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SECTION 07 92 00 - JOINT SEALANTS

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
       2. SUMMARY
          1. Section Includes:

Edit list below to correspond to Project requirements after editing Parts 2 and 3.

Silicone joint sealants.

Preformed silicone joint sealants and molded silicone cruciforms.

* + - 1. PRECONSTRUCTION TESTING

Preconstruction compatibility and adhesion testing in first paragraph below is performed off-site by sealant manufacturer. Tests require many Samples, and some tests require four weeks to complete. If retaining, also retain "Preconstruction Compatibility and Adhesion Test Reports" Paragraph in "Informational Submittals" Article.

Tremco recommends retaining below for larger scale projects.

* + - * 1. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

Submit not fewer than **[eight]** pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.

Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

Retain subparagraph below if generic test data are acceptable. Testing in paragraph below is performed on-site, either on field-constructed mock-ups or on actual construction, but far enough in advance of sealant work to allow curing of sealants and retesting if necessary. If retaining, also retain "Preconstruction Field-Adhesion Test Reports" Paragraph in "Informational Submittals" Article. Tremco recommends retaining below on all projects; field-adhesion testing is required for obtaining Tremco warranty.

* + - * 1. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

Locate test joints where indicated on Project or, if not indicated, as directed by Architect.

Conduct field tests for each application indicated below:

Each kind of sealant and joint substrate indicated.

Notify Architect seven days in advance of dates and times when test joints will be erected.

Retain first subparagraph below if required. Before retaining, determine availability of manufacturer's representative.

Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

First method in first subparagraph below is the first of four test methods recommended in Appendix X1.1 to ASTM C 1193. Second method is one of two destructive test methods recommended in ASTM C 1521. Revise if another test method is more appropriate for Project joint conditions.

Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

* + - 1. ACTION SUBMITTALS
         1. Product Data: For each joint-sealant product indicated.
         2. **Samples for Initial Selection**: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

Delete "Samples for Initial Selection" Paragraph above if colors and other characteristics are preselected and specified or scheduled. Retain first paragraph below with or without above.

Tremco recommends that Architect make color selections in the field during field-adhesion testing where actual sealant colors can be compared to installed materials.

* + - * 1. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
        2. Joint-Sealant Schedule: Include the following information:

Joint-sealant application, joint location, and designation.

Joint-sealant manufacturer and product name.

Joint-sealant color.

* + - 1. INFORMATIONAL SUBMITTALS

Coordinate first paragraph below with qualification requirements in Division 01 Section "Quality Requirements" and as supplemented in "Quality Assurance" Article.

Retain Qualification Data requirement for testing agency when Contractor is responsible for retaining agency.

* + - * 1. Qualification Data: For qualified Installer Retain first paragraph below for product certificates from manufacturers.
        2. **Product Certificates**: For each kind of joint sealant and accessory, from manufacturer.

Retain first paragraph below if retaining subparagraph requiring testing to obtain SWRI validation in "Quality Assurance" Article.

Tremco exterior silicone sealants are SWRI certified.

* + - * 1. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
        2. **Product Test Reports**: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

Correlate test reports in first two paragraphs below with testing requirements in "Preconstruction Testing" Article.

* + - * 1. **Preconstruction Compatibility and Adhesion Test Reports**: From sealant manufacturer, indicating the following:

Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

* + - * 1. **Preconstruction Field-Adhesion Test Reports**: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

Correlate test reports in first paragraph below with testing requirements in "Field Quality Control" Article.

* + - * 1. **Field-Adhesion Test Reports**: For each sealant application tested.
        2. Warranties: Sample of special warranties.
      1. QUALITY ASSURANCE
         1. Installer Qualifications: A firm with minimum [three] years of experience installation of specified products in successful use on similar projects, including a full-time on-site supervisor with a minimum of [three] years of experience installing similar work, able to communicate verbally with a contractor, [architect,] and employees.
         2. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
         3. Product Testing: Test joint sealants using a qualified testing agency.

Retain "Testing Agency Qualifications" subparagraph below when Contractor is responsible for retaining testing agency.

Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

* + - * 1. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

Retain paragraph below if Work of this Section is extensive or complex enough to justify a preinstallation conference.

* + - * 1. **Preinstallation Conference**: Conduct conference at Project site.
      1. PROJECT CONDITIONS
         1. Do not proceed with installation of joint sealants under the following conditions:

When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.

When joint substrates are wet.

Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

* + - 1. WARRANTY
         1. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

Warranty Period: Two years from date of Substantial Completion.

* + - * 1. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

Warranty Period for Silicone Sealants: Twenty years from date of Substantial Completion.

* + - * 1. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.

Disintegration of joint substrates from natural causes exceeding design specifications.

Mechanical damage caused by individuals, tools, or other outside agents.

Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

1. PRODUCTS
   * + 1. MATERIALS, GENERAL
          1. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

Retain "VOC Content of Interior Sealants" Paragraph below if required for LEED-NC, LEED-CI, or LEED-CS Credit IEQ 4.1. Coordinate product selection in other Part 2 articles to be sure that products comply.

* + - * 1. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

Generally retain first paragraph below with silicones applied to porous substrates such as marble, limestone, granite, and sandstone.

Tremco recommends early testing for stain-test response; the test protocol required 56 days to complete.

* + - * 1. **Stain-Test-Response Characteristics**: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

Retain first paragraph below for applications where sealants will come in contact with food. Indicate on Drawings or by inserts which products must comply with this requirement.

Retain paragraph below if sealant colors are not specified in the Joint-Sealant Schedule in Part 3 or on Drawings.

Tremco recommends that Architect make color selections in the field during field-adhesion testing where actual sealant colors can be compared to installed materials under project lighting conditions. Note that Tremco offers field-tintable silicones for some applications. If custom pre-tinted sealants are required, allow at least 4 weeks lead time.

* + - 1. SILICONE JOINT SEALANTS

Tremco **Spectrem 1** is an ultra low-modulus, high-performance, one-part, moisture-curing silicone joint sealant. It has exceptional physical properties, making it an ideal sealant for sealing the most demanding dynamically moving joints. This includes material having a high coefficient of linear expansion such as aluminum curtain walls, precast concrete panels, metal panels and window perimeters. Spectrem 1 is formulated for expansion, control, lap joints, and EIFS applications. It is compatible with Tremco Exo air barrier products, silicone rubber extrusions, and Proglaze ETA Engineered Transition Assembly.

**Tremco Spectrem 1** is an ultra low-modulus, high-performance, one-part, moisture-curing silicone joint sealant. It has exceptional physical properties, making it an ideal sealant for sealing the most demanding dynamically moving joints. This includes material having a high coefficient of linear expansion such as aluminum curtain walls, precast concrete panels, metal panels and window perimeters. Spectrem 1 is formulated for expansion, control, lap joints, and EIFS applications. It is compatible with Tremco Exo air barrier products, silicone rubber extrusions, and Proglaze ETA Engineered Transition Assembly.

* + - * 1. Single-Component, Nonsag, Non-Staining, Moisture-Curing Silicone Joint Sealant [**GS#\_\_**]: ASTM C 920, Type S, Grade NS, Class 100/50, Use NT, M, G, A, and O; SWRI validation.

Basis of Design Product: **Tremco, Inc., Spectrem 1**.

Hardness, ASTM C 661: 15 durometer Shore A, minimum.

Volatile Organic Compound (VOC) Content: 1 g/L maximum.

Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.

Color: [As scheduled] [As selected by Architect from manufacturers full line of not less than 12] [Match Architect's custom color].

Specifier: Tremco Spectrem 2 is a medium-modulus, one-part, high-performance, neutral-cure silicone sealant ideal for a variety of perimeter caulking and glazing applications. Its basic uses include: two-sided structural glazing; perimeter and weather seals; cap, heel and toe beads; curtain wall and window joints. Spectrem 2 may be used on aluminum, glass, steel, painted metal, plastic, stone, concrete and brick. It exhibits primerless adhesion to many common building materials.

* + - * 1. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant [**SJS#**\_\_]: ASTM C 920, Type S, Grade NS, Class 50, Use NT; SWRI validated.

Basis of Design Product: **Tremco, Inc., Spectrem 2**.

Volatile Organic Compound (VOC) Content: 50 g/L maximum.

Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.

Color: As selected by Architect from manufacturer's standard line of not less than 10 colors.

Specifier: **Tremco Proglaze SSG** is a one-part, high-modulus, neutral cure silicone sealant ideal for a wide variety of glazing applications. Proglaze SSG provides high-performance capabilities as well as an exceptionally fast cure. Proglaze SSG is designed to meet the stringent performance needs for both structural and protective glazing, in unitized curtainwall fabricating or in field glazed applications, Proglaze SSG offers fast through cure and exceptional tensile strength to meet requirements. Applications include 2 or 4 sided structural glazing; impact/hurricane applications including Miami/Dade protocol; force resistance including blast tested assemblies; and rigorous cap, heel, and toe-bead application. Consult Tremco representative for structural and protective glazing applications.

* + - * 1. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant [**GS#**\_\_]: ASTM C920, Type S, Grade NS, Class \_\_, Use NT; ASTM C 1184.

Basis of Design Product: **Tremco, Inc., Proglaze SSG**.

Tensile Strength, ASTM D 412: 350 psi (2.4 MPa), at 100 percent elongation.

Tear Strength, ASTM D 624: 67 pli (11.7 kN/m).

Peel Strength, ASTM C 794: 60 pli (10.5 kN/m).

Hardness, ASTM C 661: 40 durometer Shore A, minimum.

Volatile Organic Compound (VOC) Content: 14 g/L maximum.

Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.

Color: Black.

Specifier: **Tremco Spectrem 3** is a general-purpose, low-modulus, high performance, one-part, neutral-cure, non-staining, low dirt pickup, construction-grade silicone sealant. Spectrem 3’s patented chemistry has been specifically formulated to seal porous stone, EIFS, metal panels, masonry and pre-cast concrete joints. Its features include: low polar attraction to dirt; extremely low stain potential; low-modulus and low Shore A hardness; primerless adhesion to most porous substrates; extended tooling time and workability in high temperatures; low-VOC, zero solvent content; and matte finish.Specifier:

* + - * 1. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant [**SJS#**\_\_]: ASTM C 920, Type S, Grade NS, Class 50, Use NT.

Basis of Design Product: **Tremco, Inc., Spectrem 3**.

Volatile Organic Compound (VOC) Content: 20 g/L maximum.

Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.

Color: As selected by Architect from manufacturer's standard line of not less than 15 colors.

Specifier: **Spectrem 4TS** is a multi-component, neutral-curing, nonstaining, low dirt pick up, low-modulus silicone sealant specially formulated for use in dynamically moving building joints with +/- 50 percent movement. Spectrem 4-TS offers excellent performance in moving joints. Spectrem 4-TS is the only silicone available offering color flexibility, with the opportunity to tint the material on site. Spectrem 4-TS does not require a primer on most construction materials and exhibits tenacious adhesion once fully cured. Typical applications for Spectrem 4-TS include: EIFS, expansion and control joints, tilt-up panel joints, precast concrete panel joints, and perimeter caulking (windows, door, panels).

* + - * 1. Multi-Component, Nonsag, Non-Staining, Field-Tintable Neutral-Curing Silicone Joint Sealant [**SJS#**\_\_]: ASTM C 920, Type M, Grade NS, Class 50, Use NT; SWRI validated.

Basis of Design Product: **Tremco, Inc., Spectrem 4-TS**.

Volatile Organic Compound (VOC) Content: 20 g/L maximum.

Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.

Color: [Match Architect's custom color] [As selected by Architect from manufacturer's standard line of not less than 70 colors].

* + - 1. PREFORMED JOINT SEALANTS
         1. Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

Specifier: **Spectrem Simple Seal** is an ultra-low modulus preformed silicone tape extrusion specifically designed to have high elongation properties that can be bonded to a wide range of substrates with Tremco Spectrem 1 to provide a waterproof seal. Spectrem Simple Seal is designed for both new construction and restoration work involving window perimeter and EIFS joints, parapet walls, skylights, aluminum window seals, transition seals, curtain wall joints, sheet metal roof joints, and other lap joints. Tremco Spectrem Simple Seal is designed for both new construction and restoration work involving window perimeter, EIFS joints, parapet walls, skylights, aluminum window seals, transition seals, curtain wall joints, sheet metal roof joints and other lap joints.

* + - * 1. Preformed Silicone Joint Seals [**PS#1**]: Manufacturer's standard seal consisting of precured low-modulus silicone extrusion, in sizes to fit applications indicated on Drawings, combined with a neutral-curing liquid silicone sealant for bonding seals to substrates.

Basis of Design Product: **Tremco, Inc.; Spectrem Simple Seal**

Shore A hardness ASTM D2240: 29-32

Tensile strength ASTM D412: 218 psi

Elongation at break ASTM D412: 554%

Movement classification ASTM C1523: Class 200%

Tear propagation classification ASTM C1523: PT (partial tear)

Specifier: **Tremco Silicone Dense Rubber Extrusions** are extruded and fabricated into gaskets and accessories (such as setting blocks, spacers and shims) for use in sealing and glazing applications in building construction. Custom color matching is available. Tremco Silicone Dense Rubber Extrusions are manufactured to work with existing metal designs or custom developed with custom metal systems at the design development stage. Many profiles are available depending upon existing metal requirements.

* + - * 1. Preformed Silicone Joint Seals [PS#2]: Manufacturer's standard seal consisting of precured low-modulus silicone extrusion, in sizes to fit applications indicated on Drawings, combined with a neutral-curing liquid silicone sealant for bonding seals to substrates.

Basis of Design Product: **Tremco, Inc.; Silicone Dense Rubber Extrusions**

Ozone Resistance, 100 mPa 100 hr @ 104 °F (40 °C) 20% Elongation ASTM D1149: No cracks

Brittleness Temperature at 40°F (-40°C): Pass

Four products characterized by hardness (durometer)

Shore “A” hardness ASTM D2240: 40 durometer

Compression set ASTM D395, 22 hour @ 212°F, Ozone resistance, 100mPa ASTM D395: 13.8%

Tensile strength ASTM D412: 1060 psi (7.3 MPa)

Elongation at rupture ASTM D412: 323%

Tear strength ASTM D624: 120 lb/in (21 kN/m)

Shore “A” hardness ASTM D2240: 60 durometer

Compression set ASTM D395, 22 hour @ 212°F, Ozone resistance, 100mPa ASTM D395: 12.5%

Tensile strength ASTM D412: 1139 psi (7.8 MPa)

Elongation at rupture ASTM D412: 235%

Tear strength ASTM D624: 107 lb/in (18.7 kN/m)

Shore “A” hardness ASTM D2240: 70 durometer

Compression set ASTM D395, 22 hour @ 212°F, Ozone resistance, 100mPa ASTM D395: 11%

Tensile strength ASTM D412: 1075 psi (7.4 MPa)

Elongation at rupture ASTM D412: 167%

Tear strength ASTM D624: 121 lb/in (21.2 kN/m)

Shore “A” hardness ASTM D2240: 80 durometer

Compression set ASTM D395, 22 hour @ 212°F, Ozone resistance, 100mPa ASTM D395: 12.9%

Tensile strength ASTM D412: 1095 psi (7.6 MPa)

Elongation at rupture ASTM D412: 113%

Tear strength ASTM D624: 92 lb/in (16.1 kN/m)

* + - 1. JOINT SEALANT BACKING
         1. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

Retain one of three type options in first paragraph below; if retaining more than one, also retain fourth option. Type B products include "Sof Rod" by Nomaco and "Sonolastic Soft Backer Rod" by BASF Building Systems. Verify with joint-sealant manufacturers the suitability of each material for sealants selected. Type O sealant backings, which are open-cell urethane foams, are unsuitable for horizontal surfaces. See Evaluations.

* + - * 1. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type B (bicellular material with a surface skin)  or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
        2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.
        3. Pre-Compressed Impregnated Foam Tape:

Specifier: **Tremco illmod 600** is a pre-compressed, self-expanding, flexible joint seal that is designed to protect against wind-driven rain, sound, draft and dust. It is comprised of polyurethane foam with a flame-retardant, modified acrylic resin and treated with a pressure-sensitive adhesive on one side for easy installation. After positioning, the material self-expands to fill the void and create a permanently elastic, weathertight seal. illmod 600 is used as an exterior or interior joint sealant in applications above grade. It can be used as a primary seal in vertical and a secondary seal in horizontal applications. illmod 600 is acceptable for use in joints in pre-cast and tilt-up concrete, masonry, metal roofing panels, and EIFS.

Preformed Foam Joint Seals [**PS#3**]: Manufacturer's standard preformed, pre-compressed, open-cell foam seal manufactured from urethane foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m), impregnated with water-repellent agent. Provide factory-produced pre-compressed sizes selected to fit joint widths; coated on one side with a pressure-sensitive adhesive.

Basis of Design Product: **Tremco, illmod 600**.

Thermal conductivity ASTM C 518: .28-0.30 BTU-in/hr-°F-ft2

Thermal resistance ASTM C 518: 3.3-3.6 hr-°F-ft2/BTU

Frame spread ASTM E84: 0

Smoke development ASTM E84: 5

Volatile Organic Compound (VOC) Content: 0 g/L maximum.

Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

Color: Black or Grey.

Specifier: **ExoAir® Eco** is a pre-compressed, unique acrylic-impregnated, flexible polyurethane tape that is designed to expand to create a vapor permeable, UV stable, weathertight seal. ExoAir Eco can be utilized in exposed or hidden applications to seal against wind and driving rain. It can also be used in horizontal and vertical transom window joint connections. ExoAir Eco can be installed onto vinyl, wood, concrete, aluminum, fiberglass, and a variety of other construction materials. ExoAir Eco is used in combination with a variety of other products to create T3 Solutions.ExoAir® Eco is a pre-compressed, unique acrylic-impregnated, flexible polyurethane tape that is designed to expand to create a vapor permeable, UV stable, weathertight seal.

Preformed Foam Joint Seals [**PS#2**]: Manufacturer's standard preformed, precompressed, open-cell foam seal manufactured from urethane foam impregnated with water-repellent agent. Provide factory-produced precompressed sizes selected to fit joint; coated on one side with a pressure-sensitive adhesive.

Basis of Design Product: **Tremco Inc., ExoAir® Eco**

Resistance to driving rain ASTM E331: 2.86 psf (137 Pa)

Overall heat transfer R Value ASTM C518-10: minimum R value 3.1 in-1

Flame spread ASTM E84: 0

Smoke development ASTM E84: 5

Specifier: **ExoAir® Trio** is a pre-compressed, multi-functional, flexible, air-tight polyurethane tape for sealing joints. ExoAir Trio’s unique acrylic impregnation creates a hydrophobic, UV stable, flame retardant joint seal. ExoAir Trio is typically used within joints around doors and windows but can also be used in a variety of other areas that require a weathertight, vapor permeable, and thermally efficient transition. ExoAir Trio can be installed onto vinyl, wood, concrete, aluminum, fiberglass, and a variety of other construction materials.ExoAir® Trio is a pre-compressed, multi-functional, flexible, air-tight polyurethane tape for sealing joints. ExoAir Trio’s unique acrylic impregnation creates a hydrophobic, UV stable, flame retardant joint seal.

Preformed Foam Joint Seals [**PS#2**]: Manufacturer's standard preformed, precompressed, open-cell foam seal manufactured from urethane foam impregnated with water-repellent agent. This foam sealant has an extra layer of impregnation that acts as a vapor retarder. Provide factory-produced precompressed sizes selected to fit joint; coated on one side with a pressure-sensitive adhesive.

Basis of Design Product: **Tremco Inc., ExoAir® Trio**

Flammability class: B2 (normal flammability)

Overall heat transfer R Value ASTM C518-10: minimum R value 3.1 in-1

Coefficient of diffusional resistance EN 150 12572: μ < 100

Water vapor permeability ASTM E96: 28 perms at 70°F (21°C) and 50% RH

Windload cycling (before ASTM E2357) ASTM E283: 0.0014 cfm/ft2 at 75 Pa

Windload cycling (after ASTM E2357) ASTM E283: 0.0017 cfm/ft2 at 75 Pa

Flame spread ASTM E84: 5

Smoke development ASTM E84: 150

* + - 1. MISCELLANEOUS MATERIALS
         1. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
         2. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
         3. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

1. EXECUTION
   * + 1. EXAMINATION
          1. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
          2. Proceed with installation only after unsatisfactory conditions have been corrected.
       2. PREPARATION
          1. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Remove laitance and form-release agents from concrete.

Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

* + - * 1. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
        2. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.
      1. INSTALLATION OF JOINT SEALANTS
         1. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
         2. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
         3. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

Do not leave gaps between ends of sealant backings.

Do not stretch, twist, puncture, or tear sealant backings.

Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

* + - * 1. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
        2. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

Place sealants so they directly contact and fully wet joint substrates.

Completely fill recesses in each joint configuration.

Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

* + - * 1. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

Remove excess sealant from surfaces adjacent to joints.

Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.

Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

Use masking tape to protect surfaces adjacent to recessed tooled joints.

Retain first paragraph below if preformed silicone sealants are retained in Part 2.

Retain first paragraph below if preformed foam sealants are retained in Part 2.

Retain first paragraph below if acoustical sealants are retained in Part 2.

* + - 1. FIELD QUALITY CONTROL

Revise first paragraph below if Owner engages an independent testing agency to perform tests. Testing described below is generally required by sealant manufacturer if warranty is required. Tremco recommends retaining and editing requirements below for larger scale projects.

* + - * 1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

Extent of Testing: Test completed and cured sealant joints as follows:

First two subparagraphs below are examples only. Revise to suit Project.

Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.

First method in first subparagraph below is the first of four test methods recommended in Appendix X1.1 to ASTM C 1193. Second method is one of two destructive test methods recommended in ASTM C 1521. Revise if another test method is more appropriate for Project joint conditions.

Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

Inspect tested joints and report on the following:

Whether sealants filled joint cavities and are free of voids.

Whether sealant dimensions and configurations comply with specified requirements.

Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

* + - * 1. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.
      1. CLEANING
         1. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
      2. PROTECTION
         1. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.
      3. JOINT SEALANT SCHEDULE
         1. Glazing-Sealant Application: Exterior joints in glazing systems JS-#1.

Joint Locations:

Aluminum to aluminum joints.

Concrete to aluminum joints.

Other joints as indicated.

Silicone Glazing Sealant: Single component, nonsag, neutral curing, Class 100/50

Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

* + - * 1. Glazing-Sealant Application: Exterior joints in glazing systems JS-#2.

Joint Locations:

Glazing cap and weather beads

Other joints as indicated.

Silicone Glazing Sealant: Single component, nonsag, neutral curing, Class 50 .

Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

* + - * 1. Glazing-Sealant Application: Exterior joints in glazing systems JS-#3.

Joint Locations:

Joints between aluminum.

Other joints as indicated.

Silicone Glazing Sealant: Preformed silicone seal.

Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00