

DIVISION 07: THERMAL AND MOISTURE PROTECTION

07 9000 JOINT PROTECTION

07 9213 ELASTOMERIC JOINT SEALANTS

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SECTION 07 9213**ELASTOMERIC JOINT SEALANTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install sealants not specified to be furnished and installed under other Sections.
 - 2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.
- B. Related Requirements:
 - 1. Furnishing and installing of sealants is specified in Sections specifying work to receive new sealants.

1.2 REFERENCES

- A. Association Publications:
 - 1. American Architectural Manufacturers Association (AAMA):
 - a. 'Voluntary Specifications and Test Methods for Sealants'.
 - 2. ASM International:
 - a. 'Adhesives and Sealants', Volume 3, ASM International Handbook Committee, (May 1999).
 - b. Committee C24 on Building Seals and Sealants for various Specifications, Guides, Test Methods, and Practices related to sealant specifying and application.
 - c. Committee E6 on Building Performance for various Specifications, Guides, Test Methods, and Practices related to sealant use with air barriers, vapor retarders, and exterior enclosure systems and materials.
 - 3. The Adhesive and Sealing Council, Inc. (ASC) / Sealant, Waterproofing & Restoration Institute (SWR Institute):
 - a. 'Sealants: The Professional's Guide'.
 - b. 'Joint Sealants, Whole Building Design Guide'.
- B. Definitions:
 - 1. Adhere: To cause two surfaces to be held together by adhesion.
 - 2. Adhesive: An adhesive, as defined by The American Society for Testing and Materials (ASTM), is 'a substance capable of holding materials together by surface attachment'.
 - 3. Caulk: Caulks have variety of definitions but are generally recognized as materials used in applications where only minor elastomeric properties are needed.
 - 4. Elastomer: Rubbery material which returns to approximately its original dimensions in short time after relatively large amount of deformation.
 - 5. Flow: Movement of adhesive during bonding process before adhesive is set.
 - 6. Joint: Location at which two substrates are held together with layer of adhesive.
 - 7. Primer: Coating applied to surface, prior to application of an adhesive, to improve performance of the bond.
 - 8. Sealant. Sealants are generally used in applications where elastic properties are needed while adhesives are generally used in applications where bonding strength and rigidity are needed. With technology advancements both sealants and adhesives can be used interchangeably depending on applications performance requirements.
 - 9. Sealant Types and Classifications:
 - a. ASTM Specifications:
 - 1) Type:
 - a) Type S: Single-component sealant.
 - b) Type M: Multi-component sealant.

- 2) Grade:
 - a) Grade P: Pourable or self-leveling sealant used for horizontal traffic joints.
 - b) Grade NS: Non-sag or gunnable sealant used for vertical and non-traffic joints.
- 3) Classes: Represent movement capability in percent of joint width.
 - a) Class 100/50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand of at least 100 percent increase and decrease of at least 50 percent of joint width as measured at time of application.
 - b) Class 50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 50 percent of joint width as measured at time of application.
 - c) Class 25: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 25 percent of joint width as measured at time of application.
 - d) Class 12: Sealant that, when tested for adhesion and cohesion under cyclic movement shall withstand increase and decrease of at least 12 percent of joint width as measured at time of application.
- 4) Use:
 - a) T (Traffic): Sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages.
 - b) NT (Non-Traffic): Sealant designed for use in joints in non-traffic areas.
 - c) I (Immersion): Sealant that meets bond requirements when tested by immersion (Immersion rated sealant applications require primer).
 - d) M (Mortar): Sealant that meets bond requirements when tested on mortar specimens.
 - e) G (Glass): Sealant that meets bond requirements when tested on glass specimens.
 - f) A (Aluminum): Sealant that meets bond requirements when tested on aluminum specimens.
 - g) O (Other): Sealant that meets bond requirements when tested on substrates other than standard substrates, being glass, aluminum, mortar.
- b. Federal Specifications:
 - 1) Type:
 - a) Type I: Self-leveling, pour grade.
 - (1) Compound which has sufficient flow to give smooth level surface when applied in horizontal joint at 40 deg F (4.4 deg C).
 - b) Type II: Non-sag, gun grade
 - (1) Compound which permits application in joints on vertical surfaces without sagging (slumping) at temperatures 40 deg F (4.4 deg C) and 122 deg. F (50 deg. C).
 - c) Type NS: Non-sag, gun grade.
 - (1) Non-sag shall be a compound which permits application in joints on vertical surfaces without sagging (slumping) at temperatures between -20 deg F and 122 deg. F (- 29 and 50 deg. C).
 - 2) Class:
 - a) Class A: Compounds resistant to 50 percent total joint movement (includes Type I and Type II).
 - (1) Capable of resisting compression-extension cycling of plus and minus 25 percent of nominal half inch width.
 - b) Class B: Compounds resistant to 25 percent total joint movement (includes Type I and Type II).
 - (1) Capable of resisting compression-extension cycling of plus and minus 12 1/2 percent of nominal half inch width.
10. Shelf Life: Period of time, usually beginning with date of manufacture, during which stored adhesive will remain effective or useful.
11. Silicone: Any member of family of polymeric products whose molecular backbone is made up of alternating silicon and oxygen atoms and which has pendant hydrocarbon groups attached to silicon atoms. Used primarily as a sealant. Offers excellent resistance to water and large variations in temperature (minus 100 deg F to + 600 deg F) (minus 73.3 deg C to + 316 deg C).
12. Stability: Ability of material to remain unchanged.

13. Storage Life: Period of time during which packaged adhesive can be stored under specified temperature conditions and remain suitable for use.
14. Substrate: Material upon surface of which an adhesive-containing substance is spread for any purpose, such as bonding or coating.
15. Surface Preparation: Physical and /or chemical preparation of substrate to render it suitable for adhesive joining. Same as substrate preparation or pre-bond preparation.
16. Toxicity: Material shall have no adverse effect on health of personnel when used for its intended purpose.

C. Reference Standards:

1. American Association of State and Highway Transportation Officials:
 - a. AASHTO T 132-87(2013), 'Standard Method of Test for Tensile Strength of Hydraulic Cement Mortars'.
2. ASTM International:
 - a. ASTM C639-01(2011), 'Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants'.
 - b. ASTM C661-15, 'Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer'.
 - c. ASTM C679-03(2009), 'Standard Test Method for Tack-Free Time of Elastomeric Sealants'.
 - d. ASTM C719-14, 'Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)'.
 - e. ASTM C793-05(2010), 'Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants'.
 - f. ASTM C794-15a, 'Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants'.
 - g. ASTM C920-14a, 'Standard Specification for Elastomeric Joint Sealants'.
 - h. ASTM C1135-00(2011), 'Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants'.
 - i. ASTM C1184-14, 'Standard Specification for Structural Silicone Sealants'.
 - j. ASTM C1193-13, 'Standard Guide for Use of Joint Sealants'.
 - k. ASTM C1248-08(2012), 'Standard Test Method for Staining of Porous Substrate by Joint Sealants'.
 - l. ASTM C1330-02(2013), 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
 - m. ASTM C1481-12 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
 - n. ASTM D412-06(2013), 'Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension'.
 - o. ASTM D2202-00(2014), 'Standard Test Method for Slump of Sealants'.
 - p. ASTM D2240-05(2010), 'Standard Test Method for Rubber Property-Durometer Hardness'.
 - q. ASTM D5893-10, 'Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements'.
 - r. ASTM E119-14, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.
3. Federal Specifications:
 - a. Federal Specification TT-S-001543A (CON-NBS), 'Sealing Compound: Silicone Rubber Base (for Calking, Sealing & Glazing in Buildings and Other Structures)' (9 Jun 1971).
 - b. TT-S-00230C (CON-NBS), 'Sealing compound: Elastomeric Type, Single Component (For Calking, Sealing, And Glazing In Buildings And Other Structures.' (2 Feb 1970).
4. Government Services Administration (GSA), Commercial Item Descriptions (CID):
 - a. GSA CID A-A-272A, 'Sealing Compound: Silicone Rubber Base (For Caulking, Sealing, and Glazing in Buildings and Other Structures)'.
 - b. GSA CID A-A-1556, 'Sealing Compound Elastomeric Type, Single Component (For Caulking, Sealing, and Glazing in Buildings and Other Structures)'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Scheduling:

1. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.
2. Ensure sealants are cured before covering with other materials.

1.4 SUBMITTALS

- A. Action Submittals:
 1. Product Data:
 - a. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - b. Manufacturer's literature for each Product.
 - c. Schedule showing joints requiring sealants. Show also backing and primer to be used.
- B. Informational Submittals:
 1. Certificates:
 - a. Manufacturer's Certificate:
 - 1) Certify products are suitable for intended use and products meet or exceed specified requirements.
 - 2) Certificate from Manufacturer indicating date of manufacture.
 2. Manufacturers' Instructions:
 - a. Manufacturer's installation recommendations for each Product.
 - b. Manufacturer's installation for completing sealant intersections when different materials are joined.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
 2. Applicator Qualifications:
 - a. Company specializing in performing work of this section.
 - b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity, and approved by manufacturer.
 - c. Designate one (1) individual as project foreman who shall be on site at all times during installation.
- B. Preconstruction Testing:
 1. Pre-construction testing is not required when sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.
- C. Mockups:
 1. Provide mockups including sealant and joint accessories to illustrate installation quality and color if requested by Architect or Project Manager.
 - a. Incorporate accepted mockup as part of Work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Deliver and keep in original containers until ready for use.
 2. Inspect for damage or deteriorated materials.
- B. Storage and Handling Requirements:
 1. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
 2. Handle to prevent inclusion of foreign matter, damage by water, or breakage.

3. Store in a cool dry location, but never under 40 deg F (4 deg C) or subjected to sustained temperatures exceeding 90 deg F (32 deg C) or as per Manufacturer's written recommendations.
4. Do use sealants that have exceeded shelf life of product.

1.7 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not install sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
2. Follow Manufacturer's temperature recommendations for installing sealants.

1.8 WARRANTY

A. Manufacturer Warranty:

1. Signed warranties against adhesive and cohesive failure of sealant and against infiltration of water and air through sealed joint for period of three (3) years from date of Substantial Completion.
 - a. Manufacturer's standard warranty covering sealant materials.
 - b. Applicator's standard warranty covering workmanship.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers:

1. Manufacturer Contact List:
 - a. Dow Corning Corp., Midland, MI www.dowcorning.com.
 - b. Franklin International, Inc. Columbus, OH www.titebond.com.
 - c. GE Sealants & Adhesives (see Momentive Performance Materials Inc.).
 - d. Laticrete International Inc., Bethany, CT www.laticrete.com.
 - e. Momentive Performance Materials Inc. (formerly GE Sealants & Adhesives), Huntersville, NC www.ge.com/silicones.
 - f. Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
 - g. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com or Sika Canada Inc, Pointe Claire, QC www.sika.ca.
 - h. Tremco, Beachwood, OH www.tremcosealants.com or Tremco Ltd, Toronto, ON (800) 363-3213.

B. Materials:

1. Design Criteria:
 - a. Compliance: Meet or exceed requirements of these standards:
 - 1) ASTM C920: Elastomeric joint sealant performance standard.
 - 2) ASTM C639 or ASTM D2202: Flow (sag or slump).
 - 3) ASTM C661 or ASTM D2240: Durometer hardness (shore A).
 - 4) ASTM C679 or ASTM C794: Tack free time (peel strength).
 - 5) ASTM C719: Joint movement capability.
 - 6) ASTM 793: Effects of accelerated weathering.
 - 7) ASTM C1135 or ASTM D412: Tensile adhesion strength.
 - 8) ASTM C1184: Structural silicone sealants.
 - 9) ASTM C1248: Staining.
 - 10) ASTM D412: Modulus.
 - 11) ASTM D5893: Silicone Joint Sealant for Concrete Pavements.
 - 12) Federal Specification TT-S-001543A.
 - 13) Federal Specification TT-S-00230C.
 - 14) GSA CID A-A-272A.

- 15) GSA CID A-A-1556.
 - b. Comply with Manufacturer's ambient condition requirements.
 - c. Sealants must meet Manufacturer's shelf-life requirements.
 - d. Sealants must adhere to and be compatible with specified substrates.
 - e. Sealants shall be stable when exposed to UV, joint movements, and particular environment prevailing at project location.
 - f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer. Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):
 - 1) Adhesion Test:
 - a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer's instructions. See 'Field Quality Control' in Part 3 of this specification for Adhesive Test.
 - 2) If Primer required, shall not stain and shall be compatible with substrates.
 - 3) Allow primer to dry before applying sealant.
2. Sealants At Exterior Building Elements:
 - a. Description:
 - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
 - a) Connections.
 - b) Louvers.
 - c) Wall penetrations.
 - d) Other joints necessary to seal off building from outside air and moisture.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.
 - 2) Limitations:
 - a) Do not use below-grade applications.
 - b) Do not use on surfaces that are continuously immersed or in contact with water.
 - c) Do not use on wet, damp, frozen or contaminated surfaces.
 - d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
 - 3) Color:
 - a) Architect to select from Manufacturer's standard colors.
 - b) Match building elements instead of window (do not use white that shows dirt easily).
 - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Dow Corning:
 - a) Primer: 1200 Prime Coat.
 - b) Sealant: 791 Silicone Weatherproofing Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
 - a) Primer: SS4044 Primer.
 - b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
 - 3) Tremco:
 - a) Primer:
 - (1) Metal surface: No. 20 primer.
 - (2) Porous surfaces: No. 23 primer.
 - b) Sealant: Spectrum 1 Silicone Sealant.
 3. General Interior Sealants:
 - a. General:
 - 1) Both sides of interior door frames.
 - 2) Miscellaneous gaps between substrates.
 - b. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
 - 2) 100 percent silicone sealant.
 - c. Non-Paintable Sealant (Installer Option A):
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.

- b) Laticrete: Latasil Silicone Sealant.
- c) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2800 SilGlaze II Silicone Sealant.
- d) Sherwin Williams: White Lightning Silicone Ultra Low Odor Window and Door Sealant.
- e) Tremco: Tremsil 200 Silicone Sealant.
- f) Franklin International: Titebond 2601 (White) 2611 (Clear) 100% Silicone Sealant.
- d. Paintable Sealant (Installer Option B):
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.

2.2 ACCESSORIES

- A. Bond Breaker Tape:
 - 1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
 - 2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
- B. Joint Backing:
 - 1. Comply with ASTM C1330.
 - 2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
 - 3. Oversized 25 to 50 percent larger than joint width.
- C. Joint Cleaner:
 - 1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.
- D. Masking Tape:
 - 1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 - 1. Examine substrate surfaces and joint openings are ready to receive Work.
 - a. Verify each sealant is compatible for use with joint substrates.
 - b. Verify joint surfaces are clean and dry.
 - c. Ensure concrete surfaces are fully cured.
 - 2. Sealants provided shall meet Manufacturer's shelf-life requirements.
 - 3. Notify Architect of unsuitable conditions in writing.
 - a. Do not proceed until unsatisfactory conditions are corrected.
 - 4. Commencement of Work by installer is considered acceptance of substrate.

3.2 PREPARATION

- A. Surface Preparation:
 - 1. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:
 - a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.

- b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
 - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
 - d. Primers:
 - 1) Primers enhance adhesion ability.
 - 2) Use of primers is not a substitution for poor joint preparation.
 - 3) Primers should be used always in horizontal application where there is ponding water.
 2. Field test joints in inconspicuous location.
 - a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
 - b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
 3. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.
- B. Joints:
1. Prepare joints in accordance with ASTM C1193.
 - a. Clean joint surfaces of contaminants capable of affecting sealant bond to joint surface using Manufacturer's recommended instructions for joint preparation methods.
 - b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
 - c. Clean concrete joint surfaces to remove curing agents and form release agents.
- C. Protection:
1. Protect elements surrounding the Work of this section from damage or disfiguration.

3.3 APPLICATION

- A. General:
1. Apply silicone sealant in accordance with Manufacturer's instructions.
 2. Do not use damaged or deteriorated materials.
 3. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions.
 4. Apply primer where required for sealant adhesion.
 5. Install sealants immediately after joint preparation.
 6. Do not use silicone sealant as per the following:
 - a. Apply caulking/sealant at temperatures below 40 deg F (4 deg C).
 - b. Below-grade applications.
 - c. Brass and copper surfaces.
 - d. Materials bleeding oils, plasticizers, and solvents.
 - e. Structural glazing and adhesive.
 - f. Surfaces to be immersed in water for prolonged time.
- B. Joint Backing:
1. Install joint backing to maintain sealant joint ratios recommended by Manufacturer.
 2. Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
 3. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch (9.5 mm) deep.
- C. Bond Breaker:
1. Install bond breaker where joint backing is not used or where backing is not feasible.
 - a. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.
- D. Sealant:
1. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.

2. Fill joint opening to full and proper configuration.
3. Apply in continuous operation.
4. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.
5. Depth of sealant bite shall be **1/4 inch (6 mm)** minimum and **1/2 inch (12.7 mm)** maximum, but never more than one half or less than one fourth joint width.

- E. Caulk gaps between painted or coated substrates and unfinished or pre-finished substrates. Caulk gaps larger than **3/16 inch (5 mm)** between painted or coated substrates.

3.4 TOLERANCES

- A. Provide joint tolerances in accordance with Manufacturer's printed instructions.

3.5 FIELD QUALITY CONTROL

- A. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).
1. Perform adhesion tests in accordance with Manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant joint Hand-Pull Tab:
 - a. Perform five (5) tests for first **1,000 linear feet (300 meters)** of applied silicone sealant and one (1) test for each **1,000 linear feet (300 meters)** seal thereafter or perform one (1) test per floor per building elevation minimum.
 - b. For sealants applied between dissimilar materials, test both sides of joints.
 2. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
 3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.6 CLEANING

- A. Remove masking tape and excess sealant.
- B. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.
- C. Waste Management: Dispose of products in accordance with manufacturer's recommendation.

**END OF SECTION
END OF DIVISION 07**