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METHOD OF TEST FOR MACHINE MIXED, TWO-COMPONENT, TYPE A SEALANTS

A. SCOPE

This test method describes the procedure for testing two-component joint sealants used for filling joints in concrete structures where movement occurs. These sealants must meet the table of properties in Section 51-2.02B Type A and AL Joint Seals in the Caltrans Standard Specifications.

B. REFERENCES

- ASTM D 217 – Cone Penetration of Lubricating Grease
ASTM G 154 – Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
California Test 413 – Testing Cold Applied Two-Component Polysulfide Polymer Type Joint Sealing Compound
California Test 434 – Testing Epoxy Resin Adhesives, Binders and Sealants

C. APPARATUS

1. Concrete test blocks 1 in. × 2 in. × 3 in. fabricated according to California Test 413. Blocks purchased from the Masonry Test Block Co. in Saginaw, Michigan have also proven to be satisfactory.
2. Various sizes of Teflon spacers: ½ in. × ½ in. × 2 in.; ½ in. × 1¼ in. × 2 in.; and ½ in. × 1 in. × 2 in.
3. 6-oz seamless tin ointment containers which have an approximate diameter of 4 in. and approximate depth of 1½ in.
4. Tensile testing apparatus with a capacity of at least 100 lbs force and fitted with sample grips capable of holding the concrete test blocks.
5. Razor blade marked to a depth of 1/16 in.
6. An accelerated weathering apparatus as described in ASTM G 154. The test cycle is described in Table X2.1, Cycle 2.
7. A jig that will extend and hold the center of the tensile specimen from 1 in. to 2 in. (100 % elongation of the center section).
8. Penetrometer with a grease cone attachment as described in ASTM D 217. Cone and moveable shaft together shall weigh 150 g.

D. SPECIMEN PREPARATION

Combine the volumes recommended by the manufacturer of the two component sealant so that the total volume is a pint or less. Vigorously mix these materials for 45 s with an air powered stirrer fitted with a mixing blade. During the mixing, incorporate as little air as possible. Within 30 s after final mixing, pour the samples into the prepared molds described below. Do not scrape the sides of mixing vessel. More than one mixed batch may be required to prepare all specimens.

If the sealant comes in a side-by-side cartridge dispenser, use the static mixing nozzle provided by the manufacturer to prepare the samples below.

E. PROCEDURES

Part 1 MODULUS AT 150 % ELONGATION

1. Clean the surface of the test blocks by rinsing under tap water while scrubbing gently. Dry the blocks thoroughly (minimum 24 hrs) before preparing the samples.
2. If required, prime the surfaces of the 1 in. × 2 in. × 3 in. concrete test blocks with primer furnished by the sealant manufacturer. Prepare six ½ in. × ½ in. × 2 in. specimens of sealant using Teflon spacers to create a mold cavity between each pair of test blocks. Use adhesive tape or rubber bands to hold each block assembly together. Seal the bottom opening of the mold cavity with adhesive tape. Pour the mixed sealant into each mold cavity taking care not to trap air bubbles. The 2-in. sides of the sealant shall be centered and parallel to the 2-in. side of the test block. Cure and condition the samples for 7 days at 25°C ± 2°C before testing. Remove the Teflon spacers, adhesive tape, etc. at the end of the first 24 hr.
3. At the end of 7 days, place the block assembly into the tensile testing apparatus. Extend the cast sealant specimen at the rate of 0.2 in./min, to a width of 1¼ in. (150 % extension).
4. Record the stress at 150 % extension in pounds per square inch. The modulus is the average of two stress determinations.

Part 2 RECOVERY

1. After the modulus determination, insert the 1¼ in. spacers between the concrete blocks to maintain 150 % extension. Condition the specimens for an additional 7 days at 25°C ± 2°C.
2. Remove the spacers and place the test specimens on a glass surface so that the two 1 in. × 3 in. surfaces of each specimen bear directly on the glass. At 2-, 3-, and 5-min intervals, lift the test specimen carefully to help relieve any friction that may restrict the recovery of the sealant.
3. Measure the width of the sealant (the distance between the 2-in. × 3-in. interior face of the blocks) after 5 min of relaxation.

Part 3 NOTCH TEST

1. After the modulus determination, extend the test specimen to 1¼ in., insert the 1¼-in. spacers, and cut a notch 1/16 in. deep across the center of the ½ in. face of the sealant.
2. Examine the sealant 24 hrs later for the extent of failure in cohesion or adhesion.

Part 4 WATER RESISTANCE

1. After the modulus determination, extend two specimens 100 % to 1 in. Insert the 1 in. spacers and immerse the specimens in de-ionized water at 25°C ± 2°C for 7 days.
2. Observe for tearing or loss of adhesion. Record the elapsed time when a tear or loss of bond exceeds ¼ in.

Part 5 ULTRAVIOLET EXPOSURE TEST

1. Using a form, cast a smooth sheet of sealant 1/8 in. thick against a sheet of plastic. Cure the sample for 7 days at 25°C ± 2°C. Cut a tensile test specimen as described in California Test 434, Part 7 - Tensile Strength and Elongation.
2. Place the tensile test specimen in the jig and extend the center portion 100 % and clamp the specimen so that it remains at 100 % elongation.
3. Mount this jig in the accelerated weathering apparatus and test for 200 hrs.
4. After 200 hrs of exposure, the specimen shall exhibit no more than slight cracking or checking.

Part 6 CONE PENETRATION

1. Fill a 6 oz ointment container with the mixed sealant. Let cure 24 hrs at 25°C ± 2°C.
2. Place the container with the mixed sealant on the penetrometer. Adjust the height of the penetrometer cone so that the tip just brushes the sealant's surface and zero the dial. Release the cone shaft for 5 s. Record penetration in millimeters (mm).
3. Make three tests for penetration on the surface of the mixed sample at points not less than ¾ in. apart and ¾ in. from the edge of the container.

F. SAFETY AND HEALTH

It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Prior to handling, testing and disposing of any materials, testers must be knowledgeable about safe laboratory practices, hazards and exposure, chemical procurement and storage and personal protective apparel and equipment.

Caltrans Laboratory Safety Manual is available at:

http://www.dot.ca.gov/hq/esc/ctms/pdf/lab_safety_manual.pdf

**End of Text
(California Test 440 contains 4 pages)**