

**AGENDA****PTI M-10 Unbonded Tendon Committee**

Tuesday, May 8, 2018, 1:00 PM - 5:30 PM

Hilton Minneapolis, Minneapolis, MN – Room Conrad B/C

**Voting Members Present (0 of 22; Quorum=10)**

Michael Williams – Chair	Builders Post-Tension
Rashid Ahmed – TAB Contact, NV	Walker Parking Consultants
Mauro Barbosa	Dywidag Systems International, Inc.
Muhammad Cheema	Walter P Moore
David Harrison	Suncoast Post-Tension, Ltd.
Joe Harrison	LMS Reinforcing Steel Group
Neel Khosa	AMSYSCO, Inc.
Rattan Khosa	AMSYSCO, Inc.
Marc Khoury	CCL USA, Inc.
Larry Krauser	General Technologies, Inc.
Thomas Mathews	Precision-Hayes International
Harley Nethken	Tech-Con Systems, Inc.
Russell Price	Suncoast Post-Tension, Ltd.
Steven Ross	Lubricating Specialties Company
Doug Schlegel	Consultant
Pete Scoppa	PT USA, LP
Felix Sorkin	General Technologies, Inc.
Todd Stevens	Gerdau Reinforcing
Bob Sward	VSL
Shane Taylor	Precision-Hayes International
Slava Tkachuk	Ready Cable, Inc.
Coy Williams	Consolidated Reinforcement
Dan Williams	VSL
Miroslav Vejvoda, NV	PTI Liaison
Ted Neff, NV	PTI Staff

**Associate Members Present**

Noli Alarcon	Timothy Haahs and Associates, Inc.
E.T. Bradley	EBAA Iron, Inc.
Sam Carnell	General Technologies, Inc.
Robb Dietrich	Dywidag Systems International, Inc.
William Fossing	SRF Consulting
Roger Frenn	Dywidag Systems International, Inc.
Paul Hohensee	Precision-Hayes International
John Kennedy	Martin Specialty Products
Dale King	Bekaert Corporation
Andy Kochis	Ready Cable, Inc.
Anoop Kumar	Royal Manufacturing Company, L.P.
Hee-taik Lee	Korea Institute of Nuclear Safety
John Lorimor	Axel Americas
Martin Mikula	Mikula Group, Inc.
Sivakumar Munuswamy	Thornton Tomasetti
Srini Neelamegam	CCL USA, Inc
Rob Paderofsky	VSL
John Pearson	WJE
Michael Pedraza	United Forming, Inc.

Nandish Pethani  
 Danny Sohal  
 Mark Sterling  
 Christian Wurtz  
 Miguel Zuniga

Nektor Engineers and Project Consultants  
 Unigel  
 Martin Specialty Products  
 Post Tension Plugs  
 Gerdau Reinforcing

**Visitors**

**ACTION ITEMS FROM LAST / THIS MEETING**

Item #	Subject	Action	Responsible	Deadline / Completed

Agenda Item	Expected Outcome / Actions Taken
<b>A. <u>General</u></b> A.1 Call to Order  A.2 Introductions / Attendance Sheet ( <b>Exhibit A.2</b> )  A.3 Committee Roster  A.4 PTI Antitrust Policy ( <b>Exhibit A.4</b> )  A.5 Committee Annual Report	A.1 Meeting called to order at 1 pm by Chair M. Williams.  A.2 All present are asked to introduce themselves and to sign the Attendance Sheet.  A.3 The official committee roster is on the PTI website.  A.4 All are reminded of the PTI Antitrust Policy and asked to initial the right-hand side column on the Attendance Sheet to confirm their knowledge of and adherence to the policy.  A.5 The Annual Report will be attached to the fall meeting agenda.
<b>B. <u>Agenda &amp; Minutes</u></b> B.1 Approval of Agenda  B.2 Approval of Minutes from 10-4-17, (Meeting ballot required)	B.1 Additions/changes to agenda:  <b>B.2 Motion / Second to approve Minutes from 10/4/17: Name / Name, 0-0-0, (Y-N-A)</b>
<b>C. <u>Actions Taken Between Meetings</u></b> C.1 Letter Ballots (None)  C.2 Web Meetings (None)	C.1  C.2
<b>1. <u>Action Item 1: PT Coating TG Update</u></b> 1.1 TG Update (Lead: Shane Taylor, Members: Steve Idalski, Justin Jewkes, Rattan Khosa, Anoop Kumar, John Lorimor, Steven Ross, Doug Schlegel, Mark Schweitzer,	1.1 TG Lead Shane Taylor is asked to present the TG recommendations with justification to modify Table 2.2.2.1—Performance specification for PT coating, in M10.2-17.

Agenda Item	Expected Outcome / Actions Taken
<p>Mark Sterling, William Wesley, Michael Williams)</p> <p>1.2 TG Task: Review PT coating requirements</p>	
<p><b><u>2. Action Item 2: Specification Addenda</u></b></p> <p>2.1 PTI M10.6-15 Specification for Unbonded Single Strand Tendons Used for Slab-on-Ground Construction</p> <p>2.2 PTI M10.2-17 Specification for Unbonded Single Strand Tendons</p>	<p>2.1 The encapsulated system specification is in conflict with M10.2-17. Rather than revising the provisions, refer to M10.2-17. Proposed Addendum is in (<b>Exhibit 2.1</b>).</p> <p>2.2 SOG is totally excluded. If encapsulated system specification in M10.6-15 refers to M10.2-17, the scope exclusion of SOG needs to be modified. Proposed Addendum is in (<b>Exhibit 2.2</b>).</p>
<p><b><u>3. Action Item 3: Storage prior to shipping</u></b></p> <p>3.1 Any action required?</p>	<p>3.1 R Khosa prepared language that he wanted incorporated into the specifications regarding this item.</p>
<p><b><u>4. Action Item 4: TG – Barrier Cable</u></b></p> <p>4.1 TG Update (Lead: Todd Stevens; Members: Doug Schlegel, Rashid Ahmed, Carlos Banchik, Asit Baxi, Muhammad Cheema, Baruch Gedalia, David Harrison, Dawn Kori, Thomas Mathews, Drew Micklus, Pete Scoppa, Eric Tegner, Dan Williams</p> <p>4.2 TG Task: Draft and update Barrier Cable documents</p>	<p>4.1 TG Lead Todd Stevens is asked to report on the status of the Barrier Cable documents:</p> <ol style="list-style-type: none"> <li>1. Maintenance &amp; Repair Guide:</li> <li>2. Short Span Barrier Cable TN (new):</li> <li>3. Barrier Cable Specifications revision:</li> <li>4. Technical Note #14 revision:</li> </ol>
<p><b><u>5. Action Item 5: TG-Performance Specification</u></b></p> <p>5.1 TG Update (Lead: Doug Schlegel; Members: Russ Price, Asit Baxi, Larry Krauser, Harley Nethken, Thomas Mathews, Todd Stevens, and Rob Paderofsky)</p> <p>5.2 TG Task: Draft performance specification</p>	<p>5.1 TG task priorities:</p>
<p><b><u>6. Action Item 6: Specification Conflicts PTI 10.2-17 vs. ACI 423.7-14</u></b></p> <p>6.1 TG to address all existing conflicts between the PTI and ACI Specifications</p>	<p>6.1</p>
<p><b><u>7. Action Item 7: ACI 423.7-14 Field Filling of Transition Tube with PT Coating</u></b></p>	

Agenda Item	Expected Outcome / Actions Taken
7.1 TG to address the current ACI 423.7-14 requirement 6.5.2 c) "Within the connecting component or enclosure, either the prestressing steel shall be covered by sheathing for its full length, or the annular space between the sleeve and the strand shall be filled with PT coating in conformance with 5.2".	7.1
<b>D. <u>New Business</u></b>  D.1 Any new business?	D.1
<b>E. <u>Next Meeting</u></b> E.1 2018 PTI Committee Days, Colorado Springs CO, September 26-27, 2018  E.2 Web Meetings:	E.1  E.2 Web meetings will be scheduled as needed. Especially the TGs are encouraged to schedule web meetings to advance their work.
<b>F. <u>Adjourn</u></b>	The meeting was adjourned at pm.

### **AGENDA / MINUTES EXHIBITS**

Exhibit #	Subject
A.2 / A.4	Attendance Sheets / PTI Anti-Trust Policy
2.1	PTI M10.6-15 Specification for Unbonded Single Strand Tendons Used for Slab-on-Ground Construction, Addendum #1
2.2	PTI M10.2-17 Specification for Unbonded Single Strand Tendons Addendum #1

At a meeting on October 8, 1980, the Board of Directors first discussed the Institute's status and policies regarding compliance with antitrust laws. After review of both the internal and external compliance procedures, the following resolution was approved:

*"The staff, officers, directors and members of the Post-Tensioning Institute are reminded that they are required to comply with the spirit and specific requirements of the antitrust laws on all activities within the scope of, and related to, the official functions of PTI. Further, this restated position, along with appropriate explanatory material, should be placed in all meeting folders/books periodically, beginning with the 8th of October meeting of PTI."*

On July 24, 2012 and again on October 7, 2015, the Executive Committee authorized Legal Counsel to review and update this Policy Statement in the perspective of the Department of Justice Business Review Letter of July 30, 1997 and current case law. As a continuing guide for your participation in PTI's meetings, please review and continue to adhere to the following "Legal Limitation on Discussions at PTI Meetings."

### LEGAL LIMITATION ON DISCUSSIONS AT PTI MEETINGS AND EVENTS

A free exchange of ideas on matters of mutual interest to the members is necessary for the success of all meetings. Indeed, such an exchange of views is essential to the successful operation of every trade association and the law specifically allows legitimate exchange of views pertaining to, e.g., quality control, safety, building design and construction integrity, etc.

It is not the purpose of this memorandum to discourage the exploration in depth of any matters of legitimate concern to meeting participants. Nevertheless, to ignore certain antitrust ground rules, either through ignorance or otherwise, is to create a civil and criminal hazard businessmen simply cannot afford.

It is for these reasons that PTI provides you with a reminder that certain areas of formal and informal communication between competitors or between manufacturers and their suppliers and customers must be avoided, as posing potential antitrust problems.

The Sherman Antitrust Act, the Clayton Act, the Federal Trade Commission Act, and the Robinson-Patman Act comprise the basic federal antitrust laws, which set forth the broad areas of conduct considered illegal as restraints of trade. In general, agreements or understandings between competitors that operate as an impediment to free and open competition are forbidden. Federal antitrust prohibitions forbid any "agreement or understanding...to substantially lessen competition or tend to create a monopoly in any line of commerce." An important point to keep in mind is that communications and discussions between competitors or between sellers and customers, about matters which may be considered anti-competitive, often comprise the evidence from which courts infer antitrust violations. ***It is the policy of the Post-Tensioning Institute that such agreements, understandings or communications shall not be tolerated at any formal or informal meetings or social events of the Institute.***

The general prohibitions contained in the federal antitrust laws, have been particularized in the form of a series of consent decrees, originally entered against a number of member companies of various trade associations and the associations themselves. It is important to note that these laws not only apply to PTI members, but also to PTI itself. Often trade associations have been and are presently co-defendants in cases brought by the Justice Department and the Federal Trade Commission ("FTC"). Recently, the FTC has stated: "*Because trade associations are by their nature collaborations among competitors, the Commission and courts have long been concerned with anti-competitive restraints imposed by such organizations under the guise of codes of conduct. Competing for customers, cutting prices, and recruiting employees are hallmarks of vigorous competition. Agreements among competitors not to engage in these activities injure consumers by increasing prices and reducing quality and choice.*" Similar "codes" or policies and requirements that encourage directly or indirectly members' unlawful activity are strictly forbidden by PTI in the course of its business with its members.

## **SPECIFIC EXAMPLES OF ACTIVITIES AND PRACTICES PROHIBITED**

### **AT ALL PTI MEETINGS AND EVENTS:**

Included in activities and practices which are forbidden, and are contrary to the policy of the Institute, both under the general antitrust laws and the consent decrees, subject to the said Business Review Letter, are the following:

- Agreeing to allocate markets, customers or suppliers among competitors, classify certain customers or suppliers being entitled to preferential treatment by manufacturers, and establish geographic trading areas.
- Participating in any plan designed to induce any manufacturer or distributor to sell or refrain from selling, or discriminate in favor of, or against any particular customer or class of customers.
- Agreeing in any manner to fix or otherwise establish bids, prices (including price increases, decreases, standardization or stabilization), profits, costs, contract terms affecting price (such as discounts and credit terms), etc. because, e.g. prices were too low, with the exception of certain resale pricing agreements between manufacturers and retailers or distributors.
- Agreeing in any manner to limit or restrict the quality of products to be produced (e.g., restrictions on selling coated strand to certain customers).
- Participating in any plan which has the effect of discriminating against, or excluding competitors, suppliers or customers.

These examples are provided to guide you in your discussions during formal and informal PTI meetings and social events. If the occasion arises, more specific advice will be provided by legal counsel, who is required by Article IV, Section 7 of the PTI By-Laws to be present at all meetings of the Board of Directors and the Executive Committee.

# PTI M10.6-15 Specification for Unbonded Single Strand Tendons Used for Slab-on-Ground Construction

## Addendum #1 **Month 2018**

*[Update your specification by changing the items identified]*

### SPECIFICATION

### COMMENTARY

#### 1.0 — GENERAL

##### 1.1 — Scope

These specifications provide performance criteria for materials and detailed recommendations for the fabrication and installation of unbonded single strand tendons specifically used in any application of slab-on-ground construction using unbonded post-tensioned reinforcement. Specifications are presented for ~~both~~ “standard” ~~and “encapsulated”~~ unbonded single strand tendon systems.

The more restrictive materials, fabrication, and construction requirements for tendons used in aggressive environments as defined in Section 1.2, referred to as encapsulated tendons are specified in PTI M10.2-17\* in this specification and are essential to the long- term durability of the post-tensioning (PT) system when used in foundations that are exposed to or constructed in these environments.

\* Section 2.4.1.1 (c) is excluded from the reference to PTI M10.2-17 and is replaced by the following for encapsulated slab-on-ground applications:

Sheathing overlap systems shall allow for a minimum sheathing movement of 2 in. (50 mm). After fabrication and up until shipment to the jobsite, the overlap shall be a minimum of 2 in. (50 mm) measured from the watertight seal to the end of the sheathing.

Where appropriate, a commentary follows most major sections of the document.

## SPECIFICATION

## COMMENTARY

### 1.2 — Definitions

The following definitions govern in this specification. See “Post-Tensioning Terminology (PTT)” for additional definitions (<http://www.post-tensioning.org/ptt.php>).

**Aggressive environment** – An environment in which slab-on-ground foundations are exposed to direct or indirect applications of deicing chemicals, seawater, brackish water, or spray from these water sources; and salt-laden air as occurs in the vicinity of seacoasts and coastal waterways. Aggressive environments also include applications where stressing pockets are subject to hydrostatic head. These environments typically require encapsulated tendons.

#### 2.2.6 — Anchorages and couplers in aggressive environments

##### 2.2.6.1 — Anchorages

Anchorages used for post-tensioned slab-on-ground foundation construction shall be protected against corrosion when the LDP determines the soils or environment in which the foundation is built is to be considered aggressive, as defined in Section 1.2.

~~When anchorages are to be protected against corrosion by encapsulation, a watertight connection of the sheathing to the anchorage and a watertight enclosure of the wedge cavity and prestressing steel are required to provide corrosion protection of the anchor, wedges, and prestressing steel at all anchorages. Anchorages shall be designed to attain watertight encapsulation of the prestressing steel and all connections shall have demonstrated the ability to remain watertight when subject to pressure of 1.25 psi (0.0086 MPa) for a period of 24 hours.~~

The LDP should evaluate the conditions for each project to determine if the environment in which the foundation is built requires additional protection of the PT system.

~~[Note: Moved to DC10.5-12] Residential slab-on-ground foundation construction requires that there is a minimum of 8 in. from the top of the finished floor to the top of finished grade and that positive drainage away from the foundation be provided. This will, in most cases, ensure that the stressing pockets of the PT system are not permanently in contact with the soil and will prevent ponding of water against the foundation and immersion of the stressing pockets.~~

#### C2.2.6 — Anchorages and couplers in aggressive environments

##### C2.2.6.1 — Anchorages

The LDP should evaluate the condition for each project to determine if the environment in which the foundation is built is to be considered aggressive.

~~Protection of the anchorages of the PT system may be obtained by various means, including epoxy coating, plastic encapsulation, or other acceptable means.~~

~~The use of epoxy coating is acceptable; however, special inspection is required to identify damage that can occur to the epoxy system during transportation, handling, and installation. Damaging the epoxy coating would breach the encapsulation and make the system unacceptable. Encapsulated tendons that employ the use of “bare” metallic anchorages produced from a material that is subject to corrosion are unacceptable.~~

~~When testing an encapsulated assembly for watertightness, the specimen should be arranged in a position to ensure at least a pressure of 1.25 psi (0.0086 MPa) over the entire specimen length. The pressure of 1.25 psi (0.0086 MPa) approximates 3 ft (1 m) of water pressure. This pressure is considered to be a worst-case situation for normal applications. For applications where water pressure may exceed 3 ft (1 m) (for example, slabs below grade), the project speci-~~



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~~fication should require a more stringent test performance.~~

~~It is recommended that pressure testing include the following additional requirements:~~

~~(a) Testing should be certified by an independent testing laboratory selected by the system manufacturer. The independent testing laboratory should be accredited under ASTM C1077.~~

~~(b) Representative samples from production runs selected and assembled by the manufacturer should be used in testing.~~

~~(c) Stressing, intermediate, and fixed anchorage assemblies should each be tested.~~

~~(d) Three tests are required for each assembly with all three passing for the system to pass.~~

~~(e) Retesting is required whenever a component of an assembly changes or the testing criteria changes.~~

~~(f) The manufacturer of the encapsulated tendons should provide identification of all component parts of their individual system and provide assembly instructions that will be sent to the field for the system tested.~~

~~Encapsulated tendons using components from different manufacturers are acceptable provided they are tested in accordance with (a) through (f) mentioned previously.~~

~~The following suggested method may be used for detecting the presence of moisture:~~

~~(i) Add white pigment to the PT coating.~~

~~(ii) Use a colored dye in the water that will contrast with the white color of the PT coating.~~

~~(iii) The "Pass" criteria is no colored dye staining, anywhere on the white PT coating, inside the encapsulated tendon.~~

### 2.2.6.2 — Encapsulated tendons

Any component used to connect the sheathing to any anchorage or coupler enclosure in encapsulated tendons shall conform to the following:

1. The connecting components shall:

~~(a) Be watertight in conformance with Section 2.2.6.1.~~

~~(b) Conform to the same requirements as the sheathing for durability during fabrication, transportation, handling, storage, and installation.~~

~~(c) Have a minimum thickness of 0.050 in. (1.25 mm).~~

~~(d) Have a watertight, positive mechanical~~

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~~connection to the anchorage protection or coupler enclosure and a watertight connection at the tendon sheathing.~~

~~(e) Have a minimum 2 in. (50 mm) overlap and maintain seal between the end of the extruded sheathing covering the prestressing steel and the watertight connection at the tendon sheathing.~~

~~(f) Be translucent or have other method of verifying compliance with Sections 2.2.6.2, Item 1(a), and Section 2.2.6.2, Item 2.~~

~~2. Within the connecting component or enclosure, prestressing steel shall be either covered by sheathing for its full length, or be in full contact with PT coating in conformance with Section 2.4.3 where sheathing is not present.~~

### 2.3.2 — Minimum thickness and diameter

#### 2.3.2.1 — Minimum thickness

Minimum thickness of sheathing shall be 0.040 in. (1.02 mm) for polyethylene or polypropylene with a minimum density of 0.034 lb/in.<sup>3</sup> (0.941 g/cm<sup>3</sup>), or equivalent if other materials are used.

~~For encapsulated tendons, the minimum thickness of sheathing using the aforementioned material properties shall be 0.050 in. (1.25 mm).~~

#### 2.3.5 — Encapsulated tendons

~~The sheathing connection to sleeving at couplers and to all stressing, intermediate, and fixed anchor ages shall be in conformance with Section 2.2.6.2. Connections shall remain watertight when subjected to a pressure of 1.25 psi (0.0086 MPa) for a period of 24 hours.~~

#### 3.2.1.7 — Encapsulated tendons

~~All exposed metal tendon components shall be protected within 24 hours after their exposure during installation.~~

#### ~~C2.3.5 — Encapsulated tendons~~

~~This requirement ensures complete encapsulation of the tendon from end to end. A watertight connection may be achieved by either using special connector pieces that provide a watertight connection to the anchor at one end and to the sheathing at the other end, or by other means meeting the pressure test performance criteria. For water tightness testing requirements, refer to Section C2.2.6.1.~~

#### ~~C3.2.1.7 — Encapsulated tendons~~

~~The protection method should be suitable to the environment in which the tendons are located.~~

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### 3.2.2.3 — Cover requirements

Minimum concrete cover from the top surface to the anchorage shall not be less than 1 in. (25 mm) ~~and the minimum corner concrete cover not less than 3 in. (75 mm)~~. Minimum concrete cover from exterior face of concrete to the face of the stressing-end and fixed-end anchor casting shall be 1.5 in. (40 mm) for nonaggressive environments, ~~and 2 in. (50 mm) for encapsulated tendons.~~

### 3.2.2.5 — Encapsulated tendons

~~Stressing anchorages for encapsulated tendons shall have the strand tail and the gripping part of the anchorage capped at the wedge cavity to completely seal the area against moisture. Refer to Sections 2.2.6, 2.3.5, and 3.5.2. Encapsulation caps shall be installed as soon as possible but within 8 hours after the cutting of the tendon tails.~~

### 3.2.2.6 — Strand tail cover

Minimum concrete cover for the strand tail from the exterior edge of the concrete shall be 0.75 in. (20 mm) for nonaggressive environments unless a protective tendon cover cap is used, ~~and 1 in. (25 mm) to the encapsulating device for encapsulated tendons.~~

### 3.2.3.5 — Encapsulated tendons

~~Encapsulation caps and sleeves for encapsulated tendons shall be installed as soon as possible but within 8 hours after the approval of the stressing operation by the LDP.~~

### 3.2.4.4 — Encapsulated tendons

~~Fixed anchorages intended for use in an encapsulated tendon shall be covered at the wedge cavity side with an encapsulation cap. The encapsulation cap shall be installed at the fabrication plant after coating the strand tail and wedge area with the same PT coating meeting the requirements of Sections 2.4.1 and 2.4.4.~~

### 3.5.2 — Encapsulated tendons

~~At anchorages intended for use in encapsulated tendons, encapsulation caps filled with PT coating shall be installed within 8 hours after cutting the tendon tails and before filling the stressing pockets. (Refer to Sections 2.2.6, 2.3.5, and 3.2.2.5).~~

### C3.5.2 — Encapsulated tendons

~~The design of the encapsulation caps should provide for a method of visual inspection to verify that the encapsulation cap is filled with PT coating and has been properly installed.~~

# PTI M10.2-17 Specification for Unbonded Single Strand Tendons

## Addendum #1 **Month 2018**

*[Update your specification by changing the items identified]*

### SECTION 1 — GENERAL REQUIREMENTS

#### 1.1 — Scope

##### 1.1.1 — Work specified

This Specification provides minimum specific performance criteria for materials and requirements for the fabrication and installation of unbonded single strand tendons.

Tendons used in all applications governed by ACI 318 and ACI 350 shall be encapsulated.

This Specification governs except when specified otherwise in Contract Documents

##### 1.1.2 — Work not specified

Scope excluded from this Specification are as follows:

- (a) Ground-supported post-tensioned slabs for light commercial and residential construction unless encapsulated systems are specified per PTI M10.6
- (b) Topping slabs
- (c) Waterproofing slabs on fill

#### 1.2 — Definitions

The following definitions govern this specification. For definitions not given in the following, refer to “PTI Post-Tensioning Terminology.”