

Tremco, Inc. Commercial Sealants and Waterproofing

Section 07 01 91 JOINT SEALANTS REHABILITATION AND REPLACEMENT

Specifier: This section includes sealants for exterior joint sealant rehabilitation including silicone, urethane, and preformed joint sealants, along with administrative and execution requirements specific to the rehabilitation or replacement of existing joint sealants. The section utilizes a joint sealant schedule at the end of Part 3 to specify the type of sealant used for each joint; Edit the joint sealant schedule first. Then edit Part 2 to include the description of each sealant product used in the schedule. For limited scope projects, the joint sealant schedule may be omitted and application notes added to the selected sealants in Part 2.

This section is readily edited utilizing several common commercial specification software tools.

We recommend you consult with your Tremco construction technical representative, who can be contacted through: Tremco, Inc., Commercial Sealants and Waterproofing Division, Beachwood OH; (866) 321-6357; email: techresources@tremcoinc.com; www.tremcosealants.com.

Tremco joint sealant products appear in the following CSI MasterFormat specifications sections:

- Section 07 92 00 Joint Sealants
- Section 08 85 00 Glazing Sealants
- Section 32 13 73 Concrete Paving Joint Sealants

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SECTION 07 01 91 - JOINT SEALANTS REHABILITATION AND REPLACEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes rehabilitation and replacement of exterior [glazing and] weatherproofing sealants.

1.2 RELATED REQUIREMENTS

Specifier: If retaining this optional Related Requirements Article, edit to include only those sections included in project manual.

1. Division 01 Section "Sustainable Design Requirements" for additional requirements, including [LEED-related] documentation requirements.
2. Section 07 18 00 "Traffic Coatings" for traffic joint sealants applied as part of a traffic coating application.
3. Section 07 24 00 "Exterior Insulation and Finish Systems" for joint sealants [and compound system warranty for EIFS and joint sealants] used with EIFS rehabilitation.

1.3 REFERENCES

Specifier: If retaining this optional References Article, edit to include only those references cited in the edited section.

- A. References, General: Versions of the following cited standards current as of the date of issue of the project apply to the Work of this Section.
- B. ASTM International (ASTM): www.astm.org:
1. ASTM C 510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
 2. ASTM C 661 - Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
 3. ASTM C 719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 4. ASTM C 794 - Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 5. ASTM C 920 - Specification for Elastomeric Joint Sealants.
 6. ASTM C 1193 - Guide for Use of Joint Sealants.
 7. ASTM C 1247 - Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.
 8. ASTM C 1248 - Test Method for Staining of Porous Substrate by Joint Sealants.
 9. ASTM C 1311 - Specification for Solvent Release Sealants.
 10. ASTM C 1330 - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
 11. ASTM C 1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
 12. ASTM D 412 - Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
 13. ASTM D 624 - Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 14. ASTM D 2203 - Standard Test Method for Staining from Sealants.
 15. ASTM D 2240 - Test Method for Rubber Property - Durometer Hardness.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI): www.swrionline.org:
1. SWRI Validation Program.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of joint sealants with cleaning of joint sealant substrates and other operations that may impact installation or finished joint sealant work.
- B. Preinstallation Conference: Conduct conference at Project Site.

1.5 PRECONSTRUCTION TESTING

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

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of joint sealant product specified, including:
1. Preparation instructions and recommendations.

Retain "LEED Submittals" paragraph below and edit to suit project if envelop rehabilitation work is part of LEED-EB certification application or certification continuation.

- A. LEED Submittals:
 - 1. Product Data for LEED EB Credit MR 3 "Optimize Use of IAQ-Compliant Products:" For insulation materials, adhesives, and sealants, documentation including printed statement of VOC content.
- B. Samples for Color Selection: For each joint sealant type.
- C. Samples for Verification: For each exterior joint sealant product, for each color selected.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and qualified applicator.
- B. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- C. Preconstruction field-adhesion test reports.
- D. Field quality control adhesion test reports.
- E. Warranty: Sample of unexecuted manufacturer and installer special warranties.

1.8 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience with record of successful product in-service use.
 - 1. Single Source Responsibility: Provide exterior joint sealants by a single manufacturer responsible for testing of Project substrates to verify compatibility and adhesion of joint sealants.
- B. 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.
- C. Manufacturer Qualifications: A qualified manufacturer [listed in this Section] with minimum five years of experience in manufacture of waterproofing as one of its principal products.

Specifier: Retain "Mockups" paragraph if scope or complexity of Project warrant additional expense.

- D. Mockups: Provide joint sealant application mockup identical to specified joint sealants and installation methods, installed by Project personnel.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Accept materials on site in manufacturer's unopened original packaging.

- B. Store primers and sealants in dry location with ambient temperature range of 60 to 80 deg. F (15 to 27deg. C).

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install joint sealants during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
 - 1. Do not install primers or sealants when atmospheric temperatures or joint surface temperatures are less than 40 deg. F (4 deg. C).
 - 2. Do not install sealant when temperature is less than 5 deg F (3 deg C) below dew point.

1.11 SCHEDULING

- A. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.

1.12 FIELD CONDITIONS

Specifier: Existing joint sealant and backer materials may contain hazardous materials such as asbestos. Consult with Owner regarding testing of existing materials. If required, retain and modify one of two paragraphs below.

First paragraph is appropriate when affected materials have been tested by Owner and found to not contain hazardous materials; second paragraph is for use when work includes removal of materials that contain or may contain hazardous materials.

- A. Hazardous Materials: Testing has indicated that materials to be removed or rehabilitated do not contain hazardous materials.
 - 1. If suspected hazardous materials are encountered, do not disturb materials, and immediately notify Architect and Owner.
- B. Hazardous Materials: Testing has indicated that materials to be removed or rehabilitated may contain hazardous materials.
 - 1. Owner will remove hazardous materials prior to start of work.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except as part of remediation processes.
 - 3. Hazardous material remediation is specified elsewhere in the Contract Documents.

1.13 WARRANTY

Specifier: Tremco and Dryvit offer a compound warranty for EIFS systems when Tremco Spectrem 1, 3, or 4 silicone sealants are used for Dryvit joints. Independent third party inspection is required for some Dryvit systems as a warranty condition. Coordinate warranty requirements with Section 07 24 00. See www.dryvit.com for Dryvit warranty information.

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that demonstrate deterioration or adhesive or cohesive failure under normal use within warranty period specified.
 - 1. Warranty Period for Silicone Sealants: [Five] years date of Substantial Completion.

Specifier: Coordinate Installer's warranty provisions with requirements for Contractor's period for correction of work, which is frequently extended from one year to two or more years for components of the exterior weather envelope.

- B. Special Installer's Warranty: Original statement on Installer's letterhead in which Installer agrees to repair or replace joint sealants that demonstrate deterioration or failure within warranty period specified.
 - 1. Warranty Period: [Two] years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates exceeding design specifications.
 - 3. Mechanical damage caused by outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Specifier: Retain option for substitutions below and edit if required for project.

- A. Basis-of-Design Products: Provide joint sealant products manufactured by **Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company**, Beachwood OH; (866) 321-6357; email: techresources@tremcoinc.com; www.tremcosealants.com, [or comparable products of other manufacturer approved by Architect in accordance with Instructions to Bidders and Division 01 General Requirements].

2.2 MATERIALS, GENERAL

Specifier: Requirements in Sustainability Requirements paragraph below are required for LEED projects and may be required to meet owner- or code- stipulated sustainability requirements. Edit to comply with Project requirements.

- A. Sustainability Requirements: Provide thermal and moisture protection materials as follows:
 - 1. Provide adhesives and sealants with a VOC content complying with VOC content less than that allowed under South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
 - 2. GREEN GUARD Certification
- B. Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C1087 testing and related experience.

- C. Joint Sealant Standard: Comply with ASTM C 920 and other specified requirements for each joint sealant.
- D. Stain Test Characteristics: Where sealants are required to be nonstaining, provide sealants tested per ASTM C 1248 as non-staining on porous joint substrates specified.

Specifier: ASTM C920 Joint Sealant Use Types, Grades, Classes, and Uses that are used in reference specifications below are as follows:
Type S: Single component
Type M: Multi-components
Grade P: Pourable
Grade NS: Non-sag
Class XX: Movement capability, percent
Class XX/YY: Movement capability, percent, expansion/contraction
Exposure Use T: Traffic
Exposure Use NT: Non-traffic
Substrate Use G: Glass
Substrate Use M: Mortars
Substrate Use A: Aluminum
Substrate Use O: Other

2.3 SILICONE GLAZING SEALANTS

If retaining Silicone Glazing Sealants Article in this Section, coordinate with content of affected Division 08 sections and provide cross references to this Article.

- A. General: Refer to Section 08 80 00 "Glazing" for general requirements for application of glazing sealants.

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. Consult Tremco representative for structural glazing applications.

- B. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant [**GS#**__]: ASTM C 920, Type S, Grade NS, Class 50, Use NT; SWRI validated.
 - 1. Basis of Design Product: **Tremco, Inc., Spectrem 2.**
 - 2. Tensile Strength, ASTM D 412: 220 psi (1.5 MPa), at 100 percent elongation.
 - 3. Tear Strength, ASTM D 624: 35 pli (6.1 kN/m).
 - 4. Peel Strength, ASTM C 794: 30 pli (5.2 kN/m).
 - 5. Hardness, ASTM C 661: 37 durometer Shore A, minimum.
 - 6. Volatile Organic Compound (VOC) Content: 44 g/L maximum.
 - 7. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 - 8. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
 - 9. 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

- C. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant [**GS#**__]: ASTM C 920, Type S, Grade NS, Class 25, Use NT; ASTM C 1184.
1. Basis of Design Product: **Tremco, Inc., Proglaze SSG.**
 2. Tensile Strength, ASTM D 412: 350 psi (2.4 MPa), at 100 percent elongation.
 3. Tear Strength, ASTM D 624: 67 pli (11.7 kN/m).
 4. Peel Strength, ASTM C 794: 60 pli (10.5 kN/m).
 5. Hardness, ASTM C 661: 40 durometer Shore A, minimum.
 6. Volatile Organic Compound (VOC) Content: 14 g/L maximum.
 7. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 8. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
 9. Color: Black.

Specifier: **Proglaze® II** is a multi-component, high-modulus silicone sealant consisting of a white base and a black curing agent that, when mixed through a pump, cures to a tough, flexible rubber. Basic Uses Proglaze II is developed specifically for in-plant, 2- and 4-sided structural glazing and curtain wall applications where shortened cure time reduces glazing/sealing production time. All structural glazing applications must be reviewed and approved by Tremco Technical Services.

- D. Multi-Component, Nonsag, Non-Staining, Silicone Joint Sealant [**GS#**__]: Conforms to ASTM C920 Type M Grade NS, Class 25, Use NT, G and A. U.S. Federal Specification TT-S-00227E Class A, and Type II. Conforms to ASTM C1184, Use G and O (aluminum)
1. Basis of Design Product: **Tremco, Inc., Proglaze II.**
 2. Tensile Strength, ASTM D 412: 200-210 psi (1.37 to 1.44 MPa)
 3. Tear Strength, ASTM D 624: 45-50 pli (7.88 to 8.76 kN/m).
 4. Hardness, ASTM C 661: 40-45 durometer Shore A
 5. Ultimate Tensile Strength, ASTM C1135: 118 psi (.81 Mpa)
 6. Ultimate Elongation, ASTM C1135: 158%
 7. Volatile Organic Compound (VOC) Content: 0 g/L maximum.
 8. Color: Black.

2.4 SILICONE JOINT SEALANTS

Specifier: **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.

- A. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant [**SJS#**___]: ASTM C 920, Type S, Grade NS, Class 100/50, Use NT; SWRI validated.

1. Basis of Design Product: **Tremco, Inc., Spectrem 1.**
2. Volatile Organic Compound (VOC) Content: 1 g/L maximum.
3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.
5. Color: As selected by Architect from manufacturer's standard line of not less than 12 colors.

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.

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

1. Basis of Design Product: **Tremco, Inc., Spectrem 2.**
2. Volatile Organic Compound (VOC) Content: 50 g/L maximum.
3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.
5. Color: As selected by Architect from manufacturer's standard line of not less than 10 colors.

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.

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

1. Basis of Design Product: **Tremco, Inc., Spectrem 3.**
2. Volatile Organic Compound (VOC) Content: 20 g/L maximum.
3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
5. Color: As selected by Architect from manufacturer's standard line of not less than 15 colors.

Specifier: **Tremco Spectrem 4-TS** 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).

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

1. Basis of Design Product: **Tremco, Inc., Spectrem 4-TS.**
2. Volatile Organic Compound (VOC) Content: 20 g/L maximum.
3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
5. Color: [Match Architect's custom color] [As selected by Architect from manufacturer's standard line of not less than 70 colors].

2.5 URETHANE JOINT SEALANTS

Specifier: **Dymonic 100 High Performance, High Movement Polyurethane Sealant** is a high performance, medium-modulus, low-VOC, UV-stable, non-sag polyurethane sealant. Dymonic 100 has the unique ability to adhere to damp and green concrete. It has a movement capability of +100/-50 percent, is paintable and will not crack, craze or yellow under extreme UV exposure. It is also jet fuel resistant. Basic uses include expansion and control joints; precast concrete panel joints; perimeter caulking (windows, door, panels); aluminum, masonry and vinyl siding. Dymonic 100 is compatible with Tremco's line of Vulkem deck coatings, ExoAir barrier products and TREMProof line of cold, fluid-applied waterproofing products. It is approved for incidental food contact.

A. Single-Component, Nonsag, Moisture-Cure, Polyurethane Hybrid Joint Sealant [**UJS#**__]: ASTM C 920, Type S, Grade NS, Class 50, Use NT; Greenguard certified.

1. Basis of Design Product: **Tremco, Inc., Dymonic 100.**
2. Volatile Organic Compound (VOC) Content: 40 g/L maximum.
3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Tensile Strength ASTM D412: 350 to 450 psi
5. Percent Elongation ASTM D412: 800 to 900%
6. Modulus at 100% ASTM D412: 75 to 85 psi
7. Tear Strength ASTM D412: 65 to 75 psi
8. Smoke Development ASTM E84: 5
9. Color: As selected by Architect from manufacturer's standard line of not less than 20 colors.

Specifier: **Tremco Dymonic FC** is a low-modulus, one-component, moisture-cure, polyurethane hybrid sealant. Dymonic FC is formulated with proprietary silane end-capped polymer technology. It provides the best performance characteristics of polyurethane and silicone sealants. It is a durable, flexible, sealant that offers excellent performance in moving joints and exhibits tenacious adhesion once fully cured. Typical applications for Dymonic FC

include: expansion and control joints, precast concrete panel joints, perimeter caulking (windows, door, panels), EIFS, aluminum, masonry and vinyl siding. DymonicFC is fast curing with a skin time of 60 minutes and a tack-free time of 3-4 hours to significantly reduce dirt pickup. It will not green crack due to early movement and has an exceptional movement capability of ± 35 percent. Dymonic FC is also low-VOC, paintable and will not crack or craze under UV exposure.

- B. Single-Component, Nonsag, Moisture-Cure, Polyurethane Hybrid Joint Sealant [**UJS#**__]: ASTM C 920, Type S, Grade NS, Class 35, Use NT; Greenguard certified.
1. Basis of Design Product: **Tremco, Inc., Dymonic FC.**
 2. Volatile Organic Compound (VOC) Content: 10 g/L maximum.
 3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 4. Color: As selected by Architect from manufacturer's standard line of not less than 15 colors.

Specifier: **Tremco Dymonic** is a high-performance, low-modulus, one-component, moisture-curing, polyurethane joint sealant. Dymonic has a movement capability of $\pm 25\%$ of the original joint width, making it ideal for dynamically moving joints. It is available in 16 standard colors with several additional made-to-order colors. Dymonic is specifically designed for sealing expansion and control joints in pre-cast tilt-up concrete, curtain wall joints and perimeter caulking around windows and doors. It can also be used for radon mitigation and bedding of mullions and frames. Dymonic exhibits tenacious adhesion, which will not diminish over product life.

- C. Single-Component, Nonsag, Polyurethane Joint Sealant [**UJS#**__]: ASTM C 920, Type S, Grade NS, Class 25, Use NT; SWRI validated.
1. Basis of Design Product: **Tremco, Inc., Dymonic.**
 2. Volatile Organic Compound (VOC) Content: 60 g/L maximum.
 3. Color: As selected by Architect from manufacturer's standard line of not less than 15 colors.

Specifier: **Tremco Vulkem 116** is a one-part, moisture-curing, gun-grade polyurethane sealant. It is durable, flexible, and offers excellent performance in dynamic joints. Vulkem 116 is an excellent general-purpose sealant designed for use on poured and precast concrete, masonry work, window and door perimeters, and similar types of construction joints. Vulkem 116 has a 30-year history of delivering superior primerless adhesion to porous substrates, which makes it the choice for sealing expansion joints in commercial construction applications. It is also suitable for certain water immersion applications and is rated for 25 percent movement capability. Vulkem 116 is approved for exterior use only.

- D. Single-Component, Nonsag, Polyurethane Joint Sealant [**UJS#**__]: ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Basis of Design Product: **Tremco, Inc., Vulkem 116.**
 2. Volatile Organic Compound (VOC) Content: 60 g/L maximum.
 3. Color: As selected by Architect from manufacturer's standard line of not less than 15 colors.

Specifier: **Tremco Vulkem 45 SSL** is a one-part, moisture-curing, low-modulus polyurethane sealant. It provides exceptional wear and tear resistance required in high traffic areas. Vulkem 45 SSL is a traffic rated, pourable, semi-self-leveling sealant with exceptional primerless adhesion and movement capability. It is suitable for continuous immersion in non-chlorinated water and can be applied to damp and green concrete. The technology in Vulkem 45 SSL provides the sealant with greater UV resistance and will not out-gas. Vulkem 45 SSL is formulated for use in expansion joints in sidewalks, swimming pool decks, plazas, floors and any other horizontal surface with slopes up to 6 percent (e.g. 1 in. rise for every 16 in. run).

- E. Immersible, Single-Component, Pourable, Traffic Grade Polyurethane Joint Sealant [**UJS#** ___]: ASTM C 920, Type S, Grade P, Class 50, Use T and I.
1. Basis of Design Product: **Tremco, Inc., Vulkem 45 SSL.**
 2. Volatile Organic Compound (VOC) Content: 110 g/L maximum.
 3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 4. Color: As selected by Architect from manufacturer's standard line of not less than 5 colors.

Specifier: **Tremco Vulkem 445SSL** is a two-part, moisture-curing, low-modulus polyurethane sealant with a tintable base and an array of 70 standard colors. It provides exceptional wear and tear resistance required in high traffic areas. Vulkem 445 SSL is a traffic rated, pourable, semi-self-leveling sealant with exceptional primerless adhesion and movement capability. It is suitable for continuous immersion in non-chlorinated water and can be applied to damp and green concrete. The technology in Vulkem 445 SSL provides the sealant with greater UV resistance and will not out-gas. Vulkem 445 SSL is formulated for use in expansion joints in sidewalks, swimming pool decks, plazas, floors and any other horizontal surface with slopes up to 6 percent (e.g. 1 in. rise for every 16 in. run).

- F. Immersible, Multi-Component, Pourable, Traffic-Grade Polyurethane Joint Sealant [**UJS#** ___]: ASTM C 920, Type M, Grade P, Class 35, Use T, O, and I.
1. Basis of Design Product: **Tremco, Inc., Vulkem 445SSL.**
 2. Tensile Strength, ASTM D 412: 250 psi (1.7 MPa), at 100 percent elongation.
 3. Tear Strength, ASTM D 412: 35 pli (6.1 kN/m).
 4. Adhesion to Concrete, After Water, ASTM C 794: 28 pli (4.4 kN/m)
 5. Hardness, ASTM C 661: 40 durometer Shore A, minimum.
 6. Accelerated Weathering, ASTM C 793: Pass.
 7. Volatile Organic Compound (VOC) Content: 106 g/L maximum.
 8. Color: As selected by Architect from manufacturer's standard line of 70 colors

Specifier: **Tremco Dymeric 240 FC** is a gun grade, multi-component, chemically curing, epoxidized polyurethane sealant that includes a tintable base, curative packet, and a choice of 70 standard colors; a Limestone pretinted version is available. Dymeric 240FC is an all around general-purpose sealant that provides flexible, long life and durable waterproofing for both new construction and restoration projects in a fast curing formulation. Applications range from pre-cast tilt-up concrete, masonry, and exterior insulating and finishing systems (EIFS), to metal curtain walls, and perimeter joints around doors and windows. Suitable for immersed use in non-chlorinated fountains and water features.

- G. Multi-Component, Non-sag, Polyurethane Joint Sealant [**UJS#**__]: ASTM C 920, Type M, Grade NS, Class 50, Use I.
1. Basis of Design Product: **Tremco, Inc., Dymeric 240 FC.**
 2. Volatile Organic Compound (VOC) Content: 0 g/L maximum.
 3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 4. Color: [Match Architect's custom color] [As selected by Architect from manufacturer's standard line of not less than 70 colors].

2.6 SOLVENT-RELEASE-CURING JOINT SEALANTS

Specifier: **Tremco Butyl Sealant** is formulated from a blend of butyl rubber and polyisobutylene to form an economical, flexible sealant. Tremco Butyl Sealant is used for sealing joints in applications such as curtainwall joints, metal panel joining, bedding thresholds, secondary glazing seals, and areas where a seal is required against Tremco Neoprene or EPDM gaskets. It features excellent primerless adhesion to most common substrates such as wood, metal, glass, concrete, and masonry surfaces; up to 10 percent movement capability; good, flexible exterior grade, weather resistant caulk performance. Butyl sealant is frequently specified for interior and exterior concealed joints within metal assemblies.

- A. Butyl-Rubber-Based Joint Sealant [**BJS#**__]: ASTM C1311.
1. Basis of Design Product: **Tremco, Inc., Tremco Butyl Sealant.**
 2. Volatile Organic Compound (VOC) Content: 250 g/L maximum.
 3. Color: As selected by Architect from manufacturer's standard colors.

2.7 PRE-FORMED SEALS

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.

- A. 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.
1. Basis of Design Product: **Tremco, Inc.; Spectrem Simple Seal**
 2. Shore A hardness ASTM D2240: 29-32
 3. Tensile strength ASTM D412: 218 psi
 4. Elongation at break ASTM D412: 554%
 5. Movement classification ASTM C1523: Class 200%
 6. Tear propagation classification ASTM C1523: PT (partial tear)

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.

- B. Preformed Foam Joint Seals [**PS#2**]: Manufacturer's standard preformed, precompressed, 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 precompressed sizes selected to fit joint widths indicated on Drawings; coated on one side with a pressure-sensitive adhesive.
1. Basis of Design Product: **Tremco, illmod 600.**
 2. Thermal conductivity ASTM C 518: .28-0.30 BTU-in/hr-°F-ft²
 3. Thermal resistance ASTM C 518: 3.3-3.6 hr-°F-ft²/BTU
 4. Frame spread ASTM E84: 0
 5. Smoke development ASTM E84: 5
 6. Volatile Organic Compound (VOC) Content: 0 g/L maximum.
 7. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 8. Color: [Black] [Grey], paintable.
- C. Wall-to-Wall Expansion Joint [**PS#3**]: Preformed cellular foam.
1. Basis-of-Design Product: **Tremco, Inc., Vulkem 255 FM.**
 2. Design Criteria:
 - a. Nominal, Minimum, and Maximum Joint Widths: As indicated on Drawings.
 - b. Movement Capability: -25 percent/+75 percent.
 - c. Type of Movement: As indicated on Drawings.
 - d. Fire-Resistance Rating: Provide expansion control system and fire-barrier assembly with a rating not less than that of adjacent construction.
 - e. Color: As selected by Architect from manufacturer's full range.

2.8 JOINT SEALANT ACCESSORIES

- A. Cylindrical Sealant Backing: ASTM C 1330, Type B non-absorbent, bi-cellular material with surface skin, or Type O open-cell polyurethane, as recommended by sealant manufacturer for application.
- B. Bond Breaker Tape: Polymer tape compatible with joint sealant and adjacent materials and recommended by sealant manufacturer.
- C. Joint Substrate Primers: Substrate primer recommended by sealant manufacturer for application.
- D. Cleaners: Chemical cleaners acceptable to joint sealant manufacturer.
- E. Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

Specifier: Retain one of two "Examination of Existing Joint Sealants" paragraphs below based on project requirements. First paragraph is for project where scope of joint replacement is indicated in Contract Documents. Second paragraph is for use for cost plus fee project or with unit prices with Contractor indicating extent of proposed joint sealant replacement on shop drawing submittal.

- A. Examination of Existing Joint Sealants: Examine existing joint sealants indicated to be replaced or rehabilitated. Examine joints for compliance with requirements for joint configuration, installation tolerances, condition of joint substrate, and other conditions affecting joint-sealant performance.
- B. Examination of Existing Joint Sealants: Examine existing joint sealants and indicate extent of joint sealant replacement and rehabilitation on shop drawings. Examine joints for compliance with requirements for joint configuration, installation tolerances, condition of joint substrate, and other conditions affecting joint-sealant performance.
- C. Submit report indicating conditions that cannot be corrected to comply with joint sealant manufacturer's recommendations as part of the specified joint replacement or rehabilitation. Proceed with work once non-complying conditions are corrected.

3.2 JOINT PREPARATION

Specifier: Existing failed organic sealants must be completely removed and replaced. Existing silicone weatherseals may not need to be completely removed; recapping may be acceptable. If failed joints are to be covered with preformed silicone seals, existing sealant and backing does not need to be removed. Require field samples prior to approving recapping.

- A. Removal of Failed Joint Sealant Materials: Cut out and remove joint materials and associated backing materials as indicated on drawings[and identified during pre-installation conference].
- B. Surface Cleaning of Joint Substrates: Clean joints thoroughly immediately before installing joint sealants. Remove 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.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods in addition to solvent cleaning 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.
 - 2. Clean porous and 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.
- C. Preparation of Joint Sealants to be Recapped: Clean existing silicone sealant that is sufficiently adhered and not mechanically damaged to prepare for recapping. Use two-cloth solvent wipe in accordance with ASTM C 1193.

- D. Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.
- E. Joint Backing: Select joint backing materials recommended by sealant manufacturer as compatible with sealant and adjacent materials. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.

Specifier: Joints must be sized and detailed to allow for the recommended width/depth ratio of the sealed joint based on anticipated joint movement and construction tolerances. Design joint to minimum of 4 times anticipated movement to accommodate construction tolerances and expected movement based on coefficient of thermal expansion.

- 1. Install joint backing to maintain the following joint ratios:
 - a. Joints up to 1/2 inch (13 mm) wide: 1:1 width to depth ratio.
 - b. Joints greater than 1/2 inch (13 mm) wide: 2:1 width to depth ratio; maximum 1/2 inch (13 mm) joint depth.
- 2. Install bond breaker tape over substrates when sealant backings are not used.

3.3 INSTALLATION OF JOINT SEALANTS

- A. Sealant and Primer Installation Standard: Comply with ASTM C 1193 and manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.
- C. Joint Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.
 - 1. Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.
 - 2. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
 - 3. Tool exposed joint surface concave using tooling agents approved by sealant manufacturer for application.
- D. Cleaning: Remove excess sealant using materials and methods approved by sealant manufacturer that will not damage joint substrate materials.
 - 1. Remove masking tape immediately after tooling joint without disturbing seal.
 - 2. Remove excess sealant from surfaces while still uncured.

3.4 INSTALLATION OF PREFORMED SILICONE SEALS

Specifier: Retain this article if existing sealant joint is to be covered and sealed with **Tremco, Inc. Spectrem SimpleSeal** preformed seal.

- A. Primer: Apply primer to substrates determined by manufacturer's recommended adhesion test to require primer. Apply in accordance with manufacturer's instructions.

Specifier: **Tremco, Inc.; Spectrem SimpleSeal** is installed by bonding extrusion to joint substrate with silicone sealant such as **Spectrem 1** or **Spectrem 2**.

- B. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
1. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead 1/4 inch (6 mm) inside masking tape.
 2. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 3. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
- C. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- D. Foam Seals: Install with adhesive recommended by manufacturer.
- E. Complete horizontal joints prior to vertical joints. Lap vertical seal over seal on horizontal joint.

3.5 FIELD QUALITY CONTROL

- A. [Retain] [Owner may retain] testing agency to perform the following tests:
1. Verification that substrate preparation meets requirements.
 2. Testing and certification that joint sealant materials comply with requirements.
 3. Testing of application for compliance with adhesion requirements.
- B. Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C 1193, Method A.
1. Perform [5] tests for the first [1000 feet (300 m)] of joint length for each kind of sealant and joint substrate, and one test for each [1000 feet (300 m)] of joint length thereafter or 1 test per each floor per building elevation, minimum.
 2. For sealant applied between dissimilar materials, test both sides of joint.
- C. Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.
- D. Submit report of field adhesion testing to Architect indicating tests, locations, dates, results, and remedial actions taken.

Specifier: Edit sealant schedules below to reflect Project requirements. Delete construction items not required for Project. Identify joint sealant products by description and by identifier used in Part 2 once edited. Coordinate color requirements; certain Tremco Sealants can be custom matched for particular color requirements, while others are available in an array of standard colors only.

3.6 EXTERIOR JOINT-SEALANT SCHEDULE

- A. Exterior construction joints in [cast-in-place] [and] [tilt-up] concrete.

Specifier: Recommended products are Spectrem 1, Spectrem 2, Spectrem 3 and Spectrem 4-TS, or Dymonic 100, Dymonic FC, and Vulkem 116.

1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant [**SJS#**__].
3. Joint Sealant: Single-component non-sag urethane sealant [**UJS#**__].
4. Joint-Sealant Color: [As selected by Architect from manufacturer's standard colors] [Approved custom match to substrate sample].

- B. Exterior movement joints in concrete unit masonry.

Specifier: Recommended products are Spectrem 1, Spectrem 2, Spectrem 3 and Spectrem 4-TS, or Dymonic 100, Dymonic FC, and Vulkem 116.

1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant [**SJS#**__].
3. Joint Sealant: Single-component non-sag urethane sealant [**UJS#**__].
4. Joint-Sealant Color: [As selected by Architect from manufacturer's standard colors] [Approved custom match to substrate sample].

- C. Exterior movement joints in brick masonry.

Specifier: Recommended products are Spectrem 1, Spectrem 2, Spectrem 3 and Spectrem 4-TS, or Dymonic 100, Dymonic FC, and Vulkem 116.

1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant [**SJS#**__].
3. Joint Sealant: Single-component non-sag urethane sealant [**UJS#**__].
4. Joint-Sealant Color, Vertical Joints: [As selected by Architect from manufacturer's standard colors] [Approved custom match to brick at vertical joints].
5. Joint-Sealant Color, Horizontal Joints: [As selected by Architect from manufacturer's full range] [Approved custom match to mortar at horizontal joints].

- D. Exterior movement joints in stone masonry.

Specifier: Recommended products are Spectrem 1, Spectrem 2, Spectrem 3 and Spectrem 4-TS, or Dymonic 100, Dymonic FC, and Vulkem 116.

1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
2. Joint Sealant: Single-component non-sag urethane sealant [**UJS#**__].
3. Joint-Sealant Color: [As selected by Architect from manufacturer's standard colors] [Approved custom match to mortar].

- E. Exterior joints within exterior insulation finish systems (EIFS).

Specifier: Recommended products are Spectrem 1, Spectrem 3, and Spectrem 4-TS, or Dymonic FC.

1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant [**SJS#**__].
3. Joint Sealant: Single-component non-sag urethane sealant [**UJS#**__].
4. Joint-Sealant Color: [As selected by Architect from manufacturer's standard colors] [Approved custom match to EIFS colors].

F. Exterior exposed joints in metal panel cladding systems.

Specifier: Recommended products are Spectrem 1, Spectrem 3 and Spectrem 4-TS.

1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant [**SJS#**__].
3. Joint-Sealant Color: [As selected by Architect from manufacturer's standard colors] [Approved custom match to substrate sample].

G. Exterior joints between different materials listed above.

Specifier: Recommended products are Spectrem 1, Spectrem 2, Spectrem 3 and Spectrem 4-TS or Dymonic 100 and Dymonic FC.

1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant [**SJS#**__].
3. Joint Sealant: Single-component non-sag urethane sealant [**UJS#**__].
4. Joint-Sealant Color: [As selected by Architect from manufacturer's standard colors] [Approved custom match to substrate sample] [Multiple colors required to match several conditions].

H. Exterior perimeter joints at frames of doors, windows, storefront frames, curtain wall frames, and louvers.

Specifier: Recommended products are Spectrem 1, Spectrem 2, Spectrem 3 and Spectrem 4-TS or Dymonic 100 and Dymonic FC.

1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant [**SJS#**__].
3. Joint Sealant: Single-component non-sag urethane sealant [**UJS#**__].
4. Joint-Sealant Color: [As selected by Architect from manufacturer's standard colors] [Approved custom match to substrate sample] [Multiple colors required to match several conditions].

Specifier: Retain paragraph below if glazing sealants are specified in Division 08 Section "Glazing Sealants."

DIVISION 07 – THERMAL AND MOISTURE PROTECTION
SECTION 07 01 91 – JOINT SEALANTS REHABILITATION AND REPLACEMENT

- I. Exterior joints within structural glazing, aluminum storefront framing, curtain walls, and window systems: Refer to Division 08 Section ["Glazing Sealants"] ["Structural-Sealant-Glazed Curtain Walls"].
- J. All other exterior non-traffic joints.

Specifier: Recommended products are Spectrem 1, Spectrem 2, Spectrem 3 and Spectrem 4-TS or Dymonic 100 and Dymonic FC.

- 1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant [**SJS#**__].
- 2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant [**SJS#**__].
- 3. Joint Sealant: Single-component non-sag urethane sealant [**UJS#**__].
- 4. Joint-Sealant Color: [As selected by Architect from manufacturer's standard colors] [Approved custom match to substrate sample] [Multiple colors required to match several conditions].

- K. Exterior horizontal traffic and traffic isolation joints:[Refer to Division 32 Section "Concrete Paving Joint Sealants"].

Specifier: Recommended product is Vulkem 45 SSL.

- 1. Joint Sealant: Single-component pourable urethane sealant [**UJS#**__].
- 2. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors.

END OF SECTION