



SECTION 1057

MATERIAL FOR JOINTS

1057.1 Scope. This specification covers joint material to be used as specified or as shown on the plans.

1057.2 Acceptance. All material under this specification shall be obtained from a source identified on the PAL designated for this specification.

1057.3 Dowel Bars. Dowels for transverse joints shall be in accordance with the requirements for plain rounds of AASHTO M 31. The dowels shall be epoxy coated in accordance with [Sec 1036](#), except the coating thickness shall be a 5-mil minimum, the flexibility of coating requirement will not apply and the cut ends will not be required to be coated. The dowels shall be free of cutting burrs and other projections. Dowel supporting units shall be in accordance with one of the types shown on the plans.

1057.3.1 The free end of the dowel bar shall be coated with an approved graphite grease for a length of 11 inches. Graphite grease shall contain a minimum of 25 percent graphite, and the graphite content shall be certified by the manufacturer or shown on the container label. Graphite grease shall be applied with a thin, uniform coating that will result in a thorough covering of the free end of the bar.

1057.3.2 In lieu of the graphite grease application, the dowel bar basket supplier may supply completed basket units pre-dipped in an approved bondbreaker solution. The bondbreaker solution shall not be applied in a spray or field application. The resulting dry dowel bar coating shall be visually evident. The coating shall be uniformly applied without excessive drips or thickness. Dirty or excessively scraped dowel bar units will be rejected. Rejected units may be used if the units are fully cleaned of all dirt and bondbreaker coating and graphite grease is applied according to these specifications. The dowel basket supplier shall provide a certification for the coating with each shipment, certifying the bondbreaker product name, manufacturer and date of coating application.

1057.4 Tie Bars. Tie bars for longitudinal joints and construction joints shall be round, deformed and in accordance with AASHTO M 31, except for tie bars that are to be bent and straightened shall be in accordance with AASHTO M 31, Grade 40. Tie bars shall not be bent and straightened more than one time. Tie bars shall be epoxy coated in accordance with [Sec 1036](#), except the coating thickness shall be a 5-mil minimum, the flexibility of coating requirement will not apply and the cut ends will not be required to be coated.

1057.5 Concrete and Asphalt Joint Sealer, Hot-Poured Elastic Type. The sealer material shall be in accordance with ASTM D 6690, Type II. The joint sealer material shall be packed and shipped in suitable commercial containers clearly marked with the name of the material, the name of the manufacturer, brand name, weight, batch number, pouring temperature recommended by the manufacturer and maximum safe heating temperature.

1057.6 Preformed Fiber Expansion Joint Filler. Preformed fiber expansion joint filler material shall be in accordance with AASHTO M 213. Percent asphalt content shall be tested in accordance with AASHTO T 42 or 164 with the following modifications: Oven dry test strips at 104 ± 3 C for one hour. Cool and weigh approximately 50 g into an extraction bowl.

Cover test portion in the bowl with a chlorinated solvent, such as trichloroethylene, and allow sufficient time for solvent to soak the test portion. Follow test procedure outlined in AASHTO T 164 section 12.3 and 12.4, except discard extract and washings. Carefully transfer extracted test strips and scrap residue from the filter ring into a tared weighing pan. Oven dry at 104 ± 3 C for one (1) hour and cool in a desiccators. Calculate the percent asphalt content by weight on an oven dry basis per ASTM D 545 subsection 7.5.4. In cases of dispute, AASHTO T 42 test results will control.

1057.7 Joints for Concrete Structures

1057.7.1 Plastic Waterstop. The plastic waterstop shall consist of a basic resin of polyvinyl chloride (PVC) with additional resins, plasticizers and stabilizers as necessary to produce a durable material with a high fatigue point, resistant to acid and alkali solutions, showing little deterioration under accelerated aging tests and shall meet the approval of the engineer. The plastic waterstop shall have a tensile strength of no less than 1,800 psi and an ultimate elongation of no less than 200 percent. The waterstop shall be a continuous strip, ribbed on both sides, and with a hollow bulb center, a "U" shaped reinforced center-pleat section, or other approved type of center section.

1057.7.2 Rubber Waterstop. The rubber water stop shall consist of a durable, elastic, cured rubber compound capable of effectively sealing joints in concrete against the infiltration of moisture.

1057.7.2.1 The rubber waterstop shall be in accordance with the following requirements:

- (a) Hardness - The Shore A durometer hardness shall be 60 - 70.
- (b) Elongation - The elongation shall be no less than 450 percent.
- (c) Tensile Strength - The tensile strength shall be no less than 3,000 psi.
- (d) Water Absorption - The water absorption shall be a maximum of five percent by weight (mass) after immersion in water for two days at 158 F.
- (e) Tensile Strength After Aging - The tensile strength of the test specimen, after accelerated aging test of seven days at 158 F, shall be no less than 80 percent of the tensile strength prior to the aging test. The tensile strength of the test specimen, after accelerated aging test of 48 hours in oxygen at 158 F and 300 psi, shall be no less than 80 percent of the tensile strength prior to the test.
- (f) Compression Set - The compression set after 22 hours at 158 F shall be no more than 30 percent.

1057.7.2.2 The waterstop shall be manufactured in such a manner that the finished product will have an integral cross section that will be dense, homogeneous, and free from porosity and other imperfections. Minor surface defects, such as surface peel covering less than one square inch, and surface cavities or bumps less than 1/4 inch in the longest lateral dimension and less than 1/16 inch deep, will be permitted.

1057.7.3 Copper Sheeting for Flashing. Copper sheeting shall be of soft grade containing no less than 99.7 percent copper and shall be capable of being bent cold through an angle of 180 degrees flat upon itself without evidence of cracking. Test specimens shall have an elongation in 2 inches of at least 20 percent. The weight per square foot of the sheeting to be used will be shown on the plans. Tolerances in thickness shall be in accordance with ASTM B 248.

1057.7.4 Preformed Sponge Rubber Expansion and Partition Joint Filler. This material shall be in accordance with AASHTO M 153, Type I, Sponge Rubber.

1057.8 Plastic Joint Compound for Vitrified Clay and Concrete Pipe. Plastic joint compound shall be a homogeneous blend of bituminous or butyl rubber material, inert filler and suitable solvents or plasticizing compounds thoroughly mixed at the factory to a uniform consistency suitable for sealing joints of vitrified clay and concrete pipe. The physical requirements of the compound shall be in accordance with ASTM C 990. Trowel grade material shall conform to the following requirement:

Bitumen, soluble in soluble chlorinated solvent, such as Trichloroethylene, percent by weight, min	45
Ash, percent by weight	15-50
Penetration, standard cone, 150 g, 5 sec, 25 C – use 12 ounce can, d mm	110-275

Primer, as recommended by the manufacturer, shall be used with extruded rope or flat tape types, if required to maintain the material in position while pipe sections are being joined.

1057.9 Tubular Joint Seal. Tubular joint seal shall be manufactured from extruded closed-cellular rubber, the base polymer being a blend of nitrile and vinyl meeting the physical requirements of ASTM D 1056, Type 2, Class C, Grade 1, and the chemical resistance requirements of ASTM C990. The seal shall be a single continuous part conforming to the joint shape. The outer surface shall be completely covered with a natural skin. The cross-sectional diameter and installation shall be in accordance with the manufacturer's recommendations for the size of pipe being placed.

1057.10 Silicone Expansion Joint Sealant. The sealant for expansion joints shall be in accordance with [Sec 717.30](#). The silicone joint sealant shall be a rapid cure, self-leveling, cold applied, single or two-component silicone sealant. The sealant shall demonstrate resilience, flexibility and resistance to moisture and puncture upon curing. The sealant shall demonstrate excellent adhesion to Portland cement concrete, polymer concrete and steel over a range of temperatures from -30 to 130 F, while maintaining a watertight seal. The sealant shall not contain any solvents or diluents that cause shrinkage or expansion during curing. Acid-cure sealants shall not be used. The date of manufacture or "use by" date shall be provided with each lot of sealant or primer. Material 12 months old or older from the date of manufacture or past the "use by" date shall not be used. The engineer reserves the right to test representative samples from material proposed for use. If a backer rod is required, it shall be closed-cell material, as recommended by the sealant manufacturer. The manufacturer shall certify that the sealant meets or exceeds the following test requirements before installation begins:

Physical Properties:	Requirement
Each component as supplied: Specific Gravity (ASTM D 1475) Extrusion Rate (ASTM C 1183) Durometer Hardness, Shore (ASTM D 2240) "00" (0 C and 25 C ± 1 C [77 ± 3 F]) Ozone and U.V. Resistance (ASTM C 793)	1.2 - 1.4 200 - 550 g/minute 30 - 60 No chalking, cracking or bond loss after 5000 hrs.
After Mixing: Flow Tack-Free Time (ASTM C 679)	Self-Leveling 60 minutes maximum

Upon Complete Cure: (ASTM D 5329 ^a)	
Joint Elongation (Adhesion to concrete/ steel/polymer concrete)	600% minimum
Joint Modulus (at 100% elongation)	3-12 psi

^aModified; Sample cured two days at 77 ± 2 F and 50 ± 5 percent relative humidity.

1057.11 Silicone Joint Sealant for Saw Cut and Formed Joints. The sealant for sawed and formed joint shall be in accordance with [Sec 717.40](#). The silicone joint sealant shall be a cold applied, single component, chemically curing gray sealant with 100 percent elongation and 50 percent compressive joint movement capability. If a backer rod is required, it shall be closed-cell material, as recommended by the sealant manufacturer. The sealant shall be type NS (Non-Sag) and the physical properties shall be in accordance with ASTM D 5893 and the following:

Physical Properties	Requirement
Color	Gray
Tack free time	35 – 75 minutes
Cure time	7 days @ 75 F – 90 F and 45 – 55 % relative humidity

1057.12 Documentation. All material specified in this section shall include certification showing representative test results of the material and certify that the material supplied is in accordance with these specifications.