



SUGGESTED MASTER SPECIFICATION

SECTION 03 15 13 WATERSTOPS

(PVC, TPER, Non-Bentonite Hydrophilic, Bentonite Hydrophilic, Non-Hydrophilic)

PART 1: GENERAL

1.01 SECTION INCLUDES

- A. Provision of waterstop embedded in concrete and spanning control, expansion, and/or construction joints to create a continuous diaphragm to prevent fluid migration.
- B. Non-metallic PVC waterstops for use in concrete joints subject to water, chlorinated water, seawater and many waterborne chemicals.

1.02 REFERENCES

- A. *Durajoint*® PVC Waterstop, *Durajoint* TPER Waterstop, *Durajoint* Arctic Grade PVC Waterstop
 - 1. U.S. Army Corps of Engineers: CRD-C 572-74
 - 2. American Society for Testing Materials (ASTM)
 - o Section 031000-Concrete Forms and Accessories
 - o Section 033000-Cast In Place Concrete
 - 3. Bureau of Reclamation: C-902
 - 4. Canadian General Standards Board: 41-GP-35M Types 1 & 3
- B. *Durajoint*® DURA-Tite (*Chloroprene Rubber Hydrophilic*), *Durajoint*® EXPAND-Tite (*Bentonite Hydrophilic*), *Durajoint* SEAL-Tite (*Non-Hydrophilic*)
 - 1. U.S. Army Corps of Engineers: CRD-C 572-74
 - 2. American Society for Testing Materials (ASTM)

1.03 QUALITY ASSURANCE

- A. Waterstop manufacturer shall demonstrate five years (minimum) continuous successful experience in production of waterstop.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store/Cover waterstops to protect from elements such as sun, dust, and oils.

PART 2: PRODUCTS

2.01 PVC WATERSTOPS FOR EXPANSION JOINTS, CONTRACTION JOINTS AND CONSTRUCTION JOINTS

- A. Provide flexible polyvinyl chloride (PVC) waterstop profile(s) as manufactured by DCA Construction Products, (fill in profile type [s] and number [s])
- B. The PVC waterstop shall be extruded from an elastomeric plastic material of which basic resin is prime, virgin polyvinyl chloride.
- C. Color: Concrete Gray w/UV inhibitors.
- D. Performance Requirements:

Physical Properties - PVC	Test Method	USACE Required Values	Competitor Test Values	Durajoint Test Values
Tensile Strength	ASTM D638	Not less than 1750	2000 psi	2395
Ultimate Elongation	ASTM D638	Not less than 300%	350%	374% min.
Specific Gravity	ASTM D792	---	1.38	1.36
Stiffness in Flexure	ASTM D747	Not less than 600 psi	700 psi	2374 psi min.
Tear Resistance	ASTM D624	---	300 lbs./in.	310 lbs./in. min.
Ozone Resistance	ASTM D1149	---	N/A	Passed
Low Temperature Brittleness	ASTM D746	Low Temp Pass at -35°F/-37°C	Passed	Passed
Hardness Shore A15	ASTM D2240	---	79 ± 3	76
Water Absorption	ASTM D570	---	0.15%	0.11%
US Army Corps of Engineers	---	---	---	---
Accelerated Extraction	CRD-C 572	---	---	---
▪ Ultimate Elongation	Par 7.1	Not less than 280%	300%	383%
▪ Tensile Strength	Par 7.1	Not less than 1500 psi	1600 psi	1808 psi min.
Effects of Alkali	CRD-C 572	---	---	---
▪ Loss Weight	Par 7.2	No less than .10 weight loss	-0.10	No Change
▪ Gain Weight	Par 7.2	No more than .25 weight gain	+0.25	0.17%
▪ Hardness Change	---	Not more than +/-5 change	+/-5 Points	+5

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2.02 TPER WATERSTOP (CHEMICALLY RESISTANT) EXPANSION JOINTS, CONTRACTION, AND CONSTRUCTION JOINTS

A. Performance Requirements:

Physical Properties – Durajoint TPER Waterstop	Test Method	Values
Tensile Strength	ASTM D-412:	2000 psi
Ultimate Elongation	ASTM D-412:	Min. 450%
Tear Resistance	ASTM D-624:	278 lbs./in.
Hardness	ASTM D-2240	83 Shore A +/-5
Specific Gravity	ASTM D-792	0.96 min.
Ozone Resistance	ASTM D-1171	450 pphm
100% Modulus	ASTM D-638	1000 psi
Low Temperature Brittleness	ASTM D-746	No Cracking or Splitting (-70°F/-57°C)

2.03 NON-BENTONITE HYDROPHILIC WATERSTOP FOR NON-MOVING JOINTS – Durajoint® DURA-Tite

- A. Provide hydrophilic chloroprene rubber waterstop as supplied by DCA Construction Products, DURA-Tite (DT0725, DT2010, DT1913, DT1313, DT3010, DT3030).
- B. Waterstop shall be a combination of chloroprene rubber and chloroprene rubber modified to impart hydrophilic properties.
- C. Performance requirements as follows:

Physical Properties – Durajoint Hydrophilic Waterstop (DURA-Tite)	Test Method	Values
Color	-----	Concrete Gray
Specific Gravity	ASTM D-71	1.25 – 1.30
Elongation		400%
Hardness	ASTM D217	40
Application Temp.		-10 to 125°F (-22 to 52°C)
Service Temp.		-50 to 200°F (-45 to 93°C)
Swelling (Freshwater)		400%
Hydrostatic Pressure Resistance		
Standard Precast Concrete Joint		30 psi (2 kPa)
Precast Concrete Tunnel Segments		75 psi (5 kPa)
Cast-In-Place Construction Joint		100 psi (6.8 kPa)

2.04 HYDROPHILIC WATERSTOP FOR NON-MOVING JOINTS – Durajoint® EXPAND-Tite

- A. Provide hydrophilic waterstop as supplied by DCA Construction Products, Expand-Tite (EXP100, EXP150 - Trapezoid, or EXP200).
- B. Waterstop shall be a combination of expanding bentonite and butyl rubber to impart hydrophilic properties.
- C. The waterstop shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete.
- D. Performance requirements as follows:

Physical Properties – Durajoint Hydrophilic Waterstop (EXPAND-Tite)	Test Method	Values
Color	-----	Black
Specific Gravity	ASTM D-71	1.35 +/-5
Hydrocarbon Content	ASTM D-4	47% min.
Volatile Matter	ASTM D-6	1% max.
Penetration, cone@ 77F, 150gm, 5 secs	ASTM D-217	40 +/-5
Application Temp.		-10 to 125°F (-22 to 52°C)
Service Temp.		-30 to 180°F (-34 to 82°C)

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2.05 NON-HYDROPHILIC WATERSTOP FOR NON-MOVING JOINTS – Durajoint SEAL-Tite

- A. Provide strip applied waterstop comprised of a single component, self-sealing mastic, as supplied by DCA Construction Products, SEAL-Tite (SEA100 or SEA200).
- B. Performance Requirements as follows:

Physical Properties – Durajoint Non-Hydrophilic Waterstop (SEAL-Tite)	Test Method	Values
Color	-----	Black
Specific Gravity	ASTM D-71	1.35-1.40
Penetration, CONE @77F	ASTM D-217	60-70 mm
Flash point C.O.C., F	ASTM D92	450°F (232°C) min.
Fire Point C.O.C., F	ASTM D92	450°F (232°C) min.
Ductility, 77°F	ASTM D113	10.0 cm

2.06 GUNABLE HYDROPHILIC WATERSTOP FOR NON-MOVING JOINTS – Durajoint Ultra-Tite

- A. Provide cartridge applied waterstop as supplied by DCA Construction Products, ULTRA-Tite.
- B. Performance Requirements as follows:

Properties – Durajoint Hydrophilic Gunable Waterstop (ULTRA-Tite)	Test Method	Typical Value
Skin Time	-	60 minutes @ 75°F / 50% RH
Cure Rate (77°F at 50% Relative Humidity)	-	1/8" Per 40 Hours
Gun Grade	ASTM C679	Zero Slump
Tensile Strength	ASTM D412	159 PSI
Shear Strength	ASTM D1002	188 PSI
Elongation	ASTM D412	185%
Adhesion to Primed Concrete (Clean, Dry)	ASTM C794	30 pli, Cohesive Failure
Shore A, Hardness	ASTM D661	35
UV Stability, Accelerated Weathering	QUV Weatherometer	UV-A, No Change (2,000 Hours)
VOC Content	-	20.6 Grams/Liter
Service Temperature	-	-40°F to 220°F (-40°C to 104°C), Continuous Service
Application Ambient Temperature	-	40°F to 130°F (4°C to 55°C)
Application Surface Temperature	-	40°F to 130°F (4°C to 55°C)

PART 3: EXECUTION

3.01 INSTALLATION

- A. Durajoint Waterstop (PVC/TPER)
 1. Center the waterstop in the joint and secure into the correct position by using wood framing or hog rings spaced at 12" on center along the length of the Waterstop and wire tie to adjacent reinforcing steel.
 2. Place the centerbulb in the center of the expansion joint with each concrete edge just touching the outer most part of the centerbulb. DO NOT embed the centerbulb in concrete.
 3. Consolidate concrete by vibrating around the waterstop thoroughly to prevent honeycombing and ensure that the waterstop has been totally encapsulated.
 4. Field Splice fabrication:
 - o Waterstops should be clean and free of foreign materials.
 - o Miter ends at 45° angle either full width or diamond cut (1/2 width both sides) for continuity of ribs and/or center bulb.
 - o Using a Teflon covered splicing iron at approximately 350-380°F, place the mitered ends on both sides of Teflon splicing iron, allow 1/8" molten bead to develop.

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- Immediately press together with center bulb/ first inside rib aligned.
 - Welds should be spark tested to ensure quality. Call Durajoint Concrete Accessories for detailed Splicing Guide.
- B. Durajoint DURA-Tite – **NON-BENTONITE** Hydrophilic Waterstop
1. Remove all dust and debris and apply a coat of suitable adhesive/primer to the contact surface.
 2. Using the heel of the hand and moderate pressure, press a continuous bead *DURA-Tite* waterstop firmly into position. Ensure that the waterstop has properly bonded.
 3. Splice the ends to form a continuous seal, overlap the ends together by 2”-4”. Gently knead the two ends, creating an uninterrupted seal. Keep joints away from corners.
 4. Peel the protective backing from the exposed side of *EXPAND-Tite* and place the mating structural member into position. Cut coil ends square (or at the proper angle for mitered corners) with shears or a sharp blade to fit splices together without overlaps.
- C. Durajoint EXPAND-Tite - Hydrophilic Waterstop
1. Remove all dust and debris and apply a coat of suitable adhesive/primer to the contact surface.
 2. Using the heel of the hand and moderate pressure, press a continuous bead *EXPAND-Tite* waterstop firmly into position on the standing structure. Check that the waterstop has properly bonded.
 3. Splice the ends to form a continuous seal, overlap the ends together by 2”-4”. Gently knead the two ends, creating an uninterrupted seal. Keep joints away from corners.
 4. Peel the protective backing from the exposed side of *EXPAND-Tite* and place the mating structural member into position. Cut coil ends square (or at the proper angle for mitered corners) with shears or a sharp blade to fit splices together without overlaps.
- D. Durajoint SEAL-Tite – Non-Hydrophilic Waterstop
1. Remove all dust and debris and apply a coat of suitable adhesive/primer to the contact surface.
 2. Using the heel of the hand and moderate pressure, press a continuous bead *SEAL-Tite* waterstop firmly into position on the standing structure. Check that the waterstop has properly bonded.
 3. Splice the ends to form a continuous seal, overlap the ends together by 2”-4”. Gently knead the two ends, creating an uninterrupted seal. Keep joints away from corners.
 4. Peel the protective backing from the exposed side of *SEAL-Tite* and place the mating structural member into position. Cut coil ends square (or at the proper angle for mitered corners) with shears or a sharp blade to fit splices together without overlaps.

3.02 PREPARATION – PVC WATERSTOP

- A. Uncoil waterstop prior to installation allowing it to relax for ease of fabrication and handling.
- B. Position the waterstop the proper distance from all steel reinforcing bars. Using Hog Rings every 12 inches on center on both sides can be helpful in the process.
- C. Clean concrete joint with exposed waterstop after first pour to remove wood framing, nails, dirt and debris and protect waterstop from damage during progress of work.

3.03 QUALITY ASSURANCE FOR PVC WATERSTOP SPLICES

- A. Waterstop splicing defects which are unacceptable include, but, are not limited to the following:
 1. Charred or burnt splices.
 2. Free lap or adhesively connected joints.
 3. Misalignment that reduces waterstop cross section more than 15%.
 4. Bond failure at joint deeper than 1/16” or 15% of material thickness.
 5. Misalignment of center bulb, ribs and/or end bulbs greater than 1/16”.
 6. Visible porosity in the welded area including pin holes, bubbles in the welds.
 7. Visible signs of splice separation when cooled splice is bent at a sharp angle using hand pressure.
 8. Misalignment of waterstop splice resulting in the misalignment of the waterstop in excess of ½” in 10 feet.