



AGENDA

M-10 Performance Specification TG

Wednesday, April 21, 2021

10:00 a.m. – 12:00 p.m.

Voting Members Present (__ of 6)

Michael Williams (TG Lead)
Builders Post-Tension

Larry Krauser
General Technologies Inc.

Douglas Schlegel
Consultant

Asit Baxi
Baxi Engineering Inc.

Russell Price
Suncoast Post-Tension Ltd

Todd Stevens
PTS WEST

Visitors

ACTION ITEMS FROM LAST / THIS MEETING

Item #	Subject	Action	Responsible	Deadline / Completed
	Review Draft	Review Draft of Tensile Element	All	

Agenda Item	Expected Outcome / Actions Taken
A. <u>General</u> A.1 Call to Order A.2 PTI Antitrust Policy	
B. <u>Agenda & Minutes</u> B.1 Approval of Agenda B.2 Approval of Minutes (last TG meeting 1/19/21, no minutes)	B.1 B.2
1. <u>Action Item 1: (Review Roadmap)</u>	1. Roadmap – Attachment 1
2. <u>Action Item 2: (Review Tensile Element Draft)</u>	2. Tensile Element – Attachment 2
3. <u>Action Item 3: (Schedule way forward)</u>	4.
C. <u>New Business</u>	
D. <u>Next Meeting</u> 2021 PTI Committee Days, October 5-8, 2021 – Hyatt Regency Coconut Point Resort, Bonita Springs, FL Web Meetings: As needed	
E. <u>Adjourn</u>	

AGENDA / MEETING EXHIBITS

Exhibit #	Subject
Roster / A.4	PTI Anti-Trust Policy
1	Roadmap
2	Tensile Element

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.

Roadmap for specification development

#	Task	Draft Timeline
1	Use the section outline from <i>fib</i> Bulletin 75 as the framework for the specification.	May 2019
2	Review and edit the purpose statements in the draft (web meeting to be schedule early November). Once these purpose statements are set, they will be used as a reminder in future meetings to re-focus efforts and to keep the group on task.	Nov-Dec 2019
3	Develop one of the straight-forward sections completely as a full TG – suggest the tensile element section. This will be a learning exercise as a group to explore the finer details needed in each section.	May 2021
4	Divide into groups, soliciting help from subject area experts to develop the remaining the remaining sections.	Summer 2021

Other items we had worked on were moved to later sections in the outline and have not been refined further – they still need more work at a later time. We still have the listing of reference specifications to consider that we have gathered from past meetings. These documents are stored on the TG website under the draft / ASTM Reference folder at: https://www.post-tensioning.org/committees/committeehome.aspx?committee_code=M10D

PERFORMANCE SPECIFICATION (Outline from *fib* Bulletin 75)

210420 Draft

UNBONDED TENDON OBJECTIVE

- Provide minimum 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 shall be encapsulated.
- Unbonded single strand tendons consist of prestressing steel covered with PT coating and encased in continuous enclosure with anchorages at each end and at intermediate locations as required.

Minimum acceptance criteria listed below are based on the properties of Single-Strand Unbonded tendons produced with 2021 technology.

Administrative item to consider later: As new material is introduced to the market, additional testing and acceptance criteria may need to be adjusted as deemed appropriate by the LDP. A task force will be developed to evaluate material and address any new testing or acceptance criteria pertinent to the new product / material.

Section x.x—Alternate material

Alternate material and associated dimensional requirements may be used provided that performance equivalency is determined by testing observed and certified by an independent testing laboratory, and subject to the approval of the LDP, which demonstrates that all requirements of this PTI M10.2 Unbonded Tendon Specification are satisfied by the alternate material.

Proposed components comprised of alternate materials shall be presented / balloted in the PTI Committee M-10 Unbonded Tendon for possible inclusion in the M10.2 Unbonded Tendon Specification (review with legal – implication of approving a material). A task group appointed by PTI M-10 and comprised of experts experienced with the proposed alternate material shall be formed to review the new component and establish testing procedures, manufacturing tolerances, and other acceptance qualifications necessary to ensure that the proposed alternate material meets the minimum qualifications of this standard.

PERFORMANCE SPECIFICATION (Outline from *fib* Bulletin 75)

210420 Draft

1.1 Tensile Element*1.1.1 Objective and Purpose*

- To carry tensile force for long term / service life of the structure
- To control losses under service conditions

*1.1.2 Performance Requirements**1.1.2.1 What is essential*

- Performance
- Packaging in a manner that prevents physical damage during transportation and protects from deleterious corrosion during transit and storage
- Control and document the tensile element manufacturing process in a manner providing identification and traceability with regard to coil(s) of strand and wire rod heat number and wire coil(s) used to produce the strand.

1.1.2.2 What component is tested

- Tensile element material
 - Specified tensile strength
 - Yield strength
 - Relaxation
 - Elongation
 - Modulus of Elasticity
 - Dimensional tolerances

1.1.2.3 How often are tests required or updated

- Initially
- Test breaking strength every production lot of finished tensile element
- Test yield strength every production lot of finished tensile element.
 - Test the finished tensile element relaxation properties at least annually. Test a 1000 hour test every 3 years.
 - Interim annual relaxation tests may be performed as 200-hour tests with results extrapolated to 1000 hours, provided that the previous full 1000-hour test exhibits satisfactory results.
- Test total elongation every production lot of finished tensile element.
- Test modulus of elasticity every production lot of finished tensile element.
- Test dimensional tolerance every production lot of finished tensile element.
- If a change of raw material and/or manufacturing process of tensile element
- For each size and grade of material used

1.1.2.4 Type of testing, number of tests, size of test specimen

- *Approval testing: 1 test per tensile element size / material*

*1.1.3a Testing methods for prestressing steel**1.1.3a.1 Test specimens**Per ASTM A416**1.1.3a.2 Measuring and testing equipment**Per ASTM A416**1.1.3a.3 Test specimen temperature**Per ASTM A416*

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1.1.3a.4 Test procedure

<i>Property / Material</i>	<i>7-wire steel strand</i>
<i>Breaking strength</i>	<i>ASTM A1061</i>
<i>Yield Strength</i>	<i>ASTM A1061</i>
<i>Relaxation</i>	
<i>Elongation</i>	<i>ASTM A1061</i>

*1.1.3b Testing methods for alternate material**1.1.3b.1 Test specimens**Per material specific ASTM test equivalent to ASTM A416**1.1.3b.2 Measuring and testing equipment**Per material specific ASTM test equivalent to ASTM A416**1.1.3b.3 Test specimen temperature**Per material specific ASTM test equivalent to ASTM A416**1.1.3b.4 Test procedure*

<i>Property / Material</i>	<i>Alternate material</i>
<i>Breaking strength</i>	<i>Equivalent to ASTM A1061</i>
<i>Yield Strength</i>	<i>Equivalent to ASTM A1061</i>
<i>Relaxation</i>	
<i>Elongation</i>	<i>Equivalent to ASTM A1061</i>

1.1.4a Acceptance criteria for prestressing steel

Reporting: This report should be in either inch-pound units or in SI units.

The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the specification.

Acceptance criteria shall be the following for prestressing steel.

- Specified tensile strength
- Yield at 1% elongation 90% of breaking strength
- Relaxation losses not more than 2.5% when initially loaded to 70% of specified minimum breaking strength or not more than 3.5% when loaded to 80% of specified minimum breaking strength of the strand after 1000 h
- The total elongation under load shall not be less than 3.5 % using a gage length of not less than 24 in. [600 mm].
- Dimensional tolerance shall be -1.2% to +5.2% from the manufacturers specified dimension.
- Acceptance criteria for surface condition –

Strand used for tendons shall be dry and shall be graded as follows (guidance for evaluating the degree of rusting on strand is presented in Sason [1992]):

- (a) Grade A: No visible rust

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(b) Grade B: Light surface rust that can be removed by vigorous rubbing with a cloth. No pitting noticeable to the unaided eye. Discoloration in steel surface in affected area is permitted

(c) Grade C: Surface rust, removed with a fine steel wool pad, which leaves small pits on the steel surface of not more than 0.002 in. (0.05 mm) diameter or length

1.1.4b Acceptance criteria for alternate material

When alternative materials are used, LDP shall determine acceptance criteria necessary to meet design.

1.1.5 Reporting

1.1.5.1 Test report should contain at a minimum:

- *Date and location of testing*
- *Name of laboratory and individuals who performed and/or witnessed the testing.*
- *Calibration reports traceable to a national standard for measuring and testing equipment. Calibrations every xxxx.*

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210420 Draft

1.2 Anchorages

1.2.1 Objective and Purpose

- To transfer force from the tensile element to the structural element.

1.2.2 Performance Requirements

1.2.2.1 What is essential

- Performance

1.2.2.2 What is tested

- Anchorage assembly

1.2.2.3 How often are tests required or updated

- Initially
- If a change of design and/or manufacturing process of anchorage assembly
- For each type of material used
- When a new anchorage assembly is proposed for use

1.2.2.4 Type of testing, number of tests, size of test specimen

1.2.3 Testing methods

1.2.3.1 Test specimens

1.2.3.2 Measuring and testing equipment

1.2.3.3 Test specimen temperature

1.2.3.4 Test procedure

1.2.4 Acceptance criteria

- No slippage of anchorage at fixed end during the stressing operation
- Adequate bearing area to prevent crushing of concrete (at designed compressive strength) at transfer

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210420 Draft

1.3 Couplers*1.3.1 Objective and Purpose*

- To transfer force from one section of the tensile element to the second section of the tensile element.

*1.3.2 Performance Requirements**1.3.2.1 What is essential*

- Performance

1.3.2.2 What is tested

- Coupler assembly

1.3.2.3 How often are tests required or updated

- Initially
- If a change of design and/or manufacturing process of coupler assembly
- For each type of material used
- When a new coupler assembly is proposed for use

*1.3.2.4 Type of testing, number of tests, size of test specimen**1.3.3 Testing methods**1.3.3.1 Test specimens**1.3.3.2 Measuring and testing equipment**1.3.3.3 Test specimen temperature**1.3.3.4 Test procedure**1.3.4 Acceptance criteria*

- Tendon couplers shall not reduce elongation at rupture below that required for the anchorages

1.4 Enclosure*1.4.1 Objective and Purpose*

- To provide bond break between tensile element and any material that is in contact with the enclosure
- To contain PT coating (acting as the corrosion inhibitor and lubricant), if present
- To provide sufficient strength and durability to withstand damage during fabrication, transport, installation including concrete placement (if applicable)
- ~~To provide continuity of the enclosure at the anchorage~~ (moved to encapsulation)
- To prevent water from getting to the tensile element
- To provide electrical resistance to the tensile element (if required – maybe we remove after discussion)

*1.4.2 Performance Requirements**1.4.2.1 What is essential*

- Performance

1.4.2.2 What is tested

- Tendon assembly (for assessment of containment of corrosion inhibitor and hydrostatic testing)
- Enclosure material (for strength and durability to damage during fabrication, transport, installation, concrete placement, and stressing)

1.4.2.3 How often are tests required or updated

- Initially
- If a change of design and/or manufacturing process of enclosure

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- For each type of material used
- When a new enclosure is proposed for use

*1.4.2.4 Type of testing, number of tests, size of test specimen**1.4.3 Testing methods**1.4.3.1 Test specimens**1.4.3.2 Measuring and testing equipment**1.4.3.3 Test specimen temperature**1.4.3.4 Test procedure*

- Tensile force applied to tendon during installation - 100 lbs tensile force
- Tearing
- Splitting
- Impact
- abrasion resistance
- chemical resistance (Corrosion Resistance, and Chloride Permeability)
- UV resistance / weathering
- Electrical conductivity
- Sheathing shrinkage and expansion – shrinkage or expansion of the sheathing material is allowed if volumetric change is compensated for during fabrication and installation and does not impact the integrity of the system

1.4.4 Acceptance criteria

- Watertight and resistant to water vapors over the entire sheathing length
- Prevent ingress of water / impermeable to water and other corrosion-causing contaminants (chloride or other deleterious substances) / barrier to corrosion
- Sufficiently durable to permit handling in the field and stressing without causing breaks and tears that would expose the tensile element
- Chemically stable, without embrittlement or softening over the anticipated exposure temperature range and service life of the structure. Free chloride ions shall not be extractable from the sheathing material
- Nonreactive with concrete, prestressing steel, reinforcing steel, and PT coating

1.5 PT Coating (Lubrication / Corrosion Inhibitor)*1.5.1 Objective and Purpose*

- To allow tensile element to move independently of the surrounding material in contact with the enclosure
- To provide corrosion resistance for tensile element when the tensile element can corrode
- To provide a barrier for ingress of water / corrosive elements

*1.5.2 Performance Requirements**1.5.2.1 What is essential*

- Performance

1.5.2.2 What is tested

- Corrosion inhibitor material
- Tendon assembly (for lubrication)

1.5.2.3 How often are tests required or updated

- Initially

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210420 Draft

- If a change of chemical composition, application, and/or manufacturing process of corrosion inhibitor
- For each type of material used
- When a new corrosion inhibitor is proposed for use

*1.5.2.4 Type of testing, number of tests, size of test specimen**1.5.3 Testing methods**1.5.3.1 Test specimens**1.5.3.2 Measuring and testing equipment**1.5.3.3 Test specimen temperature**1.5.3.4 Test procedure**1.5.4 Acceptance criteria*

- Table 2.2.2.1 of M10.2-17

1.6 Wedges / force transfer mechanism from tensile element to anchor/coupler*1.6.1 Objective and Purpose*

- To transfer force from the tensile element to the anchorage

*1.6.2 Performance Requirements**1.6.2.1 What is essential*

- Performance

1.6.2.2 What component is tested

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1.6.2.3 How often are tests required or updated

- Initially
- If a change of design and/or manufacturing process of tensile element
- For each type of material used
- When a new force transfer mechanism is proposed for use

*1.6.2.4 Type of testing, number of tests, size of test specimen**1.6.3 Testing methods**1.6.3.1 Test specimens**1.6.3.2 Measuring and testing equipment**1.6.3.3 Test specimen temperature**1.6.3.4 Test procedure**1.6.4 Acceptance criteria*

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*1.6.5 Reporting***1.7 Encapsulation***1.7.1 Objective and Purpose*

- To provide sufficient strength and durability to withstand damage during fabrication, transport, installation including concrete placement (if applicable)
- To provide continuity of the enclosure at the anchorage
- To prevent water from getting to the tensile element
- To provide electrical resistance to the tensile element (if required – maybe we remove after discussion)

PERFORMANCE SPECIFICATION (Outline from *fib* Bulletin 75)

210420 Draft

1.7.2 Performance Requirements

1.7.2.1 What is essential

- Performance

1.7.2.2 What component is tested

- Tendon assembly (for hydrostatic testing)

1.7.2.3 How often are tests required or updated

- Initially
- If a change of design and/or manufacturing process of tensile element
- For each type of material used
- When a new force transfer mechanism is proposed for use

1.7.2.4 Type of testing, number of tests, size of test specimen

1.7.3 Testing methods

1.7.3.1 Test specimens

1.7.3.2 Measuring and testing equipment

1.7.3.3 Test specimen temperature

1.7.3.4 Test procedure

1.7.4 Acceptance criteria

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1.7.5 Reporting