9600000 POST – TENSIONING COMPONENTS
COMMENTS FROM INTERNAL/INDUSTRY REVIEW

Chase Knight

Comments: (Internal, 6-5-18)

→ → **960-2.1.1 Trumpets:**¶

→ → → 1. Trumpets associated with anchorages shall be constructed from ferrous metal galvanized per ASTM A123, polyethylene or polypropylene ~~plastic, or polyolefin.~~ ¶

→ → → 2. ~~For connections between the t~~Trumpet and corrugated ~~thickness at transition location shall be the thickness of the~~ duct, the trumpet thickness at transition location shall be the thickness of the corrugated duct or greater.¶

→ → → 3. For connections between the trumpet and smooth plastic duct, the trumpet thickness at the transition location shall be the minimum thickness provided in Table 2.1.1-1 or greater.¶

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high-density polyethylene¶

→ → → **960-2.2.1.1 Corrugated Plastic Duct:**¶

→ → → → 1. PT systems with duct injected with grout shall use corrugated polypropylene plastic material except where steel pipe is required.¶

→ → → → 2. Furnish ducts with minimum wall thickness as follows:¶

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plastic not necessary¶

→ → → **960-2.2.1.2 Smooth Plastic Duct:**¶

→ → → → 1. PT systems with duct injected with flexible filler shall use smooth polyethylene~~lastic~~ duct.¶

→ → → → ~~2. Duct shall be polyethylene resin material.¶~~

→ → → → 23. Duct shall have a maximum dimension ratio (DR) of 17 as established by either ASTM D3035 or ASTM F714, as appropriate for manufacturing process used.¶

→ → → → 34. Duct shall have a minimum pressure rating of 125 psi.¶

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→ → → **960-2.2.1.5 Connections, Fittings, and Tolerance:**¶

→ → → → 1. Devices or methods for all duct connections (e.g., splices, joints, couplers, connection to anchorages), shall produce smooth interior alignment with no lips or kinks.¶

→ → → → 2. Use of tape is not permitted to join or repair duct, to make connections, or for any other purpose.¶

→ → → → 3. Use a reducer when adjacent sections of duct are directly connected to each other and the outside diameters vary more than plus or minus 0.08 inch. ¶

→ → → → 4. Provide all connections that are external to the concrete with a minimum pressure rating of 150 psi.¶

→ → → → 5. Use heat shrink sleeves and circular sleeve couplers made from polyethylene~~olefin~~ or polypropylene material, or duct couplers made from polyethylene~~olefin~~ or polypropylene material with O-rings or seals to make connections between sections of corrugated plastic duct or between corrugated plastic duct and trumpets.¶

→ → → → 6. Use heat shrink sleeves and circular sleeve couplers made from polyethylene~~olefin~~ or polypropylene material to make connections between corrugated plastic duct and steel pipe.¶

→ → → → 7. Use heat shrink sleeves with or without circular sleeve couplers made from polyethylene~~olefin~~ or polypropylene material to make connections between corrugated plastic duct and anchorages with integral trumpets.¶

→ → → → 8. Use heat welding techniques, electrofusion duct couplers, or elastomer sleeves and stainless steel band clamps to make connections between sections of smooth plastic duct.¶

→ → → → 9. Use elastomer sleeves and stainless steel band clamps to make connections between smooth plastic duct and steel pipe.¶

→ → → → 10. Use welding or elastomer sleeves and stainless steel band clamps to make connections between sections of steel pipe that are external to the concrete.¶

→ → → → 11. Use welding, elastomer sleeves and stainless steel band clamps or heat shrink sleeves and circular sleeve couplers made from polyethylene~~olefin~~ or polypropylene material to make connections between steel pipe and trumpets that are internal to the concrete.¶

→ → → → 12. Use elastomer sleeves with a minimum wall thickness of 3/8 inches and reinforced with a minimum of four ply polyester reinforcement. Use a 3/8 inch wide stainless steel power seated band and clamps on each end of the elastomer sleeves to secure the sleeves to plastic ducts or steel pipes. Seat the bands with a 120 pound force prior to clamping them in place.¶

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→ → → **960-2.2.1.6 Segmental Duct Couplers:**¶
→ → → → 1. Include segmental duct couplers for permanent internal PT systems at joints between match cast precast segments.¶
→ → → → 2. Use "O"- rings or compression seals between adjoining sections of segmental duct couplers.¶

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All Jobs¶

→ → → → 3. Plastic duct couplers shall be polyethyleneolefin or polypropylene material.¶
→ → → → 4. Metallic components shall be stainless steel per 960-2.4.3.¶
→ → → → 5. Segmental duct couplers shall mount perpendicular to the bulkhead at segment joints and provide for duct alignment.¶
→ → → → 6. Segmental duct couplers shall be able to receive duct at an angle of 6°degree deviation from perpendicular.¶
→ → → → 7. Segmental duct couplers must be able to accommodate angular deviation of duct without tendon strands touching duct or coupler on either side of segment joint.¶
→ → → → 8. Ducts for prestressing, used exclusively for temporary erection PT that is to be removed from structure, are not required to be coupled across segment joints.¶

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→ → → **960-2.2.1.8 Heat Shrink Sleeves:**¶
→ → → → 1. Heat shrink sleeves shall have unidirectional circumferential recovery and be sized specifically for the duct size being coupled.¶
→ → → → 2. Use sleeves with a crosslinked polyolefin backing for grouted applications and sleeves with airradiated and cross-linked high density polyolefinethylene backing for flexible fillerexternal applications and linear density polyethylene for internal applications.¶
→ → → → 3. Use adhesive with the same bond value to steel and polyethylene or polypropyleneolefin plastic materials.¶
→ → → → 4. Heat shrink sleeves shall have an adhesive layer that meets the requirements of the following table:¶
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typically polyethylene¶

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high-density polyethylene or polypropylene¶
¶
(PE is the only polyolefin with nominal density classification)

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high-density polyethylene¶

→ → → **960-2.2.2.2 Inlets, Outlets, Drains, Ports, Valves, and Plugs:**¶
→ → → → 1. Provide permanent inlets, outlets, drains, ports, valves, and threaded plugs made of nylon, polyethylene or polypropyleneolefin materials, or stainless steel.¶
→ → → → 2. All inlets, outlets, drains and ports shall have pressure rated mechanical shut-off valves or plugs. Mechanical shut-off valves must be 1/4 turn ball valves.¶
→ → → → 3. Inlets, outlets, drains, ports, valves, and plugs shall have a minimum pressure rating of 150 psi.¶
→ → → → 4. Inlets, outlets and ports shall have a minimum inside diameter of 3/4 inches for strand and 3/8 inches for single bar tendons and four-strand ducts.¶
→ → → → 5. Drains shall have a minimum inside diameter of 3/8 inches. Locate drains, and inlets and outlets serving as drains, at the bottom of the duct cross section.¶

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high-density polyethylene¶

→ → **960-2.4.34 Polypropylene:** Conform to all of the following:¶
→ → → 1. Non-colored, unfilled polypropylene according to ASTM D4101 with a cell class range of PP0340B44541 to PP0340B67884.¶

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→ → → 2. Contains antioxidants with a minimum Oxidation Induction Time (OIT) according to ASTM D3895 of not less than 20 minutes.¶
→ → → 3. Contains a non-yellowing light stabilizer.¶
→ → → 4. Remolded finished material has a minimum failure time of three hours when tested for stress crack resistance using ASTM F2136 at an applied stress of 348 psi.¶

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Oxidative-induction-Time-(OIT)¶
¶
(title-of-ASTM-D3895)¶

→ → **960-2.4.45 Polyethylene ~~Resin~~:** Conform to all of the following:¶
→ → → 1. Meets requirements of ASTM D3350 with a minimum cell class of 445574C.¶
→ → → 2. Contains antioxidants with a minimum Oxidation Induction Time (OIT) according to ASTM D3895 of 40 minutes.¶
→ → → 3. Remolded finished material has a minimum failure time of three hours when tested for stress crack resistance using ASTM F2136 at an applied stress of 348 psi.¶

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High-density-polyethylene-(HDPE)¶

KC **Knight, Chase**
Oxidative-induction-Time-(OIT)¶
¶
(title-of-ASTM-D3895)¶

→ → **960-2.4.56 Elastomer Sleeves:** Conform to all of the following:¶
→ → → 1. Meet requirements of ASTM D1171 using Ozone Chamber Exposure Method B (no cracks permitted under 2X magnification) or ASTM D1149 Method B - Procedure B4 (no cracks permitted under 2X magnification). Do not include polyester reinforcement in the test specimen.¶
→ → → 2. Manufactured using an elastic polymeric material that is compatible with concrete, the PT system components to which the sleeves will be attached, and the filler material and filler material installation process. Identify the applicable ASTM specifications that the sleeve material complies with.¶

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elastomeric¶

Response: Agree with all of Chase Knight's comments.

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