

SECTION 07900

SEALS AND SEALANTS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing compression seals and sealants not specified elsewhere.
- B. Related Work Specified Elsewhere:
 - 1. Rabbet for compression seal in granite edging: Section 04415.
 - 2. Expansion joint cover assemblies and systems: Sections 05810 and 05811.
 - 3. Sealant for metal thresholds: Section 08710.
 - 4. Glazing sealant: Section 08800.
 - 5. Acoustical sealant: Section 09255.
 - 6. Ceramic tile sealant: Section 09320.
 - 7. Caulk for painting preparation: Section 09920.
 - 8. Paver tile sealant: Section 09340.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ASTM: C920, C1193, D412, D1752, D2628.
- B. Manufacturer Qualification:
 - 1. General: Provide the products of established manufacturers. Insofar as possible, provide products from a single manufacturer.
 - 2. Sealant color-selection capability: Have color-selection capability resolved early in the submittals process to prevent delay of the work.
 - a. Where sealants are exposed, provide products of a manufacturer who can match the colors of adjacent materials by either having an acceptable range of standard colors or by factory blending custom colors as acceptable to the Engineer and at no additional cost to the Authority.
 - b. Where a manufacturer's colors are insufficient for proper color-match, use acceptable colors from another acceptable manufacturer.
 - 3. On-site representation: Use only a sealant manufacturer who has a local, knowledgeable representative who can visit the project site prior to construction and at least twice during sealant installation to observe conditions and recommend solutions at no additional cost to the Authority.
- C. Design Criteria:
 - 1. Designed width of exterior joints: Joint widths indicated on drawings are shown at their designed width. This is measured when the joint would be at the average air temperature for the year, which is approximately 50F, based on an average minimum air temperature of zero degrees F and an average maximum air temperature of 100F.
 - 2. Designed width of interior joints: Joint widths indicated on the drawings are shown at their designed width at 50F.
 - 3. Joint width at time of seal or sealant application: Make joint widths at time of installation never less than the calculated width, which at 0 degrees F is 25 percent wider than the designed width and at 100F is 25 percent narrower than the designed width for exterior joints and 1-1/2 percent smaller than the designed width for each

degree the ambient temperature exceeds 50F, and 1-1/2 percent larger than the designed width for each degree the ambient temperature is less than 50F.

- a. It is recommended that seals and sealant be installed when the average daily air temperature is 50 degrees F plus or minus five degrees, when joint should be at its designed width.
 - b. If joints are less than the calculated width at the time of proposed installation, take corrective action, which may include saw cutting of joint or other remedial measures approved by the Engineer and by the seal or sealant manufacturer.
 - c. If the joint depth is not sufficient for the designed width of the joint, sealant and backup, cut out the joint to the required depth for the sealant and backup.
 - d. Perform cutting and remedial measures that are acceptable to the Engineer. Cost of cutting and remedial measures are at no additional cost to the Authority.
4. Joint size and sealant size: Except as otherwise indicated, make sealant at least 1/4-inch wide x 1/4-inch deep. In joints 3/8 inches wide, make sealant 1/4-inch deep. In joints wider than 3/8-inch and up to 1-inch wide, make sealant depth 1/2 of the joint width. For joints wider than 1 inch, make sealant depth as recommended by the sealant manufacturer.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
1. Samples:
 - a. Material samples: Four of each type of the following materials used in the work:
 - 1) Compression seals: 12 inches long, plus each factory-made corner unit.
 - 2) Sealant and lubricant-adhesive: Half-pint containers.
 - 3) Sealant colors: Fully cured beads of each color used, each six inches long.
 - 4) Backup material: 12 inches long.
 - 5) Joint filler: 12 inches long.
 - 6) Color chips: 12 inches long, one for each color used in the work.
 - b. Demonstration samples: Make demonstration installation of each seal and sealant installation type and color. Use approved materials, installed and cured as required. Remove demonstration samples as directed. Perform testing on sealant demonstration samples as specified under Field Testing.
 2. Shop Drawings:
 - a. General: Submit manufacturers technical product data for each product proposed to be used, together with standard and custom color-selection samples.
 - b. Compression seals: Detail correct size and placement of each type and size of compression seal in its joint.
 - c. Test results: Inspection and adhesion test results performed by sealant manufacturer.
 3. Certification by each manufacturer that the products provided will perform as required and will not stain adjacent materials.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products to jobsite in original unopened containers clearly marked with manufacturer's name and brand designation, referenced specification number, type and class as applicable.
- B. Store products in approved dry area and protect from contact with soil and from exposure to the elements. Keep products dry.
- C. Handle products to prevent breakage of containers and damage to products.

1.05 JOB CONDITIONS:

- A. Environmental Requirements:
 - 1. Application of seals or sealants, including their related products, when ambient temperature is lower than 40F or when there is ice, frost or dampness visible on surfaces to be sealed is prohibited.
 - 2. Comply with manufacturer's environmental recommendation.

PART 2 - PRODUCTS

2.01 COMPRESSION-SEAL MATERIALS:

- A. Preformed compression seals: ASTM D2628, rectangular design unless otherwise shown.
 - 1. Width: Size compression seals for full amount of joint movement as required, plus the thickness of the compressed seal as recommended by the manufacturer.
 - 2. Corners: Provide factory pre-molded or factory pre-cut and welded corner units for angular changes in direction, vertically as well as horizontally, including 30, 60, 45, 90, 120, 135, and 150 degrees as required by joint location.
- B. Lubricant-adhesive, general: One-part moisture-curing polyurethane as recommended by compression seal manufacturer, with the following additional requirements:

Physical Property	Requirement	ASTM Test Method
Average weight per gallon	8.00 pounds plus-or-minus 10 percent	-
Solids content	65 - 74 percent by weight	-
Adhesive	Fluid from 5F to 120F	-
Film strength	1200 psi, minimum	D412
Elongation	250 percent	D412

- C. Lubricant-adhesive for compression seal in granite: Same as above, but also tested for nonstaining over a three-month period on samples of granite to be used.

2.02 SEALANT AND ACCESSORIES:

- A. General: Provide joint sealant, backup rod, primer, and other related materials that are compatible with one another and with the joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on field experience and submitted test reports.
- B. Sealant (Polyurethane): Polyurethane-based or epoxidized polyurethane based, multi-part elastomeric sealant, ASTM C920, Type M (multi-component), Class 25 (withstands an increase or decrease of 25 percent of the joint width) as follows:
 - 1. For joints in horizontal surfaces: Grade P (pourable or self-leveling), Uses T (traffic areas), M (on masonry) or O (other than standard substrates).
 - 2. For joints in sloped surfaces: Grade NS (nonsag), Uses T (traffic areas), M (on masonry) or O (other than standard substrates).
 - 3. For joints in overhead and vertical surfaces: Grade NS (nonsag), Uses NT (nontraffic areas), M (on masonry), A (on aluminum), or O (other than standard substrates).
- C. Primer: Colorless, nonstaining liquid material of types suited to each substrate surface, as tested and recommended in writing by the manufacturer of each sealant to be used.
- D. Backup Rod: Preformed, compressible, resilient, non-waxed, non-extruding, nonstaining, closed-cell rod stock of polyethylene or polyethylene-jacketed foam which will maintain a uniform round or oval cross-sectional shape when compressed into the joint.
 - 1. Select backup rods as recommended by the manufacturer of each sealant to be used; compatible with joint substrates, sealants, primers, and other joint fillers; that will not bond with sealants and primers; and are approved for applications indicated based on field experience and laboratory testing.
 - 2. Select backup rod of the sizes and shapes to suit the various conditions and at about 30 percent wider than the joint width.
 - a. Where depth of joint is too shallow for round backup rod use 1/2-round backup rod, factory manufactured with cut surface fused by heat process so that it cannot release gas.
 - b. Where depth is too shallow for 1/2-round rod, use bond breaker tape.
- E. Bond-Breaker Tape: Polyethylene tape, as recommended by the manufacturer of each sealant to be used, for preventing sealant from adhering to joint-filler materials or joint surfaces at back of joint where such adhesion would promote sealant failure, or result in less than optimal performance. Provide tape sized properly for the joint. Provide self-adhesive tape where applicable.
- F. Cleaning Agent: Joint cleaning compound tested and recommended in writing by sealant manufacturer for cleaning joint surfaces before priming. Use only a cleaner which is nonstaining, non-harmful to masonry, does not leave oily residues, and does not have a detrimental effect on adhesion or in-service performance.
- G. Weep Tubes: Vinyl tubing, 3/8-inch diameter.
- H. Masking Tape: Nonstaining, nonabsorbent type, compatible with joint sealants and to surfaces adjacent to joints. Use only a masking tape which will easily come off entirely, including adhesive.
- I. Joint Filler for Sealant Joints : Nonstaining joint filler compatible with backer rod and sealant:
 - 1. Sponge rubber: Preformed strips complying with ASTM D1752 Type I.
- J. Joint Filler for Pavers and Walkways: Nonstaining joint filler compatible with backer rod and sealant; one of the following. Where filler is not shown covered by sealant, see Section 03300:
 - 1. Cork: Preformed strips complying with ASTM D1752 Type II.

2. Self-expanding cork: Preformed strips complying with ASTM D1752 Type III.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION:

- A. Inspection:
 1. With installer present, examine joints for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting the performance of joint seals and sealants.
 2. Have sealant manufacturer's representative visit the site and review the project joint conditions and details for sealant work of this Project and perform adhesion testing. Have sealant manufacturer representative report to the Engineer in writing the results of his inspections and tests.
 3. Do not proceed with work of this section until unsatisfactory conditions have been corrected.
- B. Preparation: Comply with the recommendations of ASTM C1193 and the following:
 1. Cleaning:
 - a. Clean joint surfaces receiving seals or sealants. Ensure that they are sound, smooth, clean, dry, and free of foreign substances and contaminants, including curing compounds and release agents.
 - b. Remove factory or field-applied coatings that will be detrimental to adhesion of seals, sealants or primers.
 2. Masking: Use masking where required to prevent contact of sealant and primers with adjoining surfaces that otherwise would be stained or damaged by such contact or by cleaning methods required to remove sealant or primer smears.
- C. Priming: Unless sealant manufacturer specifically recommends in writing against priming, apply primer to prepared surfaces that will receive sealant. Apply primer on clean, dry surfaces, and prior to installation of backup rod. Completely wet both inner faces of the joint with primer.
- D. Backup rod: Install backup rod in joints (after primer is dry) to provide backup and give proper shape for sealant bead. Where there is insufficient joint depth for backup rod, install half-round backup rod or bond breaker tape as approved in lieu of backup rod.
 1. Proper cross-sectional shape for sealant bead is a very slight hourglass shape with back and front faces having slight concave curvature, unless indicated otherwise. Use special blunt T-shaped tool or roller to install backup rod to the proper and uniform depth required for the sealant.
 2. Install size of backup rod that will provide approximately 30 percent compression.
 3. Do not stretch, twist, braid, puncture, or tear backup rod. A broken surface will emit gas (out-gassing) that blisters the installed sealant, thereby requiring complete removal and reinstallation of primer, backup rod, and sealant.
 4. Tightly butt backup rods at joints and intersections. At outside corners, provide sufficient length of backer rod so that rod can be bent around corner rather than cut at corner, so that out-gassing will not occur.
- E. Bond breaker tape: Where space for a backup rod is inadequate, use bond breaker tape to prevent three-sided adhesion. Install bond breaker tape smoothly over back of joints so that sealant adheres to the sides of joint but not to the back of joint.

3.02 INSTALLATION:

- A. Compression Seals:
1. If adjacent surfaces are to receive waterproofing, install compression seals prior to application of waterproofing.
 2. Prime interfaces, edges and corners of joints as necessary.
 3. Prime and lubricate joints by coating both sides of joint with lubricant-adhesive to wet-film thickness of 20 mils.
 4. While lubricant-adhesive is still wet, install compression seals to depth shown.
 5. Recess exposed edges slightly behind adjoining surfaces, unless otherwise shown, so that compressed units will not protrude from joints.
 6. Bond ends together with materials and methods recommended by manufacturer to ensure continuous watertight and airtight performance. Where factory pre-molded or pre-welded corner units are unavailable, miter-cut and bond ends at corners.
- B. Sealant:
1. Comply with ASTM C1193 and with manufacturer's recommendations, except where more stringent requirements are shown or specified.
 2. Set joint-filler units at depth or position in joint as shown to coordinate with other work, including installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between ends of joint-filler units.
 3. Install back-up material, except where shown to be omitted or recommended to be omitted by sealant manufacturer for application used.
 4. Install bond-breaker tape where shown and where recommended by manufacturer to ensure that sealants will perform as intended.
 5. Employ installation techniques which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete wetting of joint bond surfaces equally on opposite sides.
 - a. Except as otherwise shown, fill sealant rabbet to slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between horizontal surface and vertical surface, fill joint to form slight cove, so that joint will not trap moisture and dirt.
 - b. Fill joints to a depth equal to 50 percent of joint width, but not more than 1/2-inch deep nor less than 1/4-inch deep.
 - c. Ensure that temperature of sealant, as well as of substrates, at time of sealant application, is as recommended by sealant manufacturer and as specified herein. Apply sealant at optimum time after primer application.
 - d. Remove masking immediately after tooling of sealant and before sealant face starts to skin over. Do not cause dislocation of sealant, or migration of sealant to adjacent surfaces when removing masking tape.
 6. Spillage: Do not allow sealants or compounds to overflow from confines of joints, to spill onto adjoining work or to migrate into voids of exposed finishes. If spillage occurs, eliminate evidence of spillage to the Engineer's satisfaction.
 7. Seal joints in granite work with sealant, except granite-paving joints and pylon-apron joints that are shown to be grouted. Ensure joint depths of at least 3/4 inch before placing backup. If necessary, rake-out joints to a minimum depth of 3/4 inch.
 8. Weep Holes: Install weep tubes, sloping to expel water, where required to allow free drainage of hollow spaces. Where so shown, install tubes through sealant and backing to ensure an unobstructed drainage path. Do not seal over weep holes provided by other trades.

3.03 CURING AND PROTECTING:

- A. Cure sealants in compliance with manufacturer's recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.

- B. Cure and protect joint sealers during construction period, so that they will be without deterioration, soiling or damage, other than normal wear and weathering, at time of final acceptance.
- C. Cure and protect sealants so as to minimize increases in modulus of elasticity and other accelerated aging effects.
- D. Replace or restore sealants damaged or deteriorated during construction and from testing as directed. Cut out or remove damaged sealant immediately and properly prepare and reseal joint with new materials to produce sealant installation with repaired areas indistinguishable from other work.

3.04 FIELD TESTING:

- A. Sealant: Field test cured sealant installations in the presence of and where directed by the Engineer. Test each type of joint sealant for adhesion to joint substrates by hand-pull method as follows:
 - 1. Make knife cuts as follows: A transverse cut from one side of joint to the other, followed by parallel cuts approximately 2 inches long at each side of joint and meeting the transverse cut at the end of the 2-inch cuts. Place a mark 1 inch from the top of 2-inch piece.
 - 2. Use fingers to grasp the 2-inch piece of sealant just above the 1-inch mark; pull firmly away at a 90-degree angle while holding a ruler along side of sealant; pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than the distance equaling the specified maximum movement capability in extension; hold this position for 10 seconds.
 - 3. Report whether or not the sealant in joint (connected to pulled-out portion) failed to adhere to joint substrates or failed cohesively or adhesively. Include data on pull distance used to test each type of sealant and joint substrate.
 - 4. Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered acceptable, subject to certification of design and performance criteria by the manufacturer.
 - 5. Make a minimum of 10 such tests unless otherwise directed by the Engineer. Submit report of testing to the Engineer.

3.05 CLEANING:

- A. Immediately clean off excess primers, drippings, sealants and sealant smears as work progresses, using methods and with cleaning materials approved by manufacturer of each joint primer and sealant and by manufacturers of materials where joints occur.
- B. Use only materials and methods acceptable to the Engineer.

END OF SECTION