SECTION 707

JOINT MATERIAL

SCOPE

707.01.01 MATERIAL COVERED

A. This specification covers the quality requirements for poured filler, preformed fillers, and resilient and rubber type gaskets used in the construction of bridges, culverts, sidewalks, and so forth.

REQUIREMENTS

707.02.01 BLANK

PHYSICAL PROPERTIES AND TESTS

707.03.01 JOINTS

A. Materials for joints in concrete structures shall comply with provisions specified below.

707.03.02 POURABLE JOINT SEALER

A. The materials specified in this subsection shall be supplied and installed in weakened plane joints, contraction joints, and construction joints when required by the Engineer and as shown on the drawings.

B. Joint Sealant:

1. 2-component polyurethane pourable joint sealant (ACI 504R, Table 1, Type IV).
2. Sealant shall be able to expand and compress plus or minus 25 percent movement as the joint opens and closes.
3. Sealant shall be self-leveling for flat surfaces and non-sagging for sloped and vertical joints.
4. Sealant shall meet or exceed requirements of Table 1 below.

Table 1 - Minimum Requirements for Pourable Joint Sealer

Material Characteristics	Self-Leveling	Non-Sagging
Application Temperature	40 to 100 degrees F	40 to 100 degrees F
Service Range	-40 to 170 degrees F	-40 to 170 degrees F
Curing Rate	Tack-free Time: 1-2 hours Final Cure: 3-5 days	Tack-free Time: 6-8 hours Final Cure: 3 days
Tear Strength (ASTM D624)	--	45 lbs/in
Shore A Hardness (ASTM D2240)	45 ±5 (21-day)	25 ±5
Tensile Properties (ASTM D412):		
Tensile Strength	550 psi (21-day)	120 psi (at break)
Elongation	700% (at break)	500%
Modulus of Elasticity (100%)	150 psi	70 psi
Adhesion in Peel, Concrete Substrate (Fed Spec TT-00227E):		
Peel Strength	>30 pounds	25 pounds
% Adhesion Loss	0%	0%

C. No material shall be used that has skinned over or settled in the container to the extent that it cannot be easily redispersed by hand stirring to form a smooth uniform product.

D. Each container shall be clearly labeled or each delivery of material in the tanks of 2-component equipment shall be accompanied with a ticket showing designation (Component A or B), the manufacturer's name, lot or batch number, date of manufacture, date of packaging, date, if any, beyond which the polyurethane sealant shall not be used without additional testing and approval, and manufacturer's instructions for use.

E. The sealant shall be machine mixed and placed with equipment that accurately proportions and mixes the 2 components and extrudes the mixed material into the joint.

1. Such equipment shall be of a type approved by the manufacturer of the sealant and all manufacturer's instructions shall be followed.

2. Polyurethane liquid components that have been exposed to the atmosphere for more than 24 hours shall not be used.

F. Primer:

1. Special material furnished by the manufacturer of the sealant to improve bond of polyurethane sealant to concrete.

2. Primer shall be applied to the sides of the groove and to all exposed vertical surfaces in the joint prior to placing the polyurethane sealant.

3. The primer shall be dry prior to placing the sealant.

4. Contaminated primer shall be removed and replaced.

707.03.03 CHANNEL EXPANSION JOINT (1-INCH OR LESS)

A. The materials specified in this subsection shall be supplied and installed in expansion joints with widths 1-inch or less designed for channels included in Clark County Regional Flood Control District's Master Plan.

B. Joint Sealant:

1. 2-component polyurethane pourable joint sealant (ACI 504R, Table 1, Type IV).

2. Sealant shall be able to withstand up to plus or minus 25 percent movement.

3. Sealant shall be self-leveling for flat surfaces and non-sagging for slopes.

4. The sealant shall meet or exceed requirements of Table 1 in ***Subsection 707.03.02, "Pourable Joint Sealer."***

C. No material shall be used that has skinned over or settled in the container to the extent that it cannot be easily redispersed by hand stirring to form a smooth uniform product.

D. Each container shall be clearly labeled or each delivery of material in the tanks of 2-component equipment shall be accompanied with a ticket showing designation (Component A or B), the manufacturer's name, lot or batch number, date of manufacture, date of packaging, date, if any, beyond which the polyurethane sealant shall not be used without additional testing and approval, and manufacturer's instructions for use.

E. The sealant shall be machine mixed and placed with equipment that accurately proportions and mixes the 2 components and extrudes the mixed material into the joint.

1. Such equipment shall be of a type approved by the manufacturer of the sealant and all manufacturer's instructions shall be followed.

2. Polyurethane liquid components that have been exposed to the atmosphere for more than 24 hours shall not be used.

F. Joint Filler: Preformed, ASTM D1752, Type I (sponge rubber) or inert, preformed, closed cell, polypropylene material.

G. Bond Breaker Tape:

1. Adhesive backed polyethylene tape meeting or exceeding the following:

a. Adhesive Strength: 35 ounces/inch width.

b. Tensile Strength: 20 pounds./inch width.

c. Mil thickness: 14.

2. Size tape so that it covers the entire back surface of the joint without extending up the concrete slabs.

3. In joints that have considerable width variation, 1 tape may be lapped over another to accomplish total backside coverage.

4. Bond breaker tape shall be thick enough to permit easy handling and proper insertion.

H. Backer Rod:

1. Non-absorbent expanded, closed cell polyethylene foam.

2. The backer rod shall be approximately 25 percent larger in diameter than the width of the joint to be sealed.

3. Other back-up materials (paper, rope and open cell foam) are unacceptable.

4. The backer rod shall be compatible with the sealant, and no bond or reaction shall occur between the backer rod and sealant.

707.03.04 EXPANSION JOINT (1-INCH OR LESS)

A. The materials specified in this subsection shall be supplied and installed in expansion joints with widths 1-inch or less designed for structures other than those listed in ***Subsection 707.03.03, "Channel Expansion Joint (1-Inch or Less)."***

B. Joint Sealant:

1. 2-component polyurethane pourable joint sealant (ACI 504R, Table 1, Type IV).

2. Sealant shall be able to withstand up to plus or minus 25 percent movement.

3. Sealant shall be self-leveling for flat surfaces and non-sagging for slopes.

4. The sealant shall meet or exceed requirements of Table 1 above.

C. No material shall be used that has skinned over or settled in the container to the extent that it cannot be easily redispersed by hand stirring to form a smooth uniform product.

D. Each container shall be clearly labeled or each delivery of material in the tanks of 2-component equipment shall be accompanied with a ticket showing designation (Component A or B), the manufacturer's name, lot or batch number, date of manufacture, date of packaging, date, if any, beyond which the polyurethane sealant shall not be used without additional testing and approval, and manufacturer's instructions for use

E. The sealant shall be machine mixed and placed with equipment that accurately proportions and mixes the 2 components and extrudes the mixed material into the joint.

1. Such equipment shall be of a type approved by the manufacturer of the sealant and all manufacturer's instructions shall be followed.

2. Polyurethane liquid components that have been exposed to the atmosphere for more than 24 hours shall not be used.

F. Joint Filler:

1. Preformed filler conforming to AASHTO M213 or ASTM D1751 (fiber type) or ASTM D8139 (semi-rigid, closed-cell, polypropylene foam type).

2. Filler material shall be punched or drilled to admit dowels where called for on the plans.

3. Filler for each joint shall be furnished in a single piece for the full depth and width required for the joint unless otherwise specified by the Engineer.

4. When the use of more than 1 piece is authorized for a joint, the abutting ends shall be fastened securely and held in place, by stapling or other positive fastening satisfactory to the Engineer.

G. Bond Breaker Tape:

1. Adhesive backed polyethylene tape meeting or exceeding the following:

a. Adhesive Strength: 35 ounces/inch width.

b. Tensile Strength: 20 pounds./inch width.

c. Mil thickness: 14.

2. Size tape so that it covers the entire back surface of the joint without extending up the concrete slabs.

3. In joints that have considerable width variation, 1 tape may be lapped over another to accomplish total backside coverage

4. Bond breaker tape shall be thick enough to permit easy handling and proper insertion.

H. Backer rod:

1. Non-absorbent expanded, closed cell polyethylene foam.

2. The backer rod shall be approximately 25 percent larger in diameter than the width of the joint to be sealed.

3. Other backer materials (paper, rope and open cell foam) are unacceptable.

4. The backer rod shall be compatible with the sealant and no bond or reaction shall occur between the backer rod and sealant.

707.03.05 EXPANSION JOINT (GREATER THAN 1-INCH)

A. The materials specified in this subsection shall be supplied and installed in expansion joints with widths greater than 1-inch.

B. Joint Sealant:

1. Impermeable closed-cell, cross-linked, ethylene vinyl acetate, low density polyethylene copolymer, nitrogen blown foam material.
2. Joint sealant shall have a minimum working movement range of 60 percent compression and 30 percent tension.
3. The sealant shall meet or exceed the requirements listed in Table 2 below.
4. Joint sealant shall have 1/8-inch" deep by 1/8-inch wide grooves spaced at 1/4 inch to 1/2 inch along both sides of the joint and running the entire length of the joint to increase bond surface area.
5. Joint sealant material shall be resistant to degradation due to ultraviolet radiation or shall be coated with a material that provides adequate protection.
6. The joint sealant shall be installed with a width 25 percent greater than width of joint opening at a near neutral condition.
7. All direction changes in joint sealant shall be done using heat welding method.
8. Joint sealant shall be installed using all of manufacturer's recommendations.
9. Joint sealant shall be installed prior to significant joint movement after concrete placement.

C. Contractor shall prevent construction equipment from traversing joint after sealant has been placed or adequate steps shall be taken to protect sealant from construction traffic.

Table 2 - Minimum Requirements for Preformed Joint Sealer

Material Characteristics	Physical Requirements
Service Range	-94 degrees F to 160 degrees F
Tensile Strength	115 lb/in^2
Elongation at break	255%
Tear Resistance (ASTM D624)	16 lb/in^2
Water Absorption (ASTM D3575, Suffix L)	0.2 lb/ft^2
Density	2.8–3.4 lb/ft^3

D. Joint Filler: Inert, preformed, closed cell, polypropylene material.

E. Bond Breaker Tape:

1. Adhesive backed polyethylene tape meeting or exceeding the following:
   a. Adhesive Strength: 35 ounces/inch width.
   b. Tensile Strength: 20 pounds./inch width.
   c. Mil thickness: 14.
2. Size tape so that it covers the entire back surface of the joint without extending up the concrete slabs.
3. In joints that have considerable width variation, 1 tape may be lapped over another to accomplish total backside coverage.
4. Bond breaker tape shall be thick enough to permit easy handling and proper insertion.

F. Bonder: 2-component, 100 percent solid epoxy adhesive designed to bond joint material to steel, cured concrete, or wood.

707.03.06 RUBBER GASKETS

A. The ring gaskets shall conform to AASHTO M198.

707.03.07 WATERSTOPS

A. Waterstops shall conform to the following requirements:

1. Natural rubber waterstops shall be manufactured from a stock composed of a high grade compound made exclusively from new plantation rubber, reinforced carbon black, zinc oxide, accelerators, antioxidants, and softeners.

2. This compound shall contain not less than 72 percent by volume of new plantation rubber.

NATURAL RUBBER.

Test	Test Method	Requirements
Tension Testing of Vulcanized Rubber	ASTM D412	Tensile strength: 3,500 psi minimum Elongation at breaking: 550 percent Unit stress (300 percent): 1,100 psi minimum Unit stress (500 percent): 2,800 psi minimum
Test for Accelerated aging of Vulcanized Rubber by the Oxygen Pressure Method	ASTM D572	After 7 days in air at 158 degrees F (±2 degrees F) or after 48 hours in oxygen at 158 degrees F (±2 degrees F) and 300 psi, the tensile strength and elongation shall not be less than 65 percent of the original.
Test for Indentation of Rubber by Means of a Durometer	ASTM D2240	55 to 65 hardness

SYNTHETIC RUBBER

Test	Test Method	Requirements
Tension Testing of Vulcanized Rubber	ASTM D412	Tensile strength 2,500 psi minimum Elongation at breaking of 425 percent.
Test for Accelerated aging of Vulcanized Rubber by the Oxygen Pressure Method	ASTM D572	After 7 days in air at 158 degrees F (±2 degrees F) or after 48 hours in oxygen at 158 degrees F (±1 degree F) and 300 psi, the tensile strength and elongation shall not be less than 65 percent of the original.
Test for Indentation of Rubber By Means of a Durometer	ASTM D2240	50 to 70 hardness

POLYVINYL CHLORIDE

Test	Test Method	Requirements
Polyvinyl Chloride Waterstops	Corps of Engr CRD-C 572	Compliance with paragraph 6

707.03.08 ASPHALT PLANK

A. Asphalt plank shall conform to ASTM D517 for Plain Asphalt Plank.

707.03.09 PREFORMED ELASTIC JOINT SEALER

A. Preformed elastic joint sealer and lubricant adhesive shall conform to AASHTO M220.

B. The lubricant adhesive shall be homogeneous and shall remain workable from 5 degrees F to 120 degrees F.

1. Each lot of the adhesive shall be in containers with the manufacturer's name or trademark and the date of manufacture plainly marked.

2. Adhesive shall be stored at a temperature of 50 degrees F to 80 degrees F and shall be used within 270 days after the date of its manufacture.

C. The lubricant adhesive shall conform to the following requirements:

1. Average new weight per gallon, pounds: 7.84 ±5%.

2. Solids content by weight, percent: 22 - 28.

D. Each lot of the preformed elastic joint sealer and lubricant adhesive furnished under these specifications shall be identified as specified herein and shall be products that have been tested by a reputable testing laboratory, recognized by the Contracting Agency.

1. The testing laboratory shall certify that the materials meet these specifications and requirements.

2. The Contractor shall furnish the Contracting Agency with these certifications prior to using the material.

707.03.10 SUBMITTAL

A. Material shall be tested and certified in accordance with the Table 3 frequencies.

1. Prior to the use of these materials, the Contractor shall submit to the Engineer for approval a document certifying that the material meets these specifications and requirements.

2. The test shall be performed in an accredited laboratory such as the American Association for Laboratory Accreditation (A2LA) or other as approved by the Engineer.

3. A test certificate shall be included with the certifying document.

4. Subsequent submittals shall be reviewed by the Contractor for compliance then transmitted to the Engineer.

B. The Statute of Limitations duration for the record storage shall be as required by the Nevada Revised Statutes.

Table 3 - Quality Control Inspection and Testing

Product	Subsection	Reference	Submittal	Frequency
Joint Sealant	***707.03.02*** ***707.03.03***	Table 1 requirements	Certification with copy of tests	1 per lot
	707.03.04	ACI 504R, Table 1, Type IV		
	707.03.05	Table 2 requirements		
Joint Filler	***707.03.03***	Tested per ASTM D1752 Type I	Certification with copy of tests	1 per lot
	707.03.04	AASHTO M213		
	707.03.05	Inert, preformed, closed cell, polypropylene material	Certification	1 per lot
Backer Rod	***707.03.03*** ***707.03.04***	Non-absorbent expanded, closed cell polyethylene	Certification	1 per lot

Bond Breaker Tape	***707.03.03*** ***707.03.04*** ***707.03.05***	Adhesive strength 35 ounces/in width Tensile Strength 20 lb/in width Thickness 14 mil minimum	Certification with copy of tests	1 per lot
Rubber Gaskets	***707.03.06***	AASTHO M198		
Waterstops Natural and Rubber	***707.03.07***	ASTM D412 ASTM D572 ASTM D2240		
Waterstops Polyvinyl Chloride	***707.03.07***	Corps of Engr CRD-C 572		
Asphalt Plank	***707.03.08***	ASTM D517		
Preformed Elastic Joint Sealer	***707.03.09***	AASHTO M220		