1. Section 079200
Joint Sealants
	1. PART 1 GENERAL
		1. SECTION INCLUDES
			1. Nonsag gunnable joint sealants.
			2. Joint backings and accessories.
			3. Owner-provided field quality control.
		2. RELATED REQUIREMENTS
			1. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.
			2. Section 071300 - Sheet Waterproofing: Sealing cracks and joints in waterproofing substrate surfaces using materials specified in this section.
			3. Section 072500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
			4. Section 079513 - Expansion Joint Cover Assemblies: Sealants forming part of expansion joint cover assemblies.
			5. Section 081316.13 - Aluminum Terrace Doors: Field-testing of sealed joints at perimeter of door frames.
			6. Section 086300 - Metal-Framed Skylights: Structural and weatherseal sealants and accessories.
			7. Section 087100 - Door Hardware: Setting exterior door thresholds in sealant.
			8. Section 088000 - Glazing: Glazing sealants and accessories.
			9. Section 093000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.
			10. Section 233100 - HVAC Ducts and Casings: Duct sealants.
		3. REFERENCE STANDARDS
			1. ASTM Standards
				1. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015.
				2. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants 2018.
				3. ASTM C834 - Standard Specification for Latex Sealants 2017.
				4. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
				5. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2016.
				6. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
				7. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2008 (Reapproved 2012).
				8. ASTM C1311 - Standard Specification for Solvent Release Sealants 2014.
				9. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.
				10. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints 2013.
				11. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015e1.
				12. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016.
			2. SCAQMD 1168 - Adhesive and Sealant Applications 1989 (Amended 2017).
			3. Canadian General Standards Board (CGSB)
				1. CGSB 19-GP-5M-[1984], Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
				2. CAN/CGSB-19.13-[M87], Sealing Compound, One-component, Elastomeric, Chemical Curing.
				3. CGSB 19-GP-14M-[1984], Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
				4. CAN/CGSB-19.17-[M90], One-Component Acrylic Emulsion Base Sealing Compound.
				5. CAN/CGSB-19.24-[M90], Multi-component, Chemical Curing Sealing Compound.
			4. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
				1. Safety Data Sheets (SDS).
		4. SUBMITTALS
			1. See Section 013000 - Administrative Requirements, for submittal procedures.
			2. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
				1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
				2. List of backing materials approved for use with the specific product.
				3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
				4. Substrates the product should not be used on.
				5. Substrates for which use of primer is required.
				6. Substrates for which laboratory adhesion and/or compatibility testing is required.
				7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
				8. Sample product warranty.
				9. Certification by manufacturer indicating that product complies with specification requirements.
			3. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
			4. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
			5. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
			6. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation as specified in Section 016116.
			7. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
			8. Installation Plan: Submit at least four weeks prior to start of installation.
			9. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
			10. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
			11. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
			12. Installation Log: Submit filled out log for each length or instance of sealant installed.
			13. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
		5. DELIVERY, STORAGE AND HANDLING
			1. Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
			2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
			3. Storage and Handling Requirements:
				1. Store materials indoors, off ground, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
				2. Store and protect joint sealants from nicks, scratches, and blemishes.
				3. Replace defective or damaged materials with new
			4. Develop Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 35 21 - LEED Requirements.
		6. SITE CONDITIONS
			1. Ambient Conditions:
				1. Proceed with installation of joint sealants only when:

Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

Joint substrates are dry.

Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

* + - 1. Joint-Width Conditions:
				1. Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
			2. Joint-Substrate Conditions:
				1. Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.
		1. QUALITY ASSURANCE
			1. Maintain one copy of each referenced document covering installation requirements on site.
			2. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
			3. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
			4. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
			5. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
				1. Adhesion Testing: In accordance with ASTM C794.
				2. Compatibility Testing: In accordance with ASTM C1087.
				3. Stain Testing: In accordance with ASTM C1248; required only for stone substrates.
				4. Allow sufficient time for testing to avoid delaying the work.
				5. Deliver to manufacturer sufficient samples for testing.
				6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
				7. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
			6. Installation Plan: Include schedule of sealed joints, including the following.
				1. Joint width indicated in Contract Documents.
				2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
				3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
				4. Approximate date of installation, for evaluation of thermal movement influence.
				5. Installation Log Form: Include the following data fields, with known information filled out.

Unique identification of each length or instance of sealant installed.

Location on project.

Substrates.

Sealant used.

Stated movement capability of sealant.

Primer to be used or indicate as "No primer" used.

Size and actual backing material used.

Date of installation.

Name of installer.

Actual joint width; provide space to indicate maximum and minimum width.

Actual joint depth to face of backing material at centerline of joint.

Air temperature.

* + - 1. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
				1. Identification of testing agency.
				2. Name(s) of sealant manufacturers' field representatives who will be observing
				3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.

Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.

Test date.

Location on project.

Sealant used.

Stated movement capability of sealant.

Test method used.

Date of installation of field sample to be tested.

Date of test.

Copy of test method documents.

Age of sealant upon date of testing.

Test results, modeled after the sample form in the test method document.

Indicate use of photographic record of test.

* + - 1. Field Quality Control Plan:
				1. Visual inspection of entire length of sealant joints.
				2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.

For each different sealant and substrate combination, allow for one test every 12 inches (305 mm) in the first 10 linear feet (3 linear meters) of joint and one test every 24 inches (610 mm) thereafter.

If any failures occur in the first 10 linear feet (3 linear meters), continue testing at 12 inchs (305 mm) intervals at no extra cost to Owner.

* + - * 1. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.

For each different sealant and substrate combination, allow for one test every 100 feet (30 meters) in the first 1000 linear feet (305 linear meters), and one test per 1000 linear feet (305 meters) thereafter, or once per floor on each elevation.

If any failures occur in the first 1000 linear feet (305 linear meters), continue testing at frequency of one test per 500 linear feet (152 linear meters) at no extra cost to Owner.

* + - * 1. Field testing agency's qualifications.
				2. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
			1. Field Adhesion Test Procedures:
				1. Allow sealants to fully cure as recommended by manufacturer before testing.
				2. Have a copy of the test method document available during tests.
				3. Take photographs or make video records of each test, with joint identification provided in the photos/videos; for example, provide small erasable whiteboard positioned next to joint.
				4. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
				5. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer and report any deficiencies.
				6. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
				7. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
			2. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
				1. Record results on Field Quality Control Log.
				2. Repair failed portions of joints.
			3. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
				1. Sample: At least 18 inchs (457 mm) long.
				2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch (25 mm) by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
				3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.
				4. Record results on Field Quality Control Log.
				5. Repair failed portions of joints.
			4. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.
		1. WARRANTY
			1. See Section 017800 - Closeout Submittals, for additional warranty requirements.
			2. Correct defective work within a five years period after Date of Substantial Completion.
			3. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

* + 1. MANUFACTURERS
			1. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
				1. ADFAST [www.adfastcorp.com](file:///%5C%5CAPPS%5CDocuments_Technique%5Csection%20de%20devis%5CAdfast%20spec%5CEN%5Cwww.adfastcorp.com)
				2. DOW
				3. TREMCO
		2. JOINT SEALANT APPLICATIONS
			1. Scope:
				1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.

Wall expansion and control joints.

Joints between door, window, and other frames and adjacent construction.

Joints between different exposed materials.

Openings below ledge angles in masonry.

Other joints indicated below.

* + - * 1. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.

Joints between door, window, and other frames and adjacent construction.

Other joints indicated below.

* + - * 1. Do not seal the following types of joints.

Intentional weepholes in masonry.

Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.

Joints where sealant is specified to be provided by manufacturer of product to be sealed.

Joints where installation of sealant is specified in another section.

Joints between suspended panel ceilings/grid and walls.

* + - 1. ​Type 1 – ​Expansion Joints: Use non-sag ​non-staining silicone​ sealant, class 100/50 unless otherwise indicated.
			2. ​Type 2 - ​Exterior Joints: Use non-sag ​silicone​ sealant, class 50 unless otherwise indicated.
			3. Type 3 - Interior Wet Areas: ​Bathrooms, restrooms, kitchens, food service areas, food processing areas and fixtures in wet areas include ​plumbing fixtures, food service equipment, countertops, cabinets, HVAC or other similar items.
			4. Type 4 – Exterior Paintable Joints: Use non-sag Silyl-Terminated ​Polyether (STPE) sealant, class 50 unless otherwise indicated.
			5. Type 5 - Interior food service areas, food processing areas and fixtures in wet areas include plumbing fixtures, food service equipment, cleanrooms, countertops, cabinets, HVAC or other similar items.
			6. Type 6 – Interior non-moving joints that may-be painted such as doors and windows perimeter.
		1. JOINT SEALANTS - GENERAL
			1. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
			2. Colors: As indicated on drawings.
		2. NONSAG JOINT SEALANTS
			1. ​Type 1 - ​Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M, A, G, O; not expected to withstand continuous water immersion or traffic.
				1. Movement Capability: ​Plus and minus 100/50 percent​, minimum.
				2. Non-Staining To Porous Stone: Non-staining to light-colored ​natural stone​ when tested in accordance with ASTM C1248.
				3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
				4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
				5. Color: Match adjacent finished surfaces.
				6. Color: To be selected by Architect from manufacturer's standard range.
				7. Cure Type: ​neutral​.
				8. Service Temperature Range: Minus 20 to 180 degrees F (Minus 29 to 82 degrees C).
				9. Manufacturers:

**ADFAST; ADSEAL LM 4600 Series**

**DOW; Dowsil 790**

**TREMCO; Spectrem 1**

* + - 1. ​Type 2 - ​Silicone Sealant: ASTM C920, Grade NS, Uses M, A, G, O; not expected to withstand continuous water immersion or traffic.
				1. Movement Capability: ​Plus and minus 50 percent​, minimum.
				2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
				3. Color: To be selected by Architect from manufacturer's standard range.
				4. Cure Type: Single-component, neutral moisture curing
				5. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
				6. Manufacturers:

**ADFAST; ADSEAL Production 4580 Series**

**DOW; Dowsil 795**

**TREMCO; Spectrem 2**

* + - 1. ​Type 3 - ​Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses G, A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
				1. Color: White.
				2. Manufacturers:

**ADFAST; ADSEAL KB 4800 Series**

**DOW; Dowsil 786**

**TREMCO; Tremsil 200**

* + - 1. ​Type 4 - ​Tamper-Resistant, Silyl-Terminated ​Polyether (STPE) Sealant: ASTM C920, Grade NS, Uses M, A, G, O; single component; not expected to withstand continuous water immersion or traffic.
				1. Movement Capability: ​Plus and minus 50 percent​, minimum
				2. Hardness Range: ​30 to 50​, Shore A, when tested in accordance with ASTM C661.
				3. Color: To be selected by Architect from manufacturer's standard range.
				4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
				5. Manufacturers:

**ADFAST; ADSEAL DWSP 1940 Series**

**TREMCO; Dymonic FC**

* + - 1. Type 5 - Silicone Sealant: ASTM C920, Grade NS, Uses M, A, G, O; not expected to withstand continuous water immersion or traffic.
				1. Movement Capability: Plus and minus 50 percent, minimum.
				2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
				3. Color: To be selected by Architect from manufacturer's standard range.
				4. Cure Type: Single-component, neutral moisture curing
				5. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
				6. Meets ASTM E84 (flame spread index = 0 / smoke development index = 20)
				7. Manufacturers:

**ADFAST; Adseal Production 4550**

* + - 1. Type 6 - Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
				1. Manufacturers:

**ADFAST; Adseal DWM 1090**

**TREMCO; Tremlex 834**

* + - 1. Flexible Polyurethane Foam: Single-component, gun grade, and low-expanding.
				1. Color: White or Champagne.
				2. Manufacturers:

**ADFAST; Adfoam Flex 1865**

**ADFAST; Adfoam 1825**

**HILTI; CF812**

* + 1. ACCESSORIES
			1. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
				1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
				2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
				3. Open Cell: 40 to 50 percent larger in diameter than joint width.
				4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
				5. Manufacturers:

**ADFAST; Adseal Backer Rod-SR2600**

**ADFAST; Adseal Backer Rod-ST2400**

* + - 1. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
	1. PART 3 EXECUTION
		1. EXAMINATION
			1. Verify that joints are ready to receive work.
			2. Verify that backing materials are compatible with sealants.
			3. Verify that backer rods are of the correct size.
			4. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
				1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
				2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.
				3. Arrange for sealant manufacturer's technical representative to be present during tests.
				4. Record each test on Preinstallation Adhesion Test Log as indicated.
				5. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
				6. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.
		2. PREPARATION
			1. Remove loose materials and foreign matter that could impair adhesion of sealant.
			2. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
			3. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
			4. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
		3. INSTALLATION
			1. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
			2. Perform installation in accordance with ASTM C1193.
			3. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
			4. Install bond breaker backing tape where backer rod cannot be used.
			5. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
			6. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
			7. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
		4. FIELD QUALITY CONTROL
			1. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
			2. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Architect immediately.
			3. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet (300 linear m), notify Architect immediately.
			4. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
			5. Repair destructive test location damage immediately after evaluation and recording of results.
		5. POST-OCCUPANCY
			1. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.
	2. END OF SECTION