2009 NTPEP Report Series

NTPEP Report 9008.2

TWO YEAR REPORT OF FIELD PERFORMANCE AND LABORATORY EVALUATIONS OF RAPID SETTING PATCHING MATERIALS FOR PORTLAND CEMENT CONCRETE

JUNE 2007 PRODUCT SUBMISSIONS

December 2009

American Association of State Highway and Transportation Officials (AASHTO)

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PROLOGUE

General Facts about NTPEP Reports

- NTPEP Reports contain data collected according to laboratory testing and field evaluation protocols developed through consensus-based decision by the AASHTO's NTPEP Oversight Committee. These test and evaluation protocols are described in the *Project Work Plan* found in the Appendix of this Report.

- Products are voluntarily submitted by manufacturers for testing by NTPEP. Testing fees are assessed from manufacturers to reimburse AASHTO member departments for conducting testing and to report results. AASHTO member departments provide a voluntary yearly contribution to support the administrative functions of NTPEP.

- AASHTO/NTPEP does not endorse any manufacturer's product over another. Use of certain proprietary products as "test control specimens" does not constitute endorsement of those products.

- AASHTO/NTPEP does not issue product approval or disapproval; rather, test data is furnished for the User to make judgement for product prequalification or approval for their transportation agency.

Guidelines for Proper Use of NTPEP Results

- The User is urged to carefully read any Introductory notes at the beginning of this Report. Also, to consider any special clauses, footnotes or conditions which may apply to any test reported herein. Any of these notes may be relevant to the proper use of NTPEP test data.

- The User of this Report must be sufficiently familiar with the product performance requirements and/or (standard) specification of their agency in order to determine which test data is relevant to meeting those qualifying factors.

- NTPEP test data is intended to be predictive of actual product performance. Where a transportation agency has successful historical experience with a given product it is suggested to factor that precedence in granting or withholding product approval or prequalification.

NTPEP Report Special Advisory for Rapid Set Concrete Patching Materials (RSCP)

- For transportation agencies who desire to have *Rapid Set Concrete Patching Materials* periodically resubmitted for NTPEP evaluation, the RSCP Project Panel recommends a retest period of five (5) years, with a survey of member departments to be taken in 2003. (Adopted May 1999)

- The User is urged to establish QC/QA protocols for project-level acceptance of products. This NTPEP Report is useful only for expediting product prequalification and does not take the place of a managed QC/QA program.

- For specific questions regarding this NTPEP Report or for advice on how to implement NTPEP data furnished in this Report the User is encouraged to contact the NTPEP Program Manager at (202) 624-7830 for a listing of NTPEP Lead States.

***Ross Mills,* (KY)**
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***Curt Niehaus,* (KS)**
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2009 NTPEP Report Series

National Transportation Product Evaluation Program

LABORATORY AND HORIZONTAL FIELD EVALUATIONS OF RAPID SETTING PATCHING MATERIALS FOF PORTLAND CEMENT CONCRETE

JUNE 2007 PRODUCT SUBMISSIONS

NTPEP Report 9008.2

Report by:

Ohio Department of Transportation

Field Testing by:

Ohio Department of Transportation

Lab Testing by:

Kansas Department of Transportation

New York State Department of Transportation

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Background Information

The purpose of the American Association of State Highway and Transportation Officials' National Transportation Product Evaluation Program (AASHTO/NTPEP) is to provide an efficient, cost effective way of evaluating products that are used by member transportation departments in the construction of transportation facilities.

Manufacturers/suppliers who wish to have their products considered for use on transportation projects submit their materials to a central/lead agency, which coordinates a testing program using one or more testing facilities. A report is generated showing the results of the testing, and distributed to member departments for their use in determining the applicability of the product(s) for use in their state.

The NTPEP Project Panel on Rapid Setting Patching Materials for Portland Cement Concrete developed the procedures for this program work plan. These procedures will be reviewed each year at the annual Oversight NTPEP committee meeting. The working drafts of the procedures in this report were first developed by the NTPEP Committee on Rapid Setting Patching Materials for Portland Cement Concrete. These procedures were revised by the project panels at the 1996 annual NTPEP meeting. Additional revisions, which include splitting products into three categories, were adopted after the 2006 annual NTPEP meeting. These procedures will be reviewed each year at the annual Oversight NTPEP committee meeting. This annual review will respond to the changing needs of member departments and the technical improvements provided by the industry.

Under agreement with The American Traffic Safety Surfaces Association (ATSSA), this NTPEP Project Panel has two industry representatives. This ensures that industry concerns, experience and technical knowledge are considered in the testing and evaluation of products, material, and/or devices that are commonly used by the AASHTO Member Departments.

The NTPEP reports the results of these evaluations, but does not accept or reject products. However, transportation officials may choose to use the results of the evaluations in the development and maintenance of product prequalification lists.

Laboratory Testing

Laboratory Testing Material Criteria

The study will look at one of the following three categories:

Cementitious Concrete is a dry, cementitious mortar or concrete materials for rapid repairs to hardened hydraulic-cement concrete pavements and structures.

Polymer Concrete is a composite material formed by polymerization of a monomer and aggregate mixture in which the polymerized monomer acts as the sole binder for the aggregate.

Polymer-Modified Concrete is defined as hydraulic cement combined with organic polymers that are dispersed or re-dispersed in water, with or without aggregates.
In order to be classified as fast setting, the product must reach a traffic loadable condition (1200 psi compression) in under three hours.

Materials will be limited to two (2) per manufacturer per year. A generic material composition description and MSDS must accompany the submittal for classification purposes. This information will be kept in confidence by NTPEP unless directed otherwise by the manufacturer.

Rapid-Set Concrete Patching Materials are required to be resubmitted and tested (lab only) every five (5) years. A signed certification from the manufacturer will be required with the five year submittal stating that the formulation has not changed since the original submission. Manufacturers and Product names will be included in reports for the five year period but actual test data and evaluations will only be included in the initial two yearly reports.

Testing to be Performed

There are certain standard tests which should be used to evaluate Rapid Setting Patching Materials for Portland Cement Concrete. There are also some non-standard procedures which can prove to be valuable in assuring that materials procured by users are of the same quality as those originally tested.

The amount of water to be used shall be the maximum allowed as designated on the manufacturers' shipping container.

Compressive strength tests shall be made at 1 hour, 3 hours, 1 day, and 7 days in accordance with ASTM C 39, or C 579, using 4 inch x 8 inch cylinders.

Linear Shrinkage and Coefficient of Thermal Expansion shall be measured in accordance with ASTM C 531 with the following modifications: “Measure at 1 day, 3 days, 7 days, and 11 days. The samples are stored at 73^{o}F for the first 7 days, then placed in oven at 210^{o}F for 3 more days, then let cool a minimum of 16 hours at 73^{o}F”.

Slump air content (volumetric and pressure) shall be performed unless the manufacturer specifically states otherwise.

Specimens will be cured according to the methods and/or modifications listed herein unless the manufacturer specifically states otherwise and provides an alternate ASTM/AASHTO method.

All testing laboratories utilized by this NTPEP panel must be CCRL accredited for the applicable tests (if available) that will be performed.

SUMMARY OF TESTS

***Cementitious Concrete*:**

TEST	**SPECIFICATION**	
Unit Weight	ASTM C 138-01	(AASHTO T 121-05)
Slump	ASTM C 143- 05	(AASHTO T 119-07)
Autoclave Expansion	ASTM C 151- 05	(AASHTO T 107-07)
Air Content by Volumetric	ASTM C 173-01	(AASHTO T 196-05)
Making and Curing Concrete	ASTM C 192-07	
Air Content by Pressure	ASTM C 231-03	(AASHTO T 152-05)
Set Time	ASTM C 266-04	(AASHTO T 154-06)
Tensile Strength	ASTM C 496-96	(AASHTO T 198-06)
Freeze / Thaw	ASTM C 666-03	(AASHTO T 161-05)
Chloride Ion Penetration	ASTM C 1202-05	(AASHTO T 277-07)
Freeze / Thaw	NY502-3P (50 cycles) (NYSDOT Method)	
ASTM C 928 which requires the following test procedures:		
Compression, Cylinders	ASTM C 39-05	(AASHTO T 22-07)
Bond Strength using Slant Shear	ASTM C 882-05	
Length Change	ASTM C 157-93	(AASHTO T 160-05)

Polymer Concrete:

TEST	**SPECIFICATION**	
Unit Weight	ASTM C 138-01	(AASHTO T 121-05)
Slump	ASTM C 143-05	(AASHTO T 119-07)
Air Content by Volumetric	ASTM C 173-01	(AASHTO T 196-05)
Making and Curing Concrete	Ambient Laboratory Conditions	
Air Content by Pressure	ASTM C 231-03	(AASHTO T 152-05)
Thermal Expansion and Shrinkage	ASTM C 531-05 modified	
Compressive Strength	ASTM C 579-06	
Freeze-Thaw	ASTM C 666-03	(AASHTO T 161-05)
Gel Time (Pot Life)	ASTM C 881-02	
Bond (Shear) Strength	ASTM C 882-05 (wet cure)	
Thermal Compatibility	ASTM C 884-05	
Chloride Ion Penetration	ASTM C 1202-05	(AASHTO T 277-07)
Tensile Bond Strength	ASTM C 1583-04	
Tensile Elongation	ASTM D 638-03	
Tensile Strength	ASTM D 638-03 (for specific types of resins)	
Freeze / Thaw	NY502-3P (50 cycles) (NYSDOT Method)	

Polymer-Modified Concrete:

ASTM C 1439 which requires the following test procedures:

TEST	SPECIFICATION	
Compressive Strength	ASTM C 39-05	(AASHTO T 22-07)
Compressive Strength	ASTM C 109-05	(AASHTO T 106-07)
G_{sb} and Abs of Coarse Aggregate	ASTM C 127-93	(AASHTO T 85-04*)
G_{sb} and Abs of Fine Aggregate	ASTM C 128-97	(AASHTO T 84-04*)
Unit Weight	ASTM C 138-01	(AASHTO T 121-05)
Slump	ASTM C 143-05	(AASHTO T 119-07)
Air Content by Volumetric	ASTM C 173-01	(AASHTO T 196-05)
Making and Curing Concrete	ASTM C 1439-08	
Air Content by Pressure	ASTM C 231-03	(AASHTO T 152-05)
Time of Setting by Pen. Resist.	ASTM C 403-99	(AASHTO T 197-05)
Length Change*	ASTM C 157-93	(AASHTO T 160-05)
*As modified by ASTM C 928		
Thermal Compatibility	ASTM C 884-05	
Chloride Ion Penetration	ASTM C 1202-07	(AASHTO T 277-07)
Bond Strength by Direction Tension	ASTM C 1404-03	
Freeze / Thaw	NY502-3P (50 cycles) (NYSDOT Method)	

Extender Aggregate

TEST	SPECIFICATION
Gradation	AASHTO T 27-06
Soundness	AASHTO T103-07, Procedure A
Absorption	AASHTO T 84-04 or AASHTO T 85-04

Test material as supplied (neat) and as extended with the maximum amount of extender aggregate allowed as per the manufacturer's written instructions.

Laboratory evaluation of the more sophisticated or exotic patching materials should be made for reference purposes and as described in manufacturer's product data information.

Field Performance Service Test

Site Selection: One test bridge location will be selected. Sites will generally have the following characteristics:

- Full depth Portland Cement Concrete bridge deck surface, no overlays or membranes.
- Wet freeze climate.
- Patches should be located away from expansion joints and end dams.
- Boundaries of the patch area will be original sound concrete.
- Patch areas will be of similar size and characteristic (Nominal 9 ft x 3 ft x 4 inches).
- All patch edges will be saw cut.

Installation: The manufacturer will supply all labor and equipment to completely install the properly sampled and marked material (water, and extender aggregate if required). The testing state will provide site preparation using concrete saws and jack hammers. At the time of installation the manufacturer will provide written instructions for the proper installation of the material.

Traffic control and installation scheduling will be provided by the Field Testing State. The manufacturer's representative will certify that their patching material is installed in accordance with the written instructions and to their satisfaction. If the representative feels their installation was unsatisfactory, they will inform the representative of the Field Testing State of this fact in writing, within one week of the installation. Upon notification, the Field Testing State may drop that manufacturer's installation from further testing without a refund of fees. If no written notification is received within the first week, the installation will be accepted and included in the field testing.

Only one patch will be installed for each material submitted.

Field Observations: Testing will commence upon completion of the installation and continue for two years. Field observations will be made during the installation, at 12 months (interim) and at 24 months (final).

Measurements / reporting requirements:
- Material characteristics, installation procedures, cleanup procedures.
- Product installation and evaluation photographs (black / white). (Note: NTPEP will maintain, on their website, an electronic copy of the report which will contain color photographs of theinstallation and evaluations)
- Patch dimensions
- Percentage delamination
- Percentage spalling
- Edge debonding – average width and % of total length
- Mid panel cracking – average width and total length
- Site characteristics - ADT, % trucks, bridge description, and weather data

2007 Product Submissions

NTPEP Number	Manufacturer	Product Trade Name	Product Category Type	Lab Tested	Field Tested
RSCP(2007)-01	Henkel Loctite	Fixmaster Magnacrete	Cementitious Concrete	Yes	Yes
RSCP(2007)-02	Quikrete Companies	Fastset DOT Deck Repair Polymer w/ Fibers	Polymer Modified Concrete	Yes	Yes
RSCP(2007)-03	SpecChem	RepCon 928	Polymer Modified Concrete	Yes	Yes
RSCP(2007)-04	WR Meadows	Sealtight Futura-15	Cementitious Concrete	Yes	Yes
RSCP(2007)-05	Willamette Valley Co.	FastPatch	Polymer Concrete	No*	Yes
RSCP(2007)-06	CeraTech Inc.	Pavemend SQL	Cementitious Concrete	Yes	Yes
RSCP(2007)-07	CeraTech Inc.	Pavemend EX	Cementitious Concrete	Yes	Yes

***2007-05 Willamette Valley – FastPatch - was lab tested and reported in the 2006 NTPEP RSCP, Two Year Report Number 9007.2. This report can be found at NTPEP.org under the "Maintenance" heading and then under the "Rapid Setting Patch Material" heading.**

Summary of Field Site Characteristics

The field testing site was bridge deck LUC-75-0490 ER. This is an off ramp bridge from I-75 NB to Jeep Parkway, just north of the I-75 / 475 interchange in Toledo, Ohio.

The structure is a continuous steel beam bridge built in 1972. The deck has minor cracking and in general is in good condition. The deck has no significant debonding or delamination and is sound dense concrete.

The 2007 traffic survey data indicated the bridge carried 1852 ADT, with 6% trucks.

The average weather data for the area is summarized in the follow table.

Average Temperature Range (deg. F)	22.5 – 72.1
Average Temperature (deg. F)	48.5
Average Annual Rainfall (inches)	33.0
Average Annual Snowfall (inches)	37.1
Average # Days Below 32 deg. F	138
Average # Days Above 90 deg. F	14

Summary of Product Installations

The products were installed on Sunday October 7, 2007. The preparation of the patch holes began on Saturday evening and continued through the early morning hours. The bridge was shut down to traffic for the preparation of the holes and the installation of the patches. Traffic control, saw cutting and removal of the patch area concrete, and cleaning of the patch area with compressed air, was performed by the Ohio DOT.

The patches were placed across the deck in the order of their NTPEP number. Patch locations were determined by finding areas with no previous patches, no cracking, no spalling, and had sound concrete across the 3ft by 9ft patch area. All patches were a nominal 3ft by 9ft by 3.5 inches deep.

At patch 2007-06, CeraTech, Pavemend SQL, one rebar was cut by the ODOT crews during the patch preparation work. This bar, approximately 9 feet long, was removed and replaced with a new #5 epoxy coated rebar. The existing rebar was uncoated #6 bar.

At patch 2007-07, CeraTech, Pavemend EX, a small hole was punched through the deck by the ODOT crews during the patch preparation work. A board was placed on the underside of the deck and the company chose to use a small amount of their Pavemend SQL product to patch this hole prior to placing the Pavemend EX product. In addition, one rebar was cut by the ODOT crews during the patch preparation work. This bar, approximately 5 feet long, was removed and replaced with a new #5 epoxy coated rebar. The existing rebar was uncoated #6 bar.

Product installations started around 8:50 am and were completed by 11:00 am. The road was opened back to traffic at 5 pm that day.

The weather conditions for the day of the installation are shown in the table below

Date	Time	Temperature (F)	Wind Speed (mph)
10/7/06	4am	71	Calm
	6am	68	Calm
	8am	67	Calm
	10am	76	Calm
	12 noon	86	3.5
	2pm	89	Calm
	4pm	89	3.5
	6pm	87	4.6
	8pm	79	3.5
	10pm	75	Calm
	12 Midnight	71	Calm

Project Note:
In August 2008, 10 months after the patches were placed, this bridge deck was shut down to traffic due to emergency repairs that were required on an adjacent structure. The test deck was opened back to traffic in September 2009.

2007 NTPEP RSCP - Ohio Test Deck Weather Summary				
	Average Temperatures			Precipitation
	High	Avg	Low	(inch)
Oct-07	70	60	51	1.3
Nov-07	49	41	33	2.0
Dec-07	36	31	26	2.5
Jan-08	27	29	22	2.6
Feb-08	34	26	19	3.7
Mar-08	43	35	28	7.9
Apr-08	63	52	41	2.1
May-08	68	58	48	1.8
Jun-08	81	71	62	4.2
Jul-08	85	75	64	4.7
Aug-08	83	72	61	0.8
Sep-08	78	66	56	2.7
Oct-08	68	56	45	0.4
Nov-08	64	40	24	3.0
Dec-08	57	28	5	3.7
Jan-09	32	17	-8	0.7
Feb-09	50	29	6	3.2
Mar-09	57	39	16	4.2
Apr-09	74	49	34	4.4
May-09	70	59	50	2.9
Jun-09	80	69	54	2.7
Jul-09	75	68	62	3.4
Aug-09	82	71	60	2.6
Sep-09	74	64	49	1.4
Oct-09	64	50	41	3.5

Product Descriptions and Installation Instructions

NTPEP # RSCP-	Manufacturer / Product	Product Description	Product Generic Description	Summarized Installation Instructions
(2007) – 01	Henkel Loctite / Fixmaster Magnacrete	Two component, magnesium phosphate based rapid set concrete repair	The aggregate - quartz silica & magnesium oxide. The hardener - ammonium polyphosphate	Surface must be clean, dry, rough, and free from loose materials. Use plastic forms if forms are needed. Work area can be damp, however standing water should be removed. Add aggregate to activator and mix thoroughly. Add only enough activator to obtain the consistency desired. Material should be mixed immediately prior to placement and should be completed as soon as possible. For repairs deeper than 2.5cm use pea gravel to extend the product. Cleanup with water
(2007) – 02	Quikrete Companies / Fastset DOT Deck Repair Polymer w/ Fibers	Fast setting, high early strength, fiber reinforced material for concrete repair	Blended fast set cement, fibers, graded aggregate, and additives to promote air entrainment, durability, high strength, and long work time	Dampen hole with clean water, but leave no standing water. Use 1 gallon of water per 55lb bag. Add approximately 90% of the expected water and then add the dry material. Adjust water as needed to achieve a placeable consistency (slump between 4 and 7”). Mix until a uniform product is obtained. Fill forms completely working from one end to the other. Avoid partial depth lifts. Consolidate the material using hand tamping and/or chopping with a shovel. It is important to compact around the edges. Screed the surface and then apply a trowel or broom finish. Apply Quikrete Concrete Sealer (#8800) by spray, brush or roller if standard wet cure is not an option..
(2007) – 03	SpecChem / RepCon 928	Uses polymer technology offering superior durability, performance, and ease of use. No liquid activators or primers required	Single component, polymer modified, fiber reinforced, rapid setting concrete repair mortar	Surface must be clean and free of loose material, oil, grease, dust, or other contaminants. Remove rust from exposed rebar. Saw cut the perimeter of the repair 1/8" deeper than the patch. Prepare surface to SSD, prepare aggregate to SSD. For depths > 2” extend with up to 25# of clean 3/8” aggregate per 50# bag). Add water (4.75-5.25 pints depending on desired consistency - reduce this by amount of any free water on aggregate). Pour mix into water and use a low speed drill or motar mixer. Mix for 2-3 minutes. Can be used in 1-2” lifts. Trowel or sceed surface. After initial set, finish by hand trowelling - Use SpecFilm as finish aid. Under severe conditions use a ASTMC-309 curing compound.
(2007)-04	WR Meadows / Sealtight Futura-15	Single component, cementitious, very rapid hardening structural repair mortar	Select cements, graded sands and chemical additives	Substrate must be structurally sound and free of any contaminants that will adversely affect the bond. Saw cut a min. ½” depth around perimeter. A ¼” surface profile is required. Expose all reinforcing steel, ensuring a minimum clearance of ¾” behind reinforcing steel. Abrade entire circumference of steel to white metal finish. Dampen surface to SSD. In mortar mixer, add 4.75-5.25 pints of water per 50# bag of product. If extension is required, add aggregate prior to addition of product. Mix 3-5 minutes – until homogenous and lump free. Apply mixture by trowel or screed. Compact product well against prepared substrate prior to bulk placement. Finish by screeding. Apply manufacturer recommended curing compound.

Product Descriptions and Installation Instructions (cont.)

NTPEP # RSCP-	Manufacturer / Product	Product Description	Product Generic Description	Summarized Installation Instructions
(2007) – 05	Willamette Valley Co. / FastPatch	Rapid set polymer resin for repair of holes and spalls in concrete roadways	Two component polyurethane, gravel	**(This product was field tested only – Lab test results can be found in the 2006 RSCP Two Year Report).** Sweep patch hole and remove heavy debris. Use compressed air to blow out dust. Surface should be free of dirt, oils, latents, dust, and 100% free of water. Use moisture cure primer over entire patch surface. Open kit and remove resin and isocyanate. Leave gravel in bucket. Shake resin jug for 30 sec. Pour resin into bucket with gravel. Mix resin and gravel with drill and concrete mixing blade. Add isocyanate to gravel mixture and thoroughly mix with concrete mixing blade for a minimum of 60 sec. Pour mixed product into hole and spread material for proper leveling. Avoid overfilling. Add topping sand to refusal on surface.
(2007) – 06	CeraTech Inc./ Pavemend SQL	Product Withdrawn		
(2007) – 07	CeraTech Inc./ Pavemend EX	Single component, water activated, cementitious, rapid setting structural concrete	Class Fand C coal ash, aluminosilicate glass, crystalline silica, calcium oxide, and other special additives	Clean, stable surface required. Minimum 1/16” surface profile required. Pre-wet concrete mixer, then drain. Pre-wet concrete surface - no standing water. Add 1/2 gal water to mixer per 54 lb bag. Add 40 lbs of aggregate per bag (max) - use #57 or #7 stone. Add powder. Mix for 7minutes and pour. Minimum profile thickness will vary between 1.5 – 3.0 “ depending on aggregate size used. Broom finish after initial set. Product is self-curing

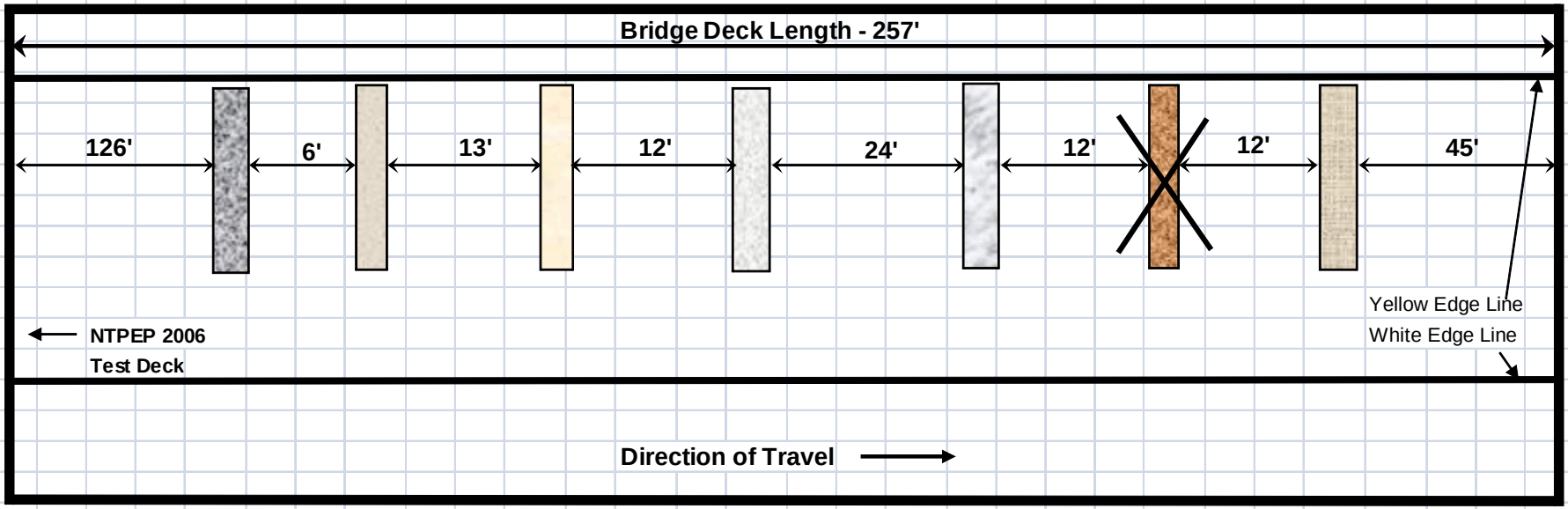
2007 NTPEP Rapid Setting Patch Material Ohio Test Deck

Product Patch Location on Bridge Deck

Bridge LUC-75-0490 ER - Off Ramp from I-75 NB to Jeep Parkway

Installed 10/7/07

(all patches were 3 ft by 9 ft by 3.5 inches deep)



NTPEP #	2007-01	2007-02	2007-03	2007-04	2007-05	2007-06	2007-07
Company	**Henkel Loctite**	**Quikrete**	**SpecChem**	**WR Meadows**	**Willamette Valley**	**CeraTech**	**CeraTech**
Product	Fixmaster MagnaCrete	Fast Set DOT Deck Repair Polymer Modified w/ Fibers	RepCon 928	Sealtight Futura-15	FastPatch	Pavemend SQL **Product Withdrawn**	Pavemend EX

Not to Scale

W S N E

Installation Photos: RSCP(2007)–01, Henkel Loctite / Fixmaster Magnacrete

Prepared patch hole

Product packaging

Mixing product

Placing and screeding product

Finishing product

Finished product

(Note: Color report available at http://www.ntpep.org/)

Installation Photos: RSCP(2007)–02, Quikrete Companies / Fastset DOT Deck Repair Polymer w/ Fibers

Prepared patch hole

Dampening patch hole surface

Mixing product

Placing and screeding product

Placing and screeding product

Finished product

Installation Photos: RSCP(2007)–03, SpecChem / RepCon 928

Prepared patch hole

Dampening patch hole surface

Placing product

Placing product

Sceeding product

Finished product

Installation Photos: RSCP(2007)–04, WR Meadows / Sealtight Futura-15

Prepared patch hole

Dampening patch hole surface

Mixing product

Placing product

Screeding and finishing product

Finished product

Installation Photos: RSCP(2007)–05, Willamette Valley / FastPatch

Prepared patch hole

Applying moisture cure primer

Placing product

Placing product

Placing product to refusal and sand finishing

Finished product

Installation Photos: RSCP(2007)–07, CeraTech / Pavemend EX

Prepared patch hole

Mixing product and pre-wetting surface

Placing product

Placing product

Finishing surface

Finished product

Year 1 Photos: RSCP(2007)–01, Henkel Loctite / Fixmaster Magnacrete


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

(Note: Color report available at http://www.ntpep.org/)

Year 2 Photos: RSCP(2007)–01, Henkel Loctite / Fixmaster Magnacrete


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

Year 1 Photos: RSCP(2007)–02, Quikrete Companies / Fastset DOT Deck Repair PM

Entire Patch

Close-up - surface

Close-up – edge (quarter is on patch)

Year 2 Photos: RSCP(2007)–02, Quikrete Companies / Fastset DOT Deck Repair PM


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

Year 1 Photos: RSCP(2007)–03, SpecChem / RepCon 928

Entire Patch

Close-up - surface

Close-up – edge (quarter is on patch)

Year 2 Photos: RSCP(2007)–03, SpecChem / RepCon 928


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

Year 1 Photos: RSCP(2007)–04, WR Meadows / Sealtight Futura-15


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

Year 2 Photos: RSCP(2007)–04, WR Meadows / Sealtight Futura-15


Entire Patch

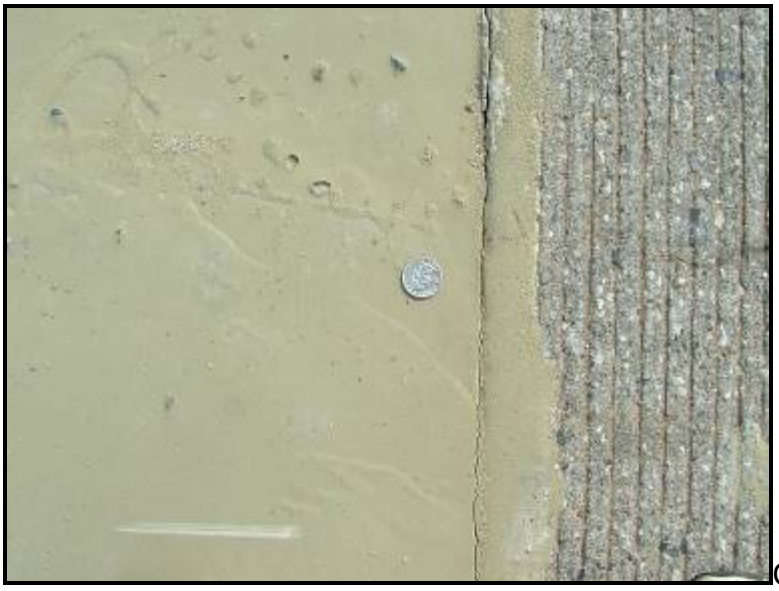

Close-up - surface


Close-up – edge (quarter is on patch)

Year 1 Photos: RSCP(2007)–05, Willamette Valley / FastPatch


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

Year 2 Photos: RSCP(2007)–05, Willamette Valley / FastPatch


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

Year 1 Photos: RSCP(2007)–07, CeraTech / Pavemend EX


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

Year 2 Photos: RSCP(2007)–07, CeraTech / Pavemend EX


Entire Patch


Close-up - surface


Close-up – edge (quarter is on patch)

Patch Rating Data

NTPEP / RSCP - 2007 Ohio Test Deck

			Year 1				Year 2			
NTPEP #	Manuf.	Product	Midpanel Avg. Crack Width (in) / Total Length (ft)	Patch Edge Avg. Crack Width (in) / Total Length (ft)	% Delam.	% Spall	Midpanel Avg. Crack Width (in) / Total Length (ft)	Patch Edge Avg. Crack Width (in) / Total Length (ft)	% Delam.	% Spall
2007-01	Henkel Loctite	Fixmaster Magnacrete	< 1/32" / 10 ft	< 1/32" / 8 ft	0%	0%	< 1/32" / 10 ft	< 1/32" / 19 ft	0%	0%
2007-02	Quikrete	Fastset DOT Deck Repair Polymer w/ Fibers	< 1/32" / 9 ft	< 1/32" / 13 ft	0%	0%	< 1/32" / 9 ft	< 1/32" / 14 ft	0%	0%
2007-03	SpecChem	RepCon 928	< 1/32" / 5 ft	< 1/32" / 17 ft	0%	0%	< 1/32" / 8 ft	< 1/32" / 17 ft	0%	0%
2007-04	WR Meadows	Sealtight Futura-15	Map crack over 1/2 patch - most 1/32"	< 1/32" / 15 ft	48%	0%	Map crack over 1/2 patch - most 1/32"	< 1/32" / 15 ft	66%	0%
2007-05	Willamette Valley	FastPatch	0	1/16" / 18ft 1/32" / 6ft	4%	0%	0	1/16" / 18ft 1/32" / 6ft	4%	0%
2007-06	CeraTech	Pavemend SQL	withdrawn							
2007-07	CeraTech	Pavemend EX	< 1/32" / 23 ft	< 1/32" / 17 ft	0%	0%	< 1/32" / 23 ft	< 1/32" / 18 ft	0%	0%

NEW YORK STATE DOT -- TECHNICAL SERVICES DIVISION -- MATERIALS BUREAU

FINAL RESULTS: 2007 NTPEP FREEZE-THAW TEST of RAPID SET CONCRETE PATCH MATERIALS

NTPEP #	Manuf / Brand	NEAT MIX RATIO	NEAT MIX TESTING				EXTENDED MIX TESTING		
			CUBES		CYLINDERS		CYLINDERS		
			Avg. % Loss [after 50 cycles]	LIMS #	Avg. % Loss [after 50 cycles]	LIMS #	MIX RATIO	Avg. % Loss [after 50 cycles]	LIMS #
RSCP(07)-1	Henkel Locktite / Fixmaster Magna-Crete	1 / 5	7.8%	216	9.5%	217	Not extended	-----	----
RSCP(07)-2	Quikrete / FastSet DOT Deck Repair	1 / 6.6	2.0%	71	1.8%	72	1 / 6.6 / 3	3.8%	147
RSCP(07)-3	SpecChem / RepCon 928	1 / 9.6	0.0%	73	0.0%	74	1 / 9.6 / 4.8	0.0%	148
RSCP(07)-4	WR Meadows / Sealtight Futura 15	1 / 9.1	0.0%	75	0.2%	76	1 / 9.1 / 4.56	0.4%	149
RSCP(07)-5	Willamette Valley Co / FastPatch	4.4 / 1 / 9.7	0.0%	218	0.0%	219	Not extended	-----	----
RSCP(07)-6	CeraTech Inc / Pavemend SQL	Withdrawn							
RSCP(07)-7	CeraTech Inc / Pavemend EX	1 / 13	0.0%	77	2.4%	78	1 / 13 / 9.6	5.5%	150

Notes: 1. The Test Method used was NY 502-3P, 50 cycles, 10% NaCl. **2**. Neat specimens were cast as standard 2" cubes and 3" x 6" cylinders. **3**. Extended specimens (and patch materials supplied premixed with extender aggregate) were cast as 3" x 6" cylinders. **4**. When the addition of coarse aggregate was required, crushed limestone conforming to New York State specification Type CA 1 was used. (Refer to ASTM C33 coarse aggregate size number 7.) **5**. When allowed by written instructions, the maximum allowable amount of aggregate was added to extend the mix. **6**. For water based mixes, the maximum allowed water to dry mix ratio was used. **7**. Neat mix ratios expressed as liquid to dry mix. Extended mix ratios expressed as liquid to dry mix to coarse aggregate. **8**. Mix ratios are unitless for water based mixes (ie. g/g.). **9**. Samples with obvious failure are removed before the completion of 50 cycles. **10**. Testing is not progressed if workable consistency is not achieved with maximum solvent per instructions. **11**.Pass/fail criteria from NYSDOT Standard Spec., Item 701-09, Rapid Set Concrete Repair Material -Normal Weather

Photos of the samples can be found on the following pages


2161
2162
-2
2163
3
05/01/2008
RSCP (2007)-01
Fixmaster Magna-Crete


1
72-1
2
72-2
147-1
71-1
-1-
71-2
2
71-3
3
05/01/2008
RSCP (2007)-02
FastSet DOT Deck Repair


1
74-1
2
74-2
1
8461
SWIS
2
8461
SWIS
73-1
-1-
73-2
-2-
73-3
-3-
05/01/2008
RSCP (2007)-03
RepCon 928


76-1
76-2
149-1
149-2
75-1
-1-
75-2
-2-
75-3
-3-
05/01/2008
RSCP (2007)-04
Sealtight Futura-15


-1-
218-1
218-2
218-3
-3-
05/01/2008
RSCP (2007)-05
FastPatch


-1-
1-8L
-2-
2-8L
TT-1
-1-
TT-2
-2-
TT-3
-3-
-1-
1-5D1
1-5D2
05/01/2008
RSCP (2007)-07
Pavemend EX

RAPID SETTING PATCHING MATERIAL
KANSAS DOT LAB RESULTS (Products Tested Neat)

NTPEP #	C 266 Initial Set Time (min.)	C 39 Compressive Strength 1 Hr (psi)	C 39 Compressive Strength 3 Hr (psi)	C 39 Compressive Strength 1 Day (psi)	C 39 Compressive Strength 7 Days (psi)	C 882 Bond Strength By Slant Shear 1 Day (psi)	C 882 Bond Strength By Slant Shear 7 Day (psi)	C 666 Expansion @ 300 Cycles (%) or at Termination	C 666 Durability Factor @ Termination, M=300 Cycles	C 496 Tensile Strength	C 1202 Charge Passed (C) CIP†	C 531 Linear Shrinkage 1 Day (%)	C 531 Linear Shrinkage 3 Days (%)	C 531 Linear Shrinkage 7 Days (%)	C 531 Linear Shrinkage 11 Days (%)	C 531 Coefficient of Thermal Expansion (in/in/Deg F)
NRSCP 07-0001	30	3160	3260	2920	3290	1930	2140	0.032	68	267	7328 High	0.002	0.005	0.001	0.121	0.0000064
NRSCP 07-0004	35	*	2860	4930	7640	2820	3970	0.022	80	650	2361 Mod.	0.031	0.056	0.066	0.200	0.0000051

* Unable to test, Material did not set for break.
** Remove beams, large splits @ 72 cycles, $P_c = 70$.

† Chloride Ion Penetrability (CIP) Based on Charge Passed

Standards referenced are ASTM.

NTPEP #	Manufacturer Name	Address	Product Identification	Phone Number
NRSCP-07-0001	Henkel Loctite, Inc.	10001 Trout Brook Crossing Rocky Hill, CT 06067	FixMaster Magna-Crete	860-571-2430
NRSCP-07-0004	W.R. Meadows, Inc.	PO Box 338 Hampshire, IL 60140-0338	Seal Tight Futura-15	847-214-2100

(Freeze Thaw Data and Pictures Follow)

Kansas DOT Freeze Thaw Evaluation
Henkel Loctite - FixMaster Magna-Crete (Neat)

NTPEP Number: RSCP(2007)-01 Date Made: 10/03/07
Mix Number: 07-01 ABC **Neat** N squared: 2953815

Expansion					
Cycle Diff	**Exp Diff**	**Exp/1Cycle**	**300 Cycles**	**Diff/1**	**#@300**
48	0.003	0.0000556	34	0.0019	0.032

Durability			
PC Diff	**PC/1 Cycle**	**Diff/1**	**#@300**
-12.5	-.26	-8.85442	67.96

Starting Information									
Mix #	**Exp.**	**Cure Wt.**	**Cure. Wt.**	**Abs**	**Wt. in H2O**	**Diff.**	**Spg. SSD**	**w/ Hanger**	**Hanger Wt.**
07-01 A	0.1756	15.53	15.62	0.58	0.00	15.62	1.00	0.00	0.00
07-01 B	0.1407	15.64	15.72	0.51	0.00	15.72	1.00	0.00	0.00
07-01 C	0.1976	15.66	15.73	0.45	0.00	15.73	1.00	0.00	0.00

Mix #	Date	Age (days)	Cycles	Avg %Exp	Avg G/L	Avg Sonic	Percent	Comment
07-01 A,B,C	10/17/07	14	0	0.000	0.00	1719	100	
07-01 A,B,C	10/23/07	20	48	0.010	-0.02	1640	91	
07-01 A,B,C	10/26/07	23	72	0.012	-0.04	1613	88	A, top spall
07-01 A,B,C	10/30/07	27	104	0.015	-0.40	1581	85	A, edge crumble, B & C, top spall
07-01 A,B,C	11/02/07	30	128	0.017	-1.06	1565	83	A, B, & C edge crumble
07-01 A,B,C	11/06/07	34	160	0.050	-2.08	1542	80	A, B, & C still crumbling
07-01 A,B,C	11/09/07	37	184	0.024	-2.89	1531	79	
07-01 A,B,C	11/13/07	41	215	0.018	-3.99	1517	78	
07-01 A,B,C	11/16/07	44	234	0.035	-5.08	1525	79	
07-01 A,B,C	11/20/07	48	266	0.030	-6.37	1506	77	
07-01 A,B,C	11/26/07	54	314	0.033	-5.68	1378	64	


NTPEP# RSCP(2007)-01
Mix# 07-01 A,B,C Neat
Henkel Loctite, Inc.
FixMaster Magna-Crete
N-07-1

Kansas DOT Freeze Thaw Evaluation
WR Meadows, Inc – Seal Tight Futura-15 (Neat)

NTPEP Number: RSCP(2007)-04 Date Made: 9/26/07
Mix Number: 07-04 ABC **Neat** N squared: 2847094

Expansion					
Cycle Diff	**Exp Diff**	**Exp/1Cycle**	**300 Cycles**	**Diff/1**	**#@300**
26	0.008	0.0002991	10	0.0030	0.022

Durability			
PC Diff	**PC/1 Cycle**	**Diff/1**	**#@300**
1.34	0.05	0.51677	79.93

Starting Information									
Mix #	**Exp.**	**Cure Wt.**	**Cure. Wt.**	**Abs**	**Wt. in H2O**	**Diff.**	**Spg. SSD**	**w/ Hanger**	**Hanger Wt.**
07-04 A	0.1596	15.42	15.55	0.84	0.00	15.55	1.00	0.00	0.00
07-04 B	0.1443	15.11	15.24	0.86	0.00	15.24	1.00	0.00	0.00
07-04 C	0.1722	15.43	15.56	0.84	0.00	15.56	1.00	0.00	0.00

Mix #	Date	Age (days)	Cycles	Avg %Exp	Avg G/L	Avg Sonic	Percent	Comment
07-04 A,B,C	10/10/07	14	0	0.000	0.00	1687	100	
07-04 A,B,C	10/16/07	20	48	0.011	0.00	1544	84	
07-04 A,B,C	10/19/07	23	72	0.014	0.00	1552	85	
07-04 A,B,C	10/23/07	27	104	0.015	-0.02	1544	84	
07-04 A,B,C	10/26/07	30	128	0.012	0.02	1559	85	
07-04 A,B,C	10/30/07	34	160	0.016	0.04	1553	85	
07-04 A,B,C	11/02/07	37	184	0.015	0.02	1551	84	
07-04 A,B,C	11/06/07	41	216	0.025	0.04	1557	85	
07-04 A,B,C	11/09/07	44	240	0.019	0.04	1552	85	C, crack along edge
07-04 A,B,C	11/13/07	48	271	0.019	-0.19	1536	83	C, corner broke off
07-04 A,B,C	11/16/07	51	290	0.019	-0.17	1504	79	
07-04 A,B,C	11/19/07	54	316	0.027	-0.15	1516	81	


NTPEP # RSCP (2007)-04
Mix # 07-04 A,B,C Neat
WR Meadows, Inc
Seal Tight Futura-15
ON-07-4

RAPID SETTING PATCHING MATERIAL
KANSAS DOT LAB RESULTS (Products Tested Extended)

NTPEP #	C 39 Compressive Strength 1 Hr (psi)	C 39 Compressive Strength 3 Hr (psi)	C 39 Compressive Strength 1 Day (psi)	C 39 Compressive Strength 7 Days (psi)	C 882 Bond Strength By Slant Shear 1 Day (psi)	C 882 Bond Strength By Slant Shear 7 Day (psi)	C 666 Expansion @ 300 Cycles (%) or at Termination	C 666 Durability Factor @ Termination, M=300 Cycles	C 496 Tensile Strength	C 1202 Charge Passed (C) CIP†	Linear Shrinkage 1 Day (%)	Linear Shrinkage 3 Days (%)	Linear Shrinkage 7 Days (%)	Linear Shrinkage 11 Days (%)	Coefficient of Thermal Expansion (in/in/Deg F)
XRSCP 07-0001	3220	3110	3180	3810	1820	2330	0.112*	20*	228	4530 High					
XRSCP 07-0004	2590	3330	5630	7530	2430	4540	0.015	91	590	2355 Mod.					
XRSCP 07-0007	280	1370	2440	3810	960	1470	0.013	99	429	9066 High					

NO TEST DATA
REFERENCE ASTM C-192 5.4

* Remove beams, edges crumbling off beams and spalling occurring @ 184 cycles, P_c = 33.
** Remove beams, large splits @ 72 cycles, P_c = 50.

† Chloride Ion Penetrability (CIP) Based on Charge Passed

Standards referenced are ASTM.

NTPEP #	Manufacturer Name	Address	Product Identification	Phone Number
XRSCP-07-0001	Henkel Loctite, Inc.	10001 Trout Brook Crossing Rocky Hill, CT 06067	FixMaster Magna-Crete	860-571-2430
XRSCP-07-0004	W.R. Meadows, Inc.	PO Box 338 Hampshire, IL 60140-0338	Seal Tight Futura-15	847-214-2100
XRSCP-07-0007	CeraTech, Inc.	1500 N Beauregard St. Ste. D Alexandria, VA 22311	Pavemend EX	443-524-4408

(Freeze Thaw Data and Pictures Follow)

Kansas DOT Freeze Thaw Evaluation
Henkel Loctite - FixMaster Magna-Crete (Extended)

NTPEP Number: RSCP(2007)-01 Date Made: 10/3/07
Mix Number: 07+01 ABC **Extended** N squared: 3348900

Expansion					
Cycle Diff	**Exp Diff**	**Exp/1Cycle**	**300 Cycles**	**Diff/1**	**#@300**
0	0.000	0.0000000	0	0.0000	< 300

Durability			
PC Diff	**PC/1 Cycle**	**Diff/1**	**#@300**
0.00	0.00	0.00000	< 300

Starting Information									
Mix #	**Exp.**	**Cure Wt.**	**Cure. Wt.**	**Abs**	**Wt. in H2O**	**Diff.**	**Spg. SSD**	**w/ Hanger**	**Hanger Wt.**
07+01 A	0.0785	16.26	16.35	0.55	0.00	16.35	1.00	0.00	0.00
07+01 B	0.1296	16.80	16.90	0.60	0.00	16.90	1.00	0.00	0.00
07+01 C	0.1601	16.25	16.35	0.62	0.00	16.35	1.00	0.00	0.00

Mix #	Date	Age (days)	Cycles	Avg %Exp	Avg G/L	Avg Sonic	Percent	Comment
07+01 A,B,C	10/17/07	14	0	0.000	0.00	1830	100	
07+01 A,B,C	10/23/07	20	48	0.021	-0.08	1651	81	
07+01 A,B,C	10/26/07	23	72	0.027	-0.04	1600	76	
07+01 A,B,C	10/30/07	27	104	0.042	-0.06	1520	69	B, edge crumble
07+01 A,B,C	11/2/07	30	128	0.052	-0.22	1423	60	A,B,&C edge crumble and spalling
07+01 A,B,C	11/06/07	34	160	0.103	-0.73	1207	44	A,B,&C still crumbling
07+01 A,B,C	11/9/07	37	184	0.112	-1.86	1056	33	Removed beams


X-07-1
NTPEP# RSCP(2007)-01
Mix# 07+01 A,B,C Extended
Henkel Loctite, Inc.
FixMaster Magna-Crete

Kansas DOT Freeze Thaw Evaluation
WR Meadows, Inc – Seal Tight Futura-15 (Extended)

NTPEP Number: RSCP(2007)-04 Date Made: 9/26/07
Mix Number: 07+04 ABC **Extended** N squared: 3122289

Expansion					
Cycle Diff	**Exp Diff**	**Exp/1Cycle**	**300 Cycles**	**Diff/1**	**#@300**
26	0.006	0.0002393	10	0.0024	0.015

Durability			
PC Diff	**PC/1 Cycle**	**Diff/1**	**#@300**
0.90	0.03	0.34680	91.28

Starting Information									
Mix #	**Exp.**	**Cure Wt.**	**Cure. Wt.**	**Abs**	**Wt. in H2O**	**Diff.**	**Spg. SSD**	**w/ Hanger**	**Hanger Wt.**
07+04 A	0.1731	16.11	16.23	0.74	0.00	16.23	1.00	0.00	0.00
07+04 B	0.2022	16.29	16.41	0.74	0.00	16.41	1.00	0.00	0.00
07+04 C	0.0955	16.21	16.32	0.68	0.00	16.32	1.00	0.00	0.00

Mix #	Date	Age (days)	Cycles	Avg %Exp	Avg G/L	Avg Sonic	Percent	Comment
07+04 A,B,C	10/10/07	14	0	0.000	0.00	1767	100	
07+04 A,B,C	10/16/07	20	48	0.007	0.00	1692	92	
07+04 A,B,C	10/19/07	23	72	0.009	0.00	1691	92	
07+04 A,B,C	10/23/07	27	104	0.010	-0.02	1690	91	
07+04 A,B,C	10/26/07	30	128	0.009	0.00	1696	92	
07+04 A,B,C	10/30/07	34	160	0.012	0.00	1696	92	
07+04 A,B,C	11/02/07	37	184	0.013	0.02	1699	92	B, popout
07+04 A,B,C	11/06/07	41	216	0.014	0.00	1697	92	
07+04 A,B,C	11/09/07	44	240	0.014	-0.02	1699	92	
07+04 A,B,C	11/13/07	48	271	0.012	0.00	1700	93	
07+04 A,B,C	11/16/07	51	290	0.012	0.00	1685	91	
07+04 A,B,C	11/19/07	54	316	0.018	0.00	1693	92	


X 07
4 A
X 07
4 B
X 07
4 C
NTPEP# RSCP(2007)-04
Mix# 07+04 A,B,C
Extended
WR Meadows, Inc.
Seal Tight Futura-15
X-07-4

Kansas DOT Freeze Thaw Evaluation
CeraTech – Pavemend EX (Extended)

NTPEP Number: RSCP(2007)-07 Date Made: 10/17/07
Mix Number: 07+07 ABC **Extended** N squared: 2699449

Expansion					
Cycle Diff	**Exp Diff**	**Exp/1Cycle**	**300 Cycles**	**Diff/1**	**#@300**
24	0.001	0.0000278	11	0.0003	0.013

Durability			
PC Diff	**PC/1 Cycle**	**Diff/1**	**#@300**
0.36	0.02	0.16627	98.67

Starting Information									
Mix #	**Exp.**	**Cure Wt.**	**Cure. Wt.**	**Abs**	**Wt. in H2O**	**Diff.**	**Spg. SSD**	**w/ Hanger**	**Hanger Wt.**
07+07 A	0.1465	15.22	15.38	1.05	0.00	15.38	1.00	0.00	0.00
07+07 B	0.1346	15.45	15.61	1.04	0.00	15.61	1.00	0.00	0.00
07+07 C	0.0993	15.24	15.40	1.05	0.00	15.40	1.00	0.00	0.00

Mix #	Date	Age (days)	Cycles	Avg %Exp	Avg G/L	Avg Sonic	Percent	Comment
07+07 A,B,C	10/31/07	14	0	0.000	0.00	1643	100	
07+07 A,B,C	11/06/07	20	48	0.009	-0.15	1607	96	
07+07 A,B,C	11/09/07	23	72	0.010	-0.15	1611	96	
07+07 A,B,C	11/13/07	27	103	0.007	-0.15	1614	97	
07+07 A,B,C	11/16/07	30	122	0.004	-0.13	1612	96	
07+07 A,B,C	11/20/07	34	154	0.013	-0.13	1618	97	
07+07 A,B,C	11/27/07	41	210	0.009	-0.13	1624	98	
07+07 A,B,C	11/30/07	44	234	0.012	-0.11	1627	98	
07+07 A,B,C	12/4/07	48	266	0.010	-0.13	1629	98	
07+07 A,B,C	12/7/07	51	289	0.013	-0.13	1631	99	
07+07 A,B,C	12/10/07	54	313	0.014	-0.13	1634	99	


NTPEP# RSCP(2007)-07
Mix# 07+07 A,B,C
Extended
CeraTech, Inc.
Pavemend EX
X-07-7

Extender Aggregate For Rapid Setting Patching Materials
For Portland Cement Concrete
Kansas DOT Testing

Gradation AASHTO T27

Sieve	% Retention
37.5	
25.0	
19.0	
12.5	0
9.5	0
4.75	68
2.36	95
1.18	98
600	99
300	99
150	100
75	100

Soundness AASHTO T103A = 0.99

Absorption AASHTO T85 = 1.0 %

Absorption AASHTO T84 = 1.2 %

L. A. WEAR AASHTO T96 = 36 C

Nelson Testing Laboratories
NTPEP Test Results
2007 RSCP Product Submissions
Polymer Modified Products
Compressive Strength Results

Compressive Strength ASTM C39 (4"x8" Cylanders) (Average of 3 tests)

NTPEP	Manuf.	Product	Neat or Extended	1 Hour	3 Hour	1 Day	7 Day	28 Day	Notes
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	1540	4193	5730	6750	9120	8.32# water / 55# bag
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	2040	4703	5423	6573	9150	8.32# water and 25# pea gravel / 55# bag
2007-03	SpecChem	RepCon 928	Neat	1410	4371	5728	7224	9345	5.2# water / 50# bag
2007-03	SpecChem	RepCon 928	Extended	1653	6150	6830	10737	10957	5.2# water and 25# pea gravel / 50# bag

Compressive Strength ASTM C109 (2" Cubes) (Average of 3 tests)

NTPEP	Manuf.	Product	Neat or Extended	1 Hour	3 Hour	1 Day	7 Day	28 Day	Notes
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	208	5894	7451	8590	9870	8.32 lbs of water per 55 lb bag
2007-03	SpecChem	RepCon 928	Neat	136	3756	5722	9110	9922	5.2 lbs of water per 50 lb bag

Nelson Testing Laboratories
NTPEP Test Results
2007 RSCP Product Submissions
Polymer Modified Products

Specific Gravity and Absorption of Fine and Coarse Aggregates - ASTM C 128 and C127

NTPEP	Manuf.	Product	Neat or Extended	Specific Gravity (g/cm³) Fine Agg.	Absorption %	Specific Gravity (g/cm³) Coarse Agg.	Absorption %
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	2.44	6.1	x	x
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	2.44	6.1	2.49	5.7
2007-03	SpecChem	RepCon 928	Neat	2.59	0.4	x	x
2007-03	SpecChem	RepCon 928	Extended	2.59	0.4	2.49	1.7

Unit Weight - ASTM C138 and Slump ASTM C143

NTPEP	Manuf.	Product	Neat or Extended	Unit Weight (lbs / cf)	Slump (inch)
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	133.0	4.0
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	142.4	3.5
2007-03	SpecChem	RepCon 928	Neat	141.4	10.5
2007-03	SpecChem	RepCon 928	Extended	146.6	8.0

Nelson Testing Laboratories
NTPEP Test Results
2007 RSCP Product Submissions
Polymer Modified Products

Length Change ASTM C157 (modified by ASTM C928) (Average of 3 samples)

NTPEP	Manuf.	Product	Neat or Extended	Length Change @ 28 days Air Storage (%)	Length Change @ 28 days Water Storage (%)
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	0.040	0.050
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	0.045	0.073
2007-03	SpecChem	RepCon 928	Neat	0.036	0.013
2007-03	SpecChem	RepCon 928	Extended	0.028	0.008

Thermal Compatibility ASTM C884

NTPEP	Manuf.	Product	Neat or Extended	Thermal Compatibility @ 5 cycles		
				Sample 1	Sample 2	Sample 3
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	Pass, no delamination or cracks	Pass, no delamination or cracks	Pass, no delamination or cracks
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	Pass, no delamination or cracks	Pass, no delamination or cracks	Pass, no delamination or cracks
2007-03	SpecChem	RepCon 928	Neat	Pass, no delamination or cracks	Pass, no delamination or cracks	Pass, no delamination or cracks
2007-03	SpecChem	RepCon 928	Extended	Pass, no delamination or cracks	Pass, no delamination or cracks	Pass, no delamination or cracks

Nelson Testing Laboratories
NTPEP Test Results
2007 RSCP Product Submissions
Polymer Modified Products

Air Content ASTM C231 (pressure method)

NTPEP	Manuf.	Product	Neat or Extended	Air Content (%)
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	4.0
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	3.3
2007-03	SpecChem	RepCon 928	Neat	3.0
2007-03	SpecChem	RepCon 928	Extended	3.0

Time of Set by Penetration Resistance ASTM C403

			Neat or	Set Time	
NTPEP	Manuf.	Product	Extended	Initial (min)	Final (min)
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	40	50
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	40	45
2007-03	SpecChem	RepCon 928	Neat	50	55
2007-03	SpecChem	RepCon 928	Extended	45	50

Nelson Testing Laboratories
NTPEP Test Results
2007 RSCP Product Submissions
Polymer Modified Products

Bond Strength by Direct Tension ASTM C1404 (Average of 3 tests)

NTPEP	Manuf.	Product	Neat or Extended	Bond Strength (psi)
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	1533
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	1447
2007-03	SpecChem	RepCon 928	Neat	1597
2007-03	SpecChem	RepCon 928	Extended	1503

Chloride Ion Penetration ASTM C1202 (Average of 3 tests) (Sample Type 2"x4" disk)

NTPEP	Manuf.	Product	Neat or Extended	Charge Passed (coulombs)
2007-02	Quikrete	FS DOT Deck Repair PM	Neat	325 very low
2007-02	Quikrete	FS DOT Deck Repair PM	Extended	311 very low
2007-03	SpecChem	RepCon 928	Neat	670 very low
2007-03	SpecChem	RepCon 928	Extended	283 very low

Chloride Ion Penetrability Based on Charge Passed

Charge Passed (coulombs)	*Chloride Ion Penetrability*
>4000	*High*
2000-4000	*Moderate*
1000-2000	*Low*
100-1000	*Very Low*
<100	*Negligible*

Appendix A – NTPEP Committee Roster (Rev: 12/16/2009)

National Transportation Product Evaluation Program (NTPEP)

Chair: Vacant

Vice Chair: Thomas E. Baker, Washington

AASHTO Staff: Keith Platte, Greta Smith, Katheryn Koretz, Evan Rothblatt and Henry Lacinak

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"The National Transportation Product Evaluation Program (NTPEP) was established by the American Association of State Highway and Transportation Officials (AASHTO) in early 1994. The program pools the professional and physical resources of the AASHTO member departments in order to test materials, products and devices of common interest. The primary goals of the program are to provide cost-effective evaluations for the states by eliminating duplication of routine testing by the states; and to reduce duplication of effort by the manufacturers who produce and market commonly used proprietary, engineered products." **NTPEP**

-- Rick Smutzer (IN), former NTPEP Chairman

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