



Florida Department of Transportation

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MEMORANDUM

DATE: August 30, 2016

TO: Specification Review Distribution List

FROM: Dan Hurtado, P.E., State Specifications Engineer

SUBJECT: Proposed Specification: **9260100 Epoxy Jointing of Precast Segments.**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change.

This change was proposed by Paul Vinik of the State Materials Office to modify the language to include epoxy requirements from Section 453. Section 453 will be deleted.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or online at <http://www2.dot.state.fl.us/ProgramManagement/Development/IndustryReview.aspx> . Comments received after **September 26, 2016**, may not be considered. Your input is encouraged.

DH/dt
Attachment

EPOXY COMPOUNDS.

(REV ~~4-1213277-18-29-16~~)

ARTICLE 926-1 is deleted and the following substituted:

926-1 Types of Compounds.

Epoxy resin based compounds for application to portland cement concrete, bituminous cement concrete, metals and other type surfaces shall be applicable for the following types as designated.

Type	Description
AB*	An epoxy resin, for bonding fresh <u>or hardened</u> concrete to hardened concrete <u>, bonding hardened concrete to hardened concrete, and constructing doweled splices in precast prestressed concrete piles.</u>
B*	An epoxy resin adhesive, for bonding hardened concrete to hardened concrete and constructing doweled splices in precast prestressed concrete piles.
E*	A fluid epoxy for crack injection in the repair of old structures.
F	An epoxy for repairing spalled areas on concrete bridge structures with these subtypes:
F-1*	A non sagging gel type for vertical surfaces.
F-2**	A pourable type for repairs where forms are to be used.
H**	An epoxy for structural bonding where asphalt overlays are to be in contact with the hardened compound.
K*	An epoxy for underwater sealing of the bottom of the jacket of an integral pile jacket system.
M***	A coal tar epoxy coating for steel sheet piles and H piles (water immersion) and hot applied coal tar epoxy tape.
PSE*	A two part epoxy system to match the cast faces of joints between precast segmental concrete superstructure and/or substructure segments.
Q*	An epoxy for use in post tensioning anchorage protection systems.
*Accepted by APL **Accepted by certified test report ***Accepted by certification	

SUBARTICLE 926-2.2 is deleted and the following substituted:

926-2.2 Approved Product List (APL): All epoxy materials shall be one of the products listed on the Department’s Approved Product List (APL) unless an alternative acceptance is identified in this Specification. All Manufacturers shall submit a product data sheet. Also, Manufacturers seeking evaluation of submitting products for inclusion on the APL consideration must shall submit an APL application in accordance with Section 6. Information on the APL application must identify the epoxy type.
–Manufacturers seeking evaluation of †Type- AB and †Type- PSE epoxies of their products shall submit product data sheets, performance test reports from the National Transportation Product Evaluation Program (NTPEP) indicating showing that the product meets

~~the requirements of an independent laboratory showing compliance with the product meets the requirements of this Section.~~

~~Manufacturers of all other types shall submit test data from an independent laboratory showing that the product meets the requirements of indicating compliance with this Section and; an infrared identification curve (2.5 to 15 µm) and a APL application in accordance with Section 6.~~

~~Information on the APL application must identify the epoxy type.~~

~~Products may only be used for applications recommended by the manufacturer.~~

ARTICLE 926-3 is deleted and the following substituted:

926-3 Specific Requirements for Types A and B Epoxy Compounds.

926-3.1 Mixing and Application: Types A and B epoxy compounds (for bonding fresh concrete to hardened concrete or bonding precast concrete parts) shall be listed on the APL and be mixed, applied, and cured in accordance with the manufacturer's directions, or as might be directed otherwise by the Engineer.

Epoxy compounds shall be used only under conditions which are compatible with the material being applied in accordance with the specific directions of the manufacturer.

926-3.2 Performance Tests: Meet the requirements of ASTM C881 Type IV, Grade 3.

~~1. Epoxy Bonding Compounds: Epoxy Bonding Compounds shall be prepared and tested in accordance with FM 3 C882. The ratio of the compressive strength of the composite cylinder to the compressive strength of the weaker concrete shall not be less than 0.90~~

~~2. Epoxy Mortars: Epoxy mortar shall be prepared and tested in accordance with FM 3 C882. The average compressive strength of the three test specimens shall be at least 5,000 psi.~~

ARTICLE 926-4 is deleted and the following substituted:

926-4 Specific Requirements for Type E Compounds.

Epoxies for crack injection shall meet the Specification for Type AB compound with these additional requirements:

Viscosity five minutes after mixing	300 to 600 cps at 77°F by ASTM D 2393
Wet bond strength to concrete, minimum	250 psi at seven days by FM 5-518

ARTICLES 926-9 to 926-12 are deleted and the following substituted:

926-9 Specific Requirements for Type PSE Epoxy Compounds.

Precast segmental epoxies (PSE) shall be listed on the APL. The epoxy shall be factory pre-proportioned in two parts and labeled with the manufacturer's name, brand name, component type (resin or hardener), the range of substrate (surface of concrete) temperature over which the application is suitable, material classification, the date of formulation, the shelf life of the material, and the manufacturer's lot number.

Normal set PSEs shall remain workable for a short open time (about one hour) and meet the requirements of ASTM C881, Type VI Grade- 3. Slow set PSEs shall remain workable over an extended open time (about eight hours), meet the requirements of ASTM C881, Type VII Grade- 3, and have a compressive yield strength of 6,000 psi at 14 days.

Epoxy bonding agents for match-cast joints between precast segments must be thermosetting, 100% solid compositions, ~~which do~~ and shall not contain solvent or any non-reactive organic ingredient except for colorant.

Epoxy bonding agents ~~must~~ shall be formulated to provide application temperature ranges which are suitable for the erection of match cast segments with substrate temperatures between 40°F and 105°F with a minimum of at least two, but preferably three, formulations dividing the range into approximately equal subranges which overlap by at least 5°F.

926-10 Specific Requirements for Type Q Compounds.

These epoxy materials shall be listed on the APL and are to be used to protect the anchorages of post-tensioning tendons or bars and other uses indicated in the Plans. The material shall produce a low exothermic reaction and have flow and fill characteristics suitable for machine base plate applications. The material will be extended with the aggregate supplied by the manufacturer. Mix with the full aggregate loading unless the use of less aggregate is approved by the Engineer.

The material shall be factory pre-proportioned including factory supplied aggregate. Deliver products in original containers with manufacturer’s name, date of manufacture, product identification label and batch numbers. Materials must be within the manufacturer’s recommended shelf life. Store and condition the product in full compliance with manufacturer’s recommendations.

The epoxy grout plus aggregate mix shall meet or exceed the specified physical properties stated herein as determined by the following standard ASTM test methods.

Property	Test Value	Test Method
Compressive Strength Cubes 7 day Cure at 77°F	> 10,000 psi	ASTM C 579B
Tensile Strength at 7 days	> 2,100 psi	ASTM C 307
Flexural Strength at 7day Cure at 77°F	> 3,600 psi	ASTM C 580
Modulus of Elasticity 7 day Cure at 77°F	< 2,100,000 psi	ASTM C 580
Coefficient of Thermal Expansion at 74 to 210°F	< 20 x 10 ⁻⁶ in/in/°F	ASTM C 531

Peak Exotherm, Specimen 12 x 12 x 3 in.	< 150°F	ASTM D 2471
Slant Shear at 7 days (Bond Strength to Concrete)	> 3000 psi	FM 5-587
Thermal Compatibility	5 Cycles Passed	ASTM C 884
Linear Shrinkage at 7 days	0.025%	ASTM C 531
Flowability and Bearing Area	90% Contact area	ASTM C 1339

Gel Time, Specimen 12 x 12 x 3 in.	< 4:00 (hr.)	ASTM D 2471
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926-~~10~~-11 Packaging, Labeling, and Safety.

All containers shall show the type, mixing directions, batch numbers, manufacturer's name, date of packaging, shelf life expiration date and quantity in pounds or gallons. Containers with components shall clearly be identified with Component A-epoxy resin or Component B-hardener. Mix ratios shall be prominently shown on labels.

Potential hazards shall be stated on each package in accordance with the Federal Hazardous Products Labeling Act.

926-~~11~~-12 Storage.

Epoxy materials, which have been in storage for more than twelve months, will not be accepted for use.

926-~~12~~-13 Fillers.

Fillers for mixing mortars and grouts may be as recommended by the manufacturer of the particular epoxy compound and may be supplied as packages accompanying the epoxy or premixed in accordance with approved properties.

If a manufacturer recommends only the gradation of filler, it must be a silica sand commercially available in Florida and shall be a gradation listed in Table I or a specified blend of these gradations.

The silica sands specified in Table ~~I~~ shall be clean, kiln dried, packaged in strong moisture proof bags, contain no more than 0.2% organic trash, and be chloride free.

Fillers shall not be used with these compounds: Types E and M.

When the fillers specified in Table ~~I~~ are used, the maximum amount shall be 2.25 volumes to one volume of mixed compound.

Table I Gradation Requirements For for Fillers For for Use-use With with Epoxy Compounds				
Grade				
	A	B	C*	D**
Sieve Opening Size	Required % Passing			
No. 4			95-100	95-100
No. 6		90-100		
No. 8			0-15	85-100
No. 16				65-97
No. 20	80-100	0-20		
No. 30	0-40			25-70
No. 50	0-10			5-35
No. 100				0-7

*For use only in sections ~~+~~1-1/2 inches or greater in thickness.
**Same as quartz sand fine aggregate for cement concrete (902-1.3.1).

9260100
All Jobs