C642	Test Method for Density Absorption and Voids in Hardened Concrete	Evaluate products ability to reduce absorption	Reduction of 72%
ASTM C1583 (modified)	Standard Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength Concrete Repair and Overlay Materials by Direct Tension (Pull off Method)	Evaluates tensile and bond strength	55 - 68% increase in Tensile Strength
ASTM C803	Penetration Resistance	Determination of hardness and compression values	In various tests compression of the top wear layer has been measured and calculated to be up to 65 mpa from a 30 mpa mix design.
ASTM B117	Standard Method of Salt Spray	Used as a chloride ion permeability test	57% decrease in permeability to Salt Spray.

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