

# PAVEMENT UNDERSEAL AND WATERPROOFING MEMBRANES



"Results of ongoing research in Vermont now strongly suggest that a properly selected and applied waterproofing membrane will reduce the oxygen and moisture supply at the rebar level enough to lower corrosion activity to non-destructive levels."

(State of Vermont research, based upon a 4 year evaluation of seven chloride contaminated bridge decks, Source: Paper presented at 4R Conference, November 1989, by Ronald I. Frascoia, State of Vermont, Agency of Transportation. *Polyguard* Membrane used in research.)

"...waterproofing membranes have reduced the rate of reflective cracking...even when reflective cracking appears over joints with membrane treatment, the cracks appear to stay tighter than cracks over joints without membrane treatment."

(Georgia DOT research, based upon a 6 year evaluation of 20 test sections of I-85. Source: Transportation research Record 916, paper presented by Wouter Gulden and Danny Brown, Georgia Department of Transportation. *Polyguard* Membrane used in research.)

## POLYGUARD PAVEMENT WATERPROOFING MEMBRANES

**DESCRIPTION:** *Polyguard Pavement Membranes* are rubberized asphalt waterproofing adhesive, laminated to polypropylene fabric backings. The laminated membrane is wound onto a disposable silicone treated release sheet to prevent the membrane from sticking onto itself while in the roll.

*Polyguard* has been specified by most state DOTs to protect bridge decks or pavement bases from water and moisture. Two variations of *Polyguard Pavement Waterproofing Membranes* are available:

- *NW-75* has a non-woven, felt-like polypropylene backing, with fibers that bond to the overlay.
- *665* has strong woven polypropylene backing. It is suitable for projects where overlay temperature does not exceed 325°F and a tack coat is used prior to overlay.

POLYGUARD		NW-75	665
PROPERTY	TEST METHOD	MARV VALUE	MARV VALUE
Thickness (using 1/2" presser foot)	ASTM D 1777 (Testing Option 1)	.065 (1.65mm)	.065 (1.65mm)
Strip Tensile Strength	ASTM D 882	50 LB/in. width (222N)	50 LB/in. width (222N)
Grab Tensile Strength	ASTM D 4632	160 LB (0.711N)	150 LB (224N)
Puncture Resistance	ASTM E 154	200 LB (896N)	200 LB (896N)
Permeance - Perms	ASTM E 96 METHOD B	0.05 max.	0.05 max.
Elongation at break of fabric	ASTM D 4632	60%	20%
Pliability at low temperatures (-15°F)	ASTM D146	No Cracks in Fabric or Rubberized Asphalt	No Cracks in Fabric or Rubberized Asphalt

**Key properties of Polyguard Membranes are...**

- High Strength
- Good Puncture Resistance
- Impermeability to Moisture
- Flexibility at Low Temperature

***These properties enable the material to act as a permanent seal, even under cracked pavement. The same properties also help to reduce the amount and severity of cracking in the overlying pavement.***

**EQUIPMENT REQUIRED:** No specialized equipment is required for unrolling and placing *Polyguard Membrane*. For large jobs, some installers utilize a simple hand truck. *Polyguard* has available a limited number of these devices as a service to our customers.

**SURFACE PREPARATION:** Pavement surfaces must be clean and dry prior to application. A smooth surface will improve adhesion. Surfaces must be free of voids, sharp projections and debris or aggregate. New concrete must be cured a minimum of 7 days, and surfaces must be free from form release agents, curing agents, and other contaminants. Form release must be the self-dissipating type. Curing compounds containing oil, wax, silicone, or pigments should not be used.

**LIQUID ADHESIVE:** Liquid adhesive should always be used to prime concrete bridge deck surfaces, or on milled pavement surfaces.

**On new asphalt surfaces,** liquid adhesive need not be used unless the temperature is too cool to obtain a good bond between membrane and pavement. The condition can occur between 40°F and 50°F.

**On old asphalt or concrete pavement,** liquid adhesive is not required if pavement temperature is over 70°F and rising. If temperature is under 70°F, liquid adhesive is recommended. Drying time of liquid adhesive can vary. Allow adhesive to cure thoroughly. Adhesive is ready for membrane application when it does not adhere to fingertips when touched lightly.

A variety of liquid adhesives are available. *650 RC Liquid Adhesive*, solvent based, can be used at temperatures over 40°F. Liquid adhesive coverage is approximately 400 ft<sup>2</sup>/gallon (250ft<sup>2</sup>/gallon on milled surface.)

**MILLED SURFACES:** if pavement surface is milled, liquid adhesive must be used, and care should be taken when rolling membrane to maximize adhesive surface contact.

**TEMPERATURE:** *Polyguard Membranes* should be applied only when pavement and air temperatures are 40°F and rising, and weather is fair. In marginal conditions, a test area should be installed, and checked for adequate adhesion.

**INSPECTION AND REPAIR:** After application is complete, the membrane should be inspected for tears, punctures and air blisters prior to placement of asphalt overlay. Repairs should be made by removing all damaged membrane so that only bonded membrane remains. Reprime any exposed pavement. Apply a new sheet of membrane over the pavement and over the previously applied membrane at the edges of the damaged area.

**TRAFFIC OVER POLYGUARD PRIOR TO OVERLAY:** *Polyguard Membrane*, properly installed and bonded to the pavement, may be opened to traffic prior to overlay for up to two weeks. The following precautions should be observed:

- During wet periods, traffic should be slowed, as the top surface of the membrane can be more slippery than pavement.
- Installation should be checked periodically to make sure that the membrane system continues to adhere. Marginal installation conditions, combined with heavy rain and traffic, have been known to cause delamination of the membrane.
- Membrane should not be left exposed to ultra-violet rays for over 30 days without a protective cover or coating.

***Polyguard Membranes are equally effective on both bridges and pavement surfaces...however, there are different installation procedures for each.***

**INSTALLATION: Joint and Crack Repair...** If liquid adhesive is required, adhesive should be applied 1" wider than the membrane. The membrane should be centered over the joint or crack within a 2" tolerance. Transverse joints and cracks should be sealed first, starting at the outside edge of the pavement and extending the full length of the joint.

The outside edge of the joint should be sealed after transverse joints. All laps should be made in such a manner that the paver does not encounter the exposed edge of the lap first.

Transverse membranes should be extended 4" to 6" beyond each pavement edge. Cracks that connect with a transverse joint should be sealed with a minimum of 2-1/2" lap at the intersection with the joint. End laps in both the transverse and longitudinal membrane should have a minimum overlap of 3".

The membrane should be installed straight and wrinkle free with no curled or uplifted edges. Any wrinkles over 3/8" in width shall be slit and folded down. Roll membrane thoroughly to improve adhesion.

**INSTALLATION: Bridges, Parking Decks, and Parking Lot Area Repairs...** The membrane should be installed straight and wrinkle free with no curled or uplifted edges. Any wrinkles over 3/8" in width should be slit and folded down.

On horizontal surfaces apply membrane from low to high pitch to provide tight seal. Side laps should be a minimum of 2-1/2". End laps should be 3". Pressure roll all membrane. A fillet or cant strip made from 95 *Liquid Membrane* should be applied to the clean dry deck and curb to avoid a sharp angle when applying the membrane flashing. Flashing strips should be applied at least 6" out on the deck and extend up the vertical face of the curb. The flashing should be applied to a point just below the planned height of the asphalt overlay. Press firmly to eliminate all gaps, openings or fish mouths. Seal curb or flashing terminations with 650 *Mastic*. Curb treatment should follow prevailing contract details. On non-working joints or cracks over 3/16" width, double ply by applying a narrow width of membrane prior to the full width membrane. Membrane surface must be rolled after application to improve adhesion.

**PAVING:** Paving mix should be applied as specified. However, minimum compacted thickness of less than 1-1/2" is not recommended. DOT or agency specifications regarding tack coat should be followed. If no agency specification exists, *Polyguard* requires a tack coat if 665 is being used. If *NW-75* is being used, a tack coat is recommended. It is difficult to guarantee that the paving mix will be applied sufficiently hot due to the type of scheduling or equipment problems common to paving operations. Use of a tack coat reduces the possibility of problems resulting from overlay with a too cool mix.

Paving temperature specified by DOT or agency should be used. If no agency specification exists, paving temperatures at compaction of 290°F to 300°F is recommended. Use of vibratory rollers during paving is NOT recommended. Note that polymer modified overlays generally require paving temperatures too high for 665. Contact *Polyguard* for technical support if polymer modified overlay is to be used.

**PRECAUTIONS:** No other use of these materials is to be made without prior approval of *Polyguard Products, Inc.* as to service and method of application. If solvent base liquid adhesives are used, MSDS sheets should be reviewed with special care. Proper protective clothing should be worn, including eye protection. All cartons of membrane and liquid adhesive containers shall be protected from the weather and lids of liquid adhesive cans securely fastened between use. In cold weather, materials shall be stored above 60°F until the day of use. Materials should be kept away from direct heat, sparks, and open flames. Do not stack higher than five feet, vertically. The liquid adhesive is an industrial coating and could be harmful or fatal if swallowed. Some are marked as red label from the standpoint of flash point. Refer to product label for handling, use storage precautions. Solvents could be irritating to the eyes. In case of contact with eyes, flush with water and contact physician. Avoid prolonged contact with skin and breathing of vapor or spray mist from liquid adhesive. If in confined areas, use adequate forced ventilation, fresh air masks, explosion proof equipment, and clean clothing. Keep out of reach of children.

The information in this data sheet is designed to be helpful to the reader. It is based on experience and information considered to be accurate and true. Readers should carefully consider and verify the information with investigation of any areas with uncertainty. *Polyguard* does not warrant the results to be obtained. Additionally, please read everything here in conjunction with *Polyguard's* conditions of sale, which are applicable to everything supplied by us. No statement here is intended for any use which would infringe any patent or copyright.

*Polyguard Products, Inc.* will replace F.O.B. Ennis, Texas, material not meeting our manufacturer's specifications one year from date of sale. Made in the U.S.A.

**SAFETY:** All *Polyguard* products must be handled in a safe manner. Some products (some mastics or primers) contain solvents, and these deserve special attention to safety since their vapors are both flammable and harmful if inhaled. Also certain 2 component products contain especially hazardous components. Read both the product label and the Material Safety Data Sheet (MSDS) before use. MSDS sheets can be obtained at our website [www.polyguardproducts.com](http://www.polyguardproducts.com). Call *Polyguard* at 214-515-5000 if you have any questions.

Purchaser is responsible for complying with all applicable federal, state, or local laws and regulations covering use of the product including waste disposal.

## Estimating and Shipping Information for Polyguard 665 and Polyguard NW-75

AMERICAN								METRIC			
POLYGUARD NW-75	ROLL SIZE WIDTH- LENGTH	FT/2 ROLL	YD/2 ROLL	NUMBER OF ROLLS/ CARTON	LBS/ CARTON	CARTONS/ PALLET	LBS/ PALLET	ROLL SIZE WIDTH- LENGTH	M2/ ROLL	KG/ CARTON	KG/ PALLET
	4' x 50'	200	22.2	1	65	25	1625	1.219M x 15.24M	18.58	29.48	737
	12" x 200'	200	22.2	1	65	24	1562	.305M x 60.96M	18.58	29.48	709
	24" x 100"	200	22.2	1	65	24	1562	.61M x 30.48M	18.58	29.48	709

AMERICAN								METRIC			
POLYGUARD 665	ROLL SIZE WIDTH- LENGTH	FT/2 ROLL	YD/2 ROLL	NUMBER OF ROLLS/ CARTON	LBS/ CARTON	CARTONS/ PALLET	LBS/ PALLET	ROLL SIZE WIDTH- LENGTH	M2/ ROLL	KG/ CARTON	KG/ PALLET
	4' x 50'	200	22.2	1	80	25	2000	1.219M x 15.24M	18.58	36.29	907
	12" x 200'	200	22.2	1	80	24	1920	.305M x 60.96M	18.58	36.29	871
	24" x 100"	200	22.2	1	80	24	1920	.61M x 30.48M	18.58	36.29	871

YEAR OF FIRST DOT USE OR APPROVAL	<b>POLYGUARD HIGHWAY UNDERSEALS – HISTORY OF RESEARCH, APPROVALS, and USE</b> <b>(Relevant published research on Polyguard materials are highlighted)</b>
ALABAMA 1979 ARKANSAS 1978 ARIZONA 1987	Polyguard underseals are listed on Specification 454.03 Membrane for Waterproofing Joints and Cracks. Polyguard underseal has been used under Special Provision 100135 Joint Sealing Membrane. Polyguard underseal has been used under Sec. 550-s Waterproofing Membrane.
CALIFORNIA 1978	CALTRANS research concluded that "...interlayers having a rubber asphalt backing (...Polyguard) do not weaken in shear by embrittlement at low temperatures (down to -20°F)" (Evaluation of Pavement Fabric Test Installations in California, undated, p.10) Polyguard underseal meets CALTRANS spec10-1.09 Prefformed Membrane Waterproofing. Numerous highway and railroad waterproofed in California.
COLORADO 1978 CONNECTICUT 1993	Polyguard underseal has been used under specification number 705.08 Prefabricated Reinforced Membrane and Primer. Polyguard is approved for use as a bridge deck waterproofing membrane on ConnDOT projects.
DELAWARE 1982	Research concluded that Polyguard underseal "...not only delayed the initial appearance of cracks, but also prevented those that did appear from becoming as severe as those in the control". (Final Report on Reflective Crack Control Membranes, 1/26/82, Contract 79-068-08, p.4.)
FLORIDA 1982	Polyguard underseals have been used under specification number 356-70 Waterproofing Concrete Pavement Joints.
GEORGIA 1977	6 year evaluation of test sections on I-85 concluded that underseals: "...have reduced the rate of reflective cracking ...even when reflective cracking appears over joints with membrane treatment, the cracks appear to stay tighter than cracks over joints without membrane treatment". (Research published in Transportation Research Record 916, paper presented by Wouter Gulden and Danny Brown.) Today Georgia DOT approves Polyguard underseals for bridge decks and pavement joints and cracks.
IDAHO 1992 INDIANA 1999 IOWA 1987 ILLINOIS 1972 KANSAS 1990 LOUISIANA 1990	Polyguard underseals meet Idaho DOT requirements, and has been used on both state and federal roads and bridges. Polyguard underseal used under Standard Specification 906.05.1 Joint Membrane System for Precast Reinforced Concrete Box Sections. Polyguard underseal is listed on 496.01 Appendix A Approved Engineering Fabric for Reflective Cracking. One of the earliest Polyguard bridge deck underseal applications took place in Sterling, Illinois the last week of September 1972. Today, Polyguard underseals fulfill requirements of special provision for Reflective Crack Control System B. Polyguard underseal has been used under special provision 90P-105 Stress Relief Interlayer Fabric. Polyguard underseals have been used under Item 4198 Waterproofing Joint Seal.
MICHIGAN 1979	Research by MDOT using Polyguard underseal demonstrated a reduction in cracking over both longitudinal joints and transverse joints. (Performance Evaluation of Plastic Fabrics as Overlay Reinforcement to Control Reflection Cracking, research Report No. 1243, April 1984, p. 32.) Subsequently, Polyguard underseals have been approved under Supplemental Specification for Prefformed Waterproofing Membrane for Concrete Bridge Decks, under Special Provision for Overlaying Longitudinal Pavement Joints and Cracks with Stress Relieving Membrane, and under Special Provision for Overlaying Bridge Deck Joints with Waterproofing Membrane.
MINNESOTA 1989	Extensive utilization of Polyguard membrane on walls, piers, and superstructure in tunnel construction on the Duluth Freeway section of I-35.
MISSISSIPPI 1984	Research by Mississippi DOT on U.S. Route 82 using Polyguard underseal demonstrated a reduction in reflective cracking, plus the ability of the material to continue sealing even when the pavement above had cracked; "Numerous cores were secured form the control and test section in December 1991. The coring was done to help verify underlying joint waterproofing... In all cases the underlying joint was waterproofed, and the tape was not ruptured". (Evaluation of Joint Sealing Tape, Final Report, State Study no.67-18, September 1992, p. 12-13) Extensive utilization of Polyguard underseals under 907-414.02.1 High Density Joint Sealing Tape and 907-414.02.2 Joint Sealing Tape, under special provision no.907-414.8, and under special provision 4435 Sec. 3.4.2.
MISSOURI 1991	Used under MSSHC Sec. 02517 Asphaltic Concrete Pavement Repair Part E Engineering Fabric for Reflective Cracking. Also used under f-011-1(28).
NORTH CAROLINA 1979	Polyguard underseal has been used under the Standard Specification for Waterproofing Membrane for Paving Joints and Cracks.
NEVADA 1988	The Federal Highway Administration (FHWA) published a report by Nevada Special Studies Section which found that Polyguard underseal used to encapsulate portable loop detectors was "...extremely durable and can withstand a wide range of weather conditions". (Oct.1988, p 1) The report was published after the Polyguard underseal had been directly exposed to a million vehicles on U.S. 395 "...without signs of undue wear and tear".
NEW YORK 1987	Polyguard underseals have been used under Item 19207.1605 Waterproofing Membrane. Research Report FHWA/NY/SR-94/114 Membranes for Pavement/Shoulder Joints noted that pavement cores with Polyguard undersea had been removed from concrete joints on Interstates I-87 and I-81 after 4-6 years under traffic. The underseal had remained intact. (December 1994, p.9.)
OHIO 1992	Polyguard underseal is approved under Item Special, Membrane Waterproofing---Sheet Types 2 and 3 for waterproofing reinforced concrete bridge decks, prestressed box beams, precast box culverts, precast three-sided culverts, and other structures.
OKLAHOMA 1975	Polyguard underseal has been used on both bridge decks and pavement joints on DOT projects.
PENNSYLVANIA 1979	Extensive quantities of Polyguard underseal have been used under Bulletin 15, sec. 467 Heavy Duty Membrane. Research Project 79-6 concluded, "Only Polyguard resulted in considerable reduction of (transverse) reflection cracks". (Follow-up Report December 1987, p.17) Research Project 79-6 also noted that inspection of pavement cores showed that the Polyguard underseal "was intact and appears to be performing satisfactorily" even when the pavement over it had cracked. (Interim report, December 1983.)
RHODE ISLAND 1980	Polyguard underseal is specified for use on transverse pavement joints on the specification for Membrane Strip Sealing of Pavement Cracks and Joints. Polyguard underseal has also been used for bridge deck waterproofing. Polyguard Hot Applied Membrane is approved for waterproofing bridge decks under Sec. 813.01.4.
SOUTH CAROLINA 1979	Polyguard underseals are listed as approved under Waterproofing Membrane Under Asphaltic Overlays for Concrete Pavement Joints. Polyguard underseal has also been used under S.C. Supplemental Specification Membrane Waterproofing for Use on Bridge Decks. (File Number 1525.606)
TENNESSEE 1977	Polyguard underseals have been approved since 1977 under "Bridge Deck B Sealant" specification. Polyguard underseals have also been used under the special provision for Reflective Cracking Prevention.
TEXAS 1978	Hundreds of miles of pavement have been treated with underseals on Texas DOT projects for joint and crack repair and bridge deck waterproofing under item Nos. 459, 3187, 3147, 3189, DMS 6320, and others.
UTAH 1985	Polyguard underseal has been utilized for bridge deck waterproofing under 534.2.3 Rubberized Asphalt Membrane.
VERMONT 1978	Polyguard underseal is listed on the Approved Products List. It has been used under Sec. 519.02 Sheet Membrane Waterproofing. Research presented at the 1989 4R Conference supports utilization of underseal for reconditioning corroding bridge decks. "...a properly selected and applied waterproofing membrane will reduce the oxygen and moisture supply at the rebar level enough to lower corrosion activity to non-destructive levels". (Interim Report 90-3, February 1990, p.9. Polyguard underseal was included in the research.)
VIRGINIA 1976	Polyguard underseals have been utilized under sec. 416, page 3, Bridge Deck Membranes, System B.
WASHINGTON 1978	Polyguard underseal is on the Qualified Products List as a bridge deck waterproofing, and has been applied to joints and cracks under the DOT's specification for Fabric Reinforcement Strips and has been applied to bridge decks under the General Special Provision for Membrane Waterproofing – Membrane System A.
WYOMING 1983	Polyguard underseal is listed as approved under Special Provision for Membrane Crack Repair ref. SS 400TA.

ISO 9001 Certified since 1996.

Accredited to the ISO 9001 Standard (American, and UK) for the design and manufacture of asphalt and polymer based membrane coatings which protect surfaces from moisture and/or corrosion.

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