



Florida Department of Transportation

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GOVERNOR

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Tallahassee, FL 32399-0450

ANANTH PRASAD, P.E.
SECRETARY

June 23, 2011

Monica Gourdine
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section **937**
Proposed Specification: **9370000 Post-Installed Anchor Systems for Structural Applications in Concrete Elements.**

Dear Ms. Gourdine:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

These changes were proposed by Gevin McDaniel of the State Structures Design Office to add undercut anchor systems.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965RP or rudy.powell@dot.state.fl.us.

If you have any questions relating to this specification change, please call Rudy Powell, State Specifications Engineer at 414-4280.

Sincerely,

Signature on file

Rudy Powell, Jr., P.E.
State Specifications Engineer

RP/dt

Attachment

cc: Gregory Jones, Chief Civil Litigation
Florida Transportation Builders' Assoc.
State Construction Engineer

POST-INSTALLED ANCHOR SYSTEMS FOR STRUCTURAL APPLICATIONS IN CONCRETE ELEMENTS.

(REV ~~456-2946917823~~-11)

SECTION 937 (Pages 889 – 891) is deleted and the following substituted:

SECTION 937

~~ADHESIVE BONDING MATERIAL~~ **POST-INSTALLED ANCHOR** SYSTEMS FOR STRUCTURAL APPLICATIONS **IN CONCRETE ELEMENTS.**

937-1 General ~~Requirements.~~

Post-installed anchor systems intended for structural applications in concrete elements may be either include adhesive-bonded anchor systems or undercut anchor systems. ~~Adhesive bonding material systems for structural applications shall consist of pre-packaged 2-part chemical components. The material systems shall be specifically intended for use in structural applications for bonding anchors and dowels to hardened concrete. Applications are limited to anchors and dowels installed in positions ranging from vertically downward to horizontal.~~

~~Do not use material from containers which are damaged or have been previously opened. Use only full packages of components. Combining of epoxy bonding components from bulk supplies is not permitted.~~

~~Material systems for Type HV and HSHV shall be pre-packaged to automatically proportion and mix the materials for use. Manual proportioning of the components will not be permitted.~~

~~937-1.1 Type HV Adhesives: Use Type HV adhesive bonding materials for all horizontal installations and vertical installations other than constructing doweled pile splices, except when Type HSHV is required. Type HV adhesives may not be substituted for Type HSHV adhesives.~~

~~937-1.2 Type HSHV Adhesives: Use higher strength Type HSHV adhesive bonding materials for installation of traffic railing barrier reinforcement and anchor bolts into existing concrete bridge decks and approach slabs. Type HSHV adhesives may be substituted for Type HV adhesives.~~

937-2 Qualified Products List (QPL).

Manufacturers of ~~adhesive bonding material~~ *post-installed anchor* systems may apply for inclusion of individual products on the Qualified Products List. The application shall be made in accordance with ~~6-1~~ *Section 6* and shall include certified test reports from an independent testing laboratory which shows the material system meets all the requirements ~~specified herein~~ *of this Section*.

937-3 Certification.

The Contractor shall provide the Engineer with certification from the manufacturer of the ~~adhesive bonding material~~ *anchor* system, confirming that the requirements of this Section are met. The certification shall conform to the requirements

of Section 6. Each certification shall cover only one LOT of ~~adhesive anchoring~~ materials.

937-4 Adhesive Bonding Material Systems.

937-4.1 General: Adhesive bonding material systems for structural applications shall consist of pre-packaged 2-part chemical components. The material systems shall be specifically intended for use in structural applications for bonding anchors and dowels to hardened concrete. Applications are limited to anchors and dowels installed in positions ranging from vertically downward to horizontal.

Do not use material from containers which are damaged or have been previously opened. Use only full packages of components. Combining of ~~epoxy~~ adhesive bonding components from bulk supplies is not permitted.

Material systems ~~for Type HV and HSHV~~ shall be pre-packaged to automatically proportion and mix the materials for use. Manual proportioning of the components will not be permitted.

~~High Strength Horizontal to Vertical (HSHV) adhesive bonding systems permitted for horizontal to vertically downward installations, are intended for traffic railing installations where a shallower embedment is required.~~

~~Horizontal to Vertical (HV) adhesive bonding systems permitted for horizontal to vertically downward installations, are intended for all other structural uses.~~

937-4 Minimum Performance Requirements (FM 5-568).

937-4.2 Minimum Performance Requirements (FM 5-568): When tested in accordance with FM 5-568, the adhesive bonding material system, for general use, shall meet the following requirements:

| Uniform Bond Stress | | |
|-------------------------|-----------|-----------|
| | Type HV | Type HSHV |
| Confined Tension | 2,290 psi | 3,060 psi |
| Damp-Hole Installation | 1,680 psi | 1,830 psi |
| Elevated Temperature | 2,290 psi | 3,060 psi |
| Horizontal Orientation | 2,060 psi | 2,060 psi |
| Short Term Cure | 1,710 psi | 1,710 psi |
| Specified Bond Strength | 1,080 psi | 1,830 psi |

~~Maximum Coefficient of Variation for Uniform Bond Stress—: 20%.~~

~~Maximum Coefficient of Variation for Uniform Bond Stress 20%~~

Long Term Load (Creep):

(1) The rate of displacement shall decrease during the 42 day application of load.

(2) At 42 days the total displacement due to creep (with load still applied) shall be less than 0.03 inch and during the last 14 days of the 42 day load duration, the total displacement due to creep shall be less than 0.003 inch.

(3) After removal of the 42 day load, the uniform bond Stress from a subsequent Confined Tension Test shall not be less than 1,826 psi.

~~937-5 Product Identification (Fingerprint) Properties (FM 5-569).~~

937-4.3 Product Identification (Fingerprint) Properties (FM 5-569): References for comparison including Infrared Absorption, Density or Average Weight, Gel Time or Setting Time, and Bond Strength shall be determined in accordance with FM 5-569.

~~937-6 Packaging and Marking.~~

937-4.4 Packaging and Marking: The adhesive bonding material system shall be delivered to the project site in original unopened containers with the manufacturer's label identifying the product. Each package shall be clearly marked with the following information:

Manufacturer's name and address
Product Name
Date of Manufacture
Expiration Date
LOT Identification Number
Storage and Handling Requirements

Each package shall include the manufacturer's instructions for anchor and dowel installation. The instructions shall include the following information:

Diameters of drilled holes for applicable anchor and dowel sizes.
Cleaning procedure for drilled holes, including a description of permitted and prohibited equipment and techniques.

Allowable temperature ranges for storage, installation and curing.
Identification of acceptable mixing/dispensing nozzles.
Fabrication requirements for anchors and dowels.
Description of tools permitted or required for installation.
Method of identifying properly proportioned and mixed adhesive materials.

Time and temperature schedule for initial set and full-strength cure.

Special requirements for special installation conditions such as damp holes, or horizontal or near horizontal orientation of the anchor or dowel.

937-5 Undercut Anchor Systems.

937-5.1 General: ~~The undercut anchor system shall be constructed of Provide only Type 316- stainless steel undercut anchor systems qualified for use in cracked concrete.~~

~~The Undercut anchor sleeve must~~ shall form a cone shaped undercut or expand into a preformed cone (or reverse cone) shaped undercut. Anchors using only self-cutting teeth that are expanded to form the undercut are not permitted.

Undercut anchors with a marked setting indicator not requiring a specified setting torque are permitted. ~~The M~~ marked setting indicator must shall indicate the displacement of the anchor bolt relative to the anchorage sleeve and must be visible above the concrete surface after setting operation is complete.

937-5.2 Minimum, Performance Requirements: ~~Use undercut anchor systems designed in accordance with ACI 318, Appendix D and the Department's Structures Manual.~~

~~Use only~~ Test undercut anchor systems ~~tested~~ in accordance with the International Code Council Evaluation Service (ICC-ES) Acceptance Criteria for Mechanical Anchors in Concrete Elements ACI 193, meeting the assessment requirements of Qualification of Post-Installed Mechanical Anchors in Concrete (ACI 355.2-07) as specified in ACI 318, Appendix D.

937-5.3 Packaging and Marking: The ~~Deliver~~ undercut anchor systems shall be delivered to the project site in packaging with the manufacturer's label identifying the product.

~~Clearly mark~~ Each package or anchor shall be clearly marked with the following information:

Manufacturer's name and address

Product Name

Anchor material grade

LOT Identification Number

Include the manufacturer's instructions for installation of the anchor with each package or anchor with the following information, as a minimum:

Diameter and depth of drilled holes for applicable anchor sizes,

Cleaning and preparation procedures for drilled holes,

Description of tools permitted or required for installation.

**POST-INSTALLED ANCHOR SYSTEMS FOR STRUCTURAL APPLICATIONS
IN CONCRETE ELEMENTS.**

(REV 6-23-11)

SECTION 937 (Pages 889 – 891) is deleted and the following substituted:

**SECTION 937
POST-INSTALLED ANCHOR SYSTEMS FOR
STRUCTURAL APPLICATIONS IN CONCRETE ELEMENTS.**

937-1 General.

Post-installed anchor systems intended for structural applications in concrete elements include adhesive-bonded anchor systems or undercut anchor systems.

937-2 Qualified Products List (QPL).

Manufacturers of post-installed anchor systems may apply for inclusion of individual products on the Qualified Products List. The application shall be made in accordance with Section 6 and shall include certified test reports from an independent testing laboratory which shows the material system meets all the requirements of this Section.

937-3 Certification.

The Contractor shall provide the Engineer with certification from the manufacturer of the anchor system, confirming that the requirements of this Section are met. The certification shall conform to the requirements of Section 6. Each certification shall cover only one LOT of anchoring materials.

937-4 Adhesive Bonding Material Systems.

937-4.1 General: Adhesive bonding material systems for structural applications shall consist of pre-packaged 2-part chemical components. The material systems shall be specifically intended for use in structural applications for bonding anchors and dowels to hardened concrete. Applications are limited to anchors and dowels installed in positions ranging from vertically downward to horizontal.

Do not use material from containers which are damaged or have been previously opened. Use only full packages of components. Combining of adhesive bonding components from bulk supplies is not permitted.

Material systems shall be pre-packaged to automatically proportion and mix the materials for use. Manual proportioning of the components will not be permitted.

937-4.2 Minimum Performance Requirements (FM 5-568): When tested in accordance with FM 5-568, the adhesive bonding material system, for general use, shall meet the following requirements:

| Uniform Bond Stress | | |
|------------------------|-----------|-----------|
| | Type HV | Type HSHV |
| Confined Tension | 2,290 psi | 3,060 psi |
| Damp-Hole Installation | 1,680 psi | 1,830 psi |

| Uniform Bond Stress | | |
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| | Type HV | Type HSHV |
| Elevated Temperature | 2,290 psi | 3,060 psi |
| Horizontal Orientation | 2,060 psi | 2,060 psi |
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| Specified Bond Strength | 1,080 psi | 1,830 psi |
| Maximum Coefficient of Variation for Uniform Bond Stress: 20%. | | |

Long Term Load (Creep):

(1) The rate of displacement shall decrease during the 42 day application of load.

(2) At 42 days the total displacement due to creep (with load still applied) shall be less than 0.03 inch and during the last 14 days of the 42 day load duration, the total displacement due to creep shall be less than 0.003 inch.

(3) After removal of the 42 day load, the uniform bond Stress from a subsequent Confined Tension Test shall not be less than 1,826 psi.

937-4.3 Product Identification (Fingerprint) Properties (FM 5-569):

References for comparison including Infrared Absorption, Density or Average Weight, Gel Time or Setting Time, and Bond Strength shall be determined in accordance with FM 5-569.

937-4.4 Packaging and Marking: The adhesive bonding material system shall be delivered to the project site in original unopened containers with the manufacturer's label identifying the product. Each package shall be clearly marked with the following information:

- Manufacturer's name and address
- Product Name
- Date of Manufacture
- Expiration Date
- LOT Identification Number
- Storage and Handling Requirements

Each package shall include the manufacturer's instructions for anchor and dowel installation. The instructions shall include the following information:

Diameters of drilled holes for applicable anchor and dowel sizes.
Cleaning procedure for drilled holes, including a description of permitted and prohibited equipment and techniques.

Allowable temperature ranges for storage, installation and curing.
Identification of acceptable mixing/dispensing nozzles.
Fabrication requirements for anchors and dowels.
Description of tools permitted or required for installation.
Method of identifying properly proportioned and mixed adhesive materials.

Time and temperature schedule for initial set and full-strength cure.

Special requirements for special installation conditions such as damp holes, or horizontal or near horizontal orientation of the anchor or dowel.

937-5 Undercut Anchor Systems.

937-5.1 General: The undercut anchor system shall be constructed of Type 316 stainless steel.

The undercut anchor sleeve shall form a cone shaped undercut or expand into a preformed cone or reverse cone shaped undercut. Anchors using only self-cutting teeth that are expanded to form the undercut are not permitted.

Undercut anchors with a marked setting indicator not requiring a specified setting torque are permitted. The marked setting indicator shall indicate the displacement of the anchor bolt relative to the anchor sleeve and must be visible above the concrete surface after setting operation is complete.

937-5.2 Minimum Performance Requirements: Test undercut anchor systems in accordance with the International Code Council Evaluation Service (ICC-ES) Acceptance Criteria for Mechanical Anchors in Concrete Elements ACI 193, meeting the assessment requirements of Qualification of Post-Installed Mechanical Anchors in Concrete (ACI 355.2-07) as specified in ACI 318, Appendix D.

937-5.3 Packaging and Marking: The undercut anchor systems shall be delivered to the project site in packaging with the manufacturer's label identifying the product.

Each package or anchor shall be clearly marked with the following information:

- Manufacturer's name and address
- Product Name
- Anchor material grade
- LOT Identification Number

Include the manufacturer's instructions for installation of the anchor with each package or anchor with the following information, as a minimum:

- Diameter and depth of drilled holes for applicable anchor sizes,
- Cleaning and preparation procedures for drilled holes,
- Description of tools permitted or required for installation.