

No changes were made in response to these comments.

08/06/2015 Industry Review of Specification 960 – ETAG 013 Requirement	
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1	<p><b>Specification:</b> 960-2.1(5) Anchorage Assembly</p> <p><b>Comment:</b> I am of the opinion that it would be better to require all testing, including fatigue, to be done by either LRFD or ETAG-013 specs. That way not only anchorages and couplers tested as per ETAG-013 that meet LRFD requirements would be allowed but also new domestic developments wouldn't need to be tested unnecessarily to a more rigorous specification that takes longer and is relatively more expensive.</p> <p><b>Response:</b> Specification 960 requires PT anchorages to be designed to meet LRFD requirements and to be tested in accordance with either LRFD or ETAG-013. This may allow grouted PT systems that have already been designed and testing in accordance with ETAG-013 to be used if they utilize comparable materials and can be shown to also meet the LRFD design requirements by calculations alone. This allowance was purposely made because of the additional Specification 960 requirement for anchorages that will be used for tendons with flexible filler to be fatigue tested in accordance with ETAG-013.</p> <p>ETAG-013 fatigue testing is required in lieu of LRFD dynamic testing because of the following statements in PTI M50 (upon which the LRFD requirements are based):            From C 4.1.3.7 Fatigue Tests of Strand-Wedge Connections:            "The 500,000 cycle dynamic testing required by AASHTO, Section II – 10.3.2.2 follows industry precedents. The required tests are non-destructive and do not establish the fatigue life of the strand, or of the strand wedge connections. They reflect the good experience record of prestressed structures to resist fatigue loading. They also take into account, [sic] that dynamic tests require special equipment and are time consuming."            From C 6.2.2 Dynamic System Qualification Test for Unbonded Systems:            "This Section meets the requirements for unbonded tendons of the "PTI Guide Specifications for Post-Tensioning" and of AASHTO, Section II-10.3.2.2. Full sized tendon tests for each size are necessary. Adequacy of wedge plates and couplers, [sic] can not [sic] be established on scaled down tendons. The one system test is supplemented by the required 4 or 3 dynamic tests on single strand or bar samples. (Requirements 6.1.6(2) and 6.1.7(2)."</p> <p>To our knowledge, unbonded multiple strand PT systems that have been used in bridges in this country have historically been grouted. Thus the relevancy of the LRFD /PTI dynamic testing requirements to PT systems with flexible filler is questionable. The ETAG-013 fatigue testing requirements however have a significant history of successful use in Europe for tendons with flexible filler.</p>
Jacob Myer, Schwager Davis Design Engineer, jacobm@schwagerdavis.com	
2	<p><b>Specification:</b> 960-2.1(2) Anchorage Assembly</p> <p><b>Comment:</b> We strongly encourage FDOT to align the anchorage efficiency test limit with the PTI/ASBI M50 specification. The M50 specification and AASHTO call for 95% MUTS and PT suppliers have performed their system testing according to these requirements. Changing to 96% AUTS would require many systems to be retested.</p> <p><b>Response:</b> The LRFD Bridge Design Specifications Section 5.4.5 requires anchorages and couplers to develop 95% of MUTS but the LRFD Bridge Construction Specifications Section 10.3.2 requires</p>

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	anchorages and couplers to develop at least 96% AUTS. FDOT post-tensioning specifications have followed these LRFD requirements for some time and continue to do so in the current Specification 960.
<b>3</b>	<b>Specification:</b> 960-2.1 (5) Anchorage Assembly
	<b>Comment:</b> We strongly recommend keeping the FDOT specification separate from the ETAG specification. Testing performed in Europe will have been performed at laboratories with different accreditations. Also many material grades used for testing are not available domestically in the US and would therefore require retesting of the system with the new material.  For the same reason we feel an unbonded fatigue test requirement should be developed domestically in, PTI M50, AASHTO, or FDOT, and referenced to remain consistent as a universal domestic specification.
	<b>Response:</b> See the response to Comment 1 above. In regards to laboratory credentials, 960-3.1 addresses laboratories outside of the United States. The FDOT agrees that domestic unbonded fatigue test requirements should be developed to test multiple strand bridge PT systems used with flexible filler comparable to those already included in ETAG-013. Until such time as this is done, FDOT will required ETAG-013 fatigue testing for tendons used with flexible filler.
<b>4</b>	<b>Specification:</b> 960-2.2.1.6(5) Segmental Duct Couplers
	<b>Comment:</b> Only 1 out of the 4 segment couplers available mount perpendicular to the bulkhead. It is a requirement for a proprietary detail and should be removed. The M50 specification also removed the word “perpendicular” for this reason.
	<b>Response:</b> Mounting of the duct coupler perpendicular to the bulkhead allows for easier stripping of the bulkhead forms. Allowances have been made for couplers that do not meet this specification requirement based on their successful use on past Department projects.
<b>5</b>	<b>Specification:</b> 960-2.3.2.2 (4) Bar
	<b>Comment:</b> HS bars with flat nuts have a history of successful use and should be allowed. In certain applications, spherical nuts are recommended but for standard PT flat nuts provide lower and more consistent seating losses.
	<b>Response:</b> Spherical nuts allow for a larger tolerance of misalignment of bars at bearing plates and will likely also increase the fatigue resistance of bars used with flexible filler. The use of flat nuts may be acceptable for temporary PT bars.
<b>Zuming Xia, VSL Senior Engineer, zxia@structuraltec.com</b>	
<b>6</b>	<b>Specification:</b> 960-2.1(5) Anchorage Assembly
	<b>Comment:</b> We understand that to allow ETAG-013 as an alternative for PT system approval, VSL suggests to keep AASHTO LRFD construction spec in the fatigue test as well.
	<b>Response:</b> See responses to Comments 1 and 3.
<b>7</b>	<b>Specification:</b> 960-2.1(5) Anchorage Assembly
	<b>Comment:</b> VSL is heavily involved and in support PTI/ASBI spec. We recommend FDOT to consider adopt this joint spec as well.
	<b>Response:</b> See the responses to Comments 1 and 3.