

## SECTION 705 - JOINT MATERIALS

**705.01 Joint Fillers.** Preformed fillers for joints shall conform to AASHTO M 33, AASHTO M 153 or AASHTO M 213. The Contractor shall punch the preformed fillers to admit the dowels according to the contract. The Contractor shall furnish the filler for each joint in one (1) piece for the full depth and width required for the joint. If the Engineers accepts the use of more than one (1) piece for a joint, the Contractor shall fasten the abutting ends securely and hold the abutting ends accurately to shape by stapling or other positive fastening satisfactory.

The Contractor shall make the expansion joint filler material according to the contract. If ten (10) percent or more of the lot or shipment is of non-uniform or improper construction, the Engineer may reject the entire lot or shipment.

**705.02 Joint Mortar.** Pipe joint mortar includes one (1) part portland cement and two (2) parts accepted fine aggregate (by volume) with water as necessary to get the required consistency. The Contractor shall use the mortar within thirty (30) minutes after its preparation.

**705.03 Flexible Watertight Gaskets.** Gaskets shall be rubber or flexible plastic gaskets conforming to AASHTO M 198.

**705.04 Joint Sealer.**

**(A) Poured.** The poured joint sealer shall be a modified polymeric material. The poured joint sealer includes two (2) components that the Contractor will mix uniformly and pour directly into the joints. The weight of component "A" in the mixture shall be more than ten (10) percent of the weight used for component "B".

Upon opening, neither component shall exhibit more than a slight degree of skinning.

If tested according to Hawaii Test Method HWY-TC 11, the joint sealer shall comply with the requirements below.

The Contractor shall submit test results certifying compliance of the joint sealer according to the contract. The Contractor shall submit certificates before installation of the joint sealer.

The enclosed cell sponge rubber placed under the joint sealer shall conform to AASHTO M 153, Type I.

**(B) Preformed.** The preformed joint sealer shall be:

- (1) of elastic polychloroprene,
- (2) compatible with concrete, and

(3) resistant to heat, abrasion, oxidation, oils, gasoline, salt and other materials.

The Contractor shall shape the sealer so that when installed at minimum joint opening, the Contractor shall compress the sealer completely to solidify and have a minimum of air spaces. The Contractor shall also shape the sealer so that in its compressed condition, the Contractor shall depress the top center of the exposed surface below the surface of the installed sealer. The Contractor shall shape the sealer with vertical sides and the thickness of the sides, webs and top section shown in the contract shall be absolute minimums.

For seals up to two (2) inches in width, the minimum pressure generation at eighty-five (85) percent compression (compressed 15 percent) shall be three (3) pounds per square inch.

The Contractor shall compound the sealer using the low crystallizing polychloroprene base and shall conform to ASTM D 2628.

The Contractor shall cut and buff the test sections used in the testing methods from the actual extruded compression joint seal. The Contractor shall identify each lot of the joint seal with the manufacturer's name or trademark. The Contractor shall accompany each lot of the joint seal by the manufacturer's affidavit testing conformance to the contract.

The Contractor shall furnish to the Engineer certified test results certifying compliance of the joint sealer according to the contract. The contractor shall furnish certificates before installation of the joint sealer.

**Lubricant - Adhesive.** The adhesive shall be one (1) part moisture curing polyurethane and aromatic hydrocarbon solvent mixture with the following physical properties:

Average Weight per gallon	8.00 lbs. $\pm$ 10 percent
Solid Contents	65 percent by weight
Adhesive shall remain fluid from	5°F to 120°F
Film Strength (ASTM D 412)	2000 psi minimum
Elongation	250 percent
Low Temperature (ASTM D 746) 60°C	Tensile-ok Elongation-not brittle

The Contractor shall deliver each lot of the adhesive in containers plainly marked with the manufacturer's name or trademark and date of manufacture. The Contractor shall accompany each lot by the manufacturer's affidavit attesting conformance with the contract.

PROPERTIES OF LABORATORY MIXED MATERIAL	
Determination	Requirement
Viscosity, 5 minutes after mixing	200 to 350 poise
Application time (pot life or time to reach 2000 poise at 77°F)	1 hour minimum
Penetration at 77°F after 24 hours aging at 77°F	150 maximum
<sup>1</sup> Penetration at 77°F	50 to 120
<sup>1</sup> Penetration at 158°F	1.5 x Penetration at 77°F
<sup>1</sup> Resilience at 77°F	70% minimum 60% minimum <sup>2</sup>
<sup>1</sup> Resilience at 158°F	60% minimum 50% minimum <sup>2</sup>
Resilience of oven-aged sample at 7 days	70% minimum 60% minimum <sup>2</sup>
Bond to concrete <sup>3</sup> 100% extension, dry, at -20°F	No failure
<sup>1</sup> Bond to concrete, 100% extension, wet, at -20°F	No failure
Non-volatile content	88% minimum
<sup>1</sup> After 96 hours aging at 77°F.	
<sup>2</sup> This requirement applies if the penetration at 77°F, after 96 hours aging at 77°F is 90-120.	
<sup>3</sup> Cure sample for 24 hours at 77°F, then oven-age at 158°F ± 2°F for 7 days before testing.	

705.05 **Flashing Compound.** Flashing compound for retaining wall joints shall be an asphaltic mastic, be asbestos free, and conform to ASTM Specification D 4586. The product shall adhere to damp concrete and masonry surfaces.

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705.05

Flashing compound for construction joint waterproofing shall conform to ASTM D 4586 as a plying cement in the construction of membrane waterproofing systems with fabrics conforming to ASTM D 1668 (asphalt types). The product shall adhere to damp concrete and masonry surfaces.

705.06 Waterproofing.

- (A) **Primer.** Primer shall conform to AASHTO M 116.
- (B) **Fabric.** Fabric for waterproofing shall conform to ASTM D 1668.
- (C) **Asphalt.** Asphalt for waterproofing shall conform to AASHTO M 115.

705.07 **Waterstops.** The Contractor may use rubber or polyvinyl chloride (PVC) waterstops.

Before installing the waterstops, the Contractor shall submit to the Engineer a Certificate of Compliance showing that the waterstops conform according to the contract and test results.

- (A) **Rubber Waterstops.** The Contractor shall make waterstops from either plain or synthetic rubber.

The Contractor shall make plain rubber waterstops from a stock of high-grade compound made from new plantation rubber, reinforcing carbon black, zinc oxide, accelerators, antioxidants and softeners. This compound shall contain more than seventy-two (72) percent by volume of new plantation rubber.

The Contractor shall make synthetic rubber waterstops from a compound made from neoprene or GR-S, reinforcing carbon black, zinc oxide, polymerization agents and softeners. This compound shall contain more than seventy (70) percent by volume of neoprene or GR-S.

The physical properties of the rubber waterstops shall conform to:

PHYSICAL PROPERTIES - RUBBER WATERSTOP	PLAIN	SYNTHETIC
Shore Durometer ASTM D 2240	55-65	50-70
Tensile Strength, minimum psi ASTM D 412	3,500	2,500
Elongation at Break minimum percent	550	425
Unit Stress, minimum psi At 300% elongation	1,100	---
Unit Stress, minimum psi At 500% elongation	2,800	---
Tensile Strength and Elongation, minimum percent of original ASTM D 572 after 7 days in air at 158°F ± 2°F or after 4 days in oxygen at 158°F ± 2°F and 300 psi pressure	65	65

The Contractor shall mold or extrude the waterstops with an integral cross section. The section shall be uniform with a permissible variation in dimensions of  $\pm$  one thirty-secondth (1/32) inch. The Engineer will not permit splices in straight strips. The Contractor shall cure the strips and special connection pieces well so that the cross section shall be dense, homogeneous, and free from porosity. The Contractor shall mold the junctions in the special connection pieces full. During the vulcanizing period, the Contractor shall hold the joint securely by suitable clamps. The material at the splices shall be dense and homogeneous throughout the cross section.

The molds may be of cast iron or mild steel. The Contractor shall construct the molds suitably for continuous production. The Contractor shall unfinish the cavities but smooth to produce a uniform section with a permissible variation in dimensions of  $\pm$  one thirty-secondth (1/32) inch. The manufacturer may construct the molds so that by blanking in certain portions, the Contractor may use the mold for the manufacture of other sections.

The Contractor shall mold the field splices full. The Contractor shall bevel the splice faces at an angle of forty-five (45) to flatter. The finished splices shall have a tensile strength of more than fifty (50) percent of the unspliced material.

**(B) PVC Waterstops.** The Contractor shall make the PVC waterstops from PVC conforming to the Corps of Engineers' Specification No. CRD-C572.

The Contractor shall make field splices for PVC waterstops by heat sealing the adjacent surfaces according to the manufacturer's recommendations. The Contractor shall use a thermostatically controlled electric source of heat to make the splices. The heat shall be sufficient only to melt the plastic.

**705.08 Mortar for Manholes.** Materials used in the mortar shall conform to Section 601 - Structural Concrete. The Contractor shall use mortar before the mortar attains its initial set. The Engineer will not permit retempering with water.

**(A) Mortar for Water System and Storm Drain Manholes.** Mortar includes one (1) part of portland cement and two and a half (2-1/2) parts of fine aggregate (by volume).

**(B) Mortar for Sanitary Sewer Manholes.** Mortar includes one (1) part of portland cement to three (3) parts of fine aggregate (by volume).

If mortar comes in direct contact with sewage or sewage gases, the fine aggregate shall contain no calcareous sand.

**705.09 Lead.** Lead shall conform to Federal Specification QQ-L-156 (1), Type I, Pig Lead. The Contractor shall furnish lead in linked ingots or notched bar ingots weighing three (3) to six (6) pounds each. The Contractor shall

linked them together by small segments that the Contractor can easily sever in pigs weighing approximately one hundred (100) pounds each. Such ingots shall have the manufacturer's or trade name stamped on the ingot.

**705.10 Packing for Lead Joint.** The Contractor shall use Pyroseal Type K, Hydro-ring or Rubber Ring Packing with lead joint cast iron pipes. The Contractor shall groove the hydro-rings to take a narrow caulking iron. The Contractor shall make the hydro-rings of rubber construction by Pollard Pipeline Equipment, or equal.

**705.11 Jointing Compound for Sewer Pipe.** The product includes a filled hydrocarbon plastic material containing fifty-seven (57) to sixty-two (62) percent of inorganic matter. The Contractor shall easily pour at temperatures above four hundred thirty (430) degrees Fahrenheit and shall maintain its filler in suspension during use.

**(A) Resistance to Water, Acids and Alkalis.** After prolonged exposure in water and solutions of five (5) percent  $H_2SO_4$ , five (5) percent NaOH, five (5) percent NaOCl, the compound shall show no visual or other evidence of surface attack.

**(B) Adhesion and Tensile Strength.** The jointing compound shall meet the following tension test requirements:

(1) The Contractor shall shape the test blocks of fired sewer pipe material so that the Contractor may clamp the test block into a tension testing machine;

(2) The test shall present an area of one square inch in a plane perpendicular to the direction of pull joined by the compound;

(3) The test shall leave about half (1/2) inch of compound between the blocks.

After the compound has solidified, the Contractor shall soak the whole assembly in water at seventy-seven (77) degrees Fahrenheit for twenty-four (24) hours. While still wet, the Contractor shall break the compound under tension. The Contractor shall break at least three (3) samples under tension. The average breaking tension of the samples shall be more than two hundred (200) pounds per square inch.

The breaks shall be through the compound and not at the interfacial surface between the compound and block.

**(C) Hardness.** If tested according to ASTM D 5, the penetration shall be less than 2.5 millimeter after four (4) hours with a two thousand (2,000) gram load. The exceptions are that the Contractor shall use an untapered needle having a diameter of two (2) millimeter and the load shall remain on the specimen during the four (4) hour period.

**705.12 Expanded Polystyrene and Hardboard.** Expanded polystyrene shall be commercially available polystyrene board. Expanded polystyrene shall have a:

(1) flexural strength of thirty-five (35) pounds per square inch \*|  
minimum according to ASTM C 203 and \*|

(2) compressive yield strength of between sixteen (16) and forty (40) \*|  
pounds per square inch at five (5) per cent compression. \*|

Hardboard shall be one-eighth (1/8) inch minimum thickness conforming to Federal Specification LLL-B-810. The Contractor shall hold the boards in \*|  
place by nails, waterproof adhesives, or other means accepted by the \*|  
Engineer.