UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 01 17.61

SEALING CRACKS IN ASPHALT PAVING

05/17

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USACE / NAVFAC / AFCEC / NASA | **UFGS-32 01 17.61 (May 2017)**

Preparing Activity: USACE | **Superseding UFGS-32 01 17.16 (August 2008)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

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SECTION 32 01 17.61

SEALING CRACKS IN ASPHALT PAVING
05/17

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NOTE: This guide specification covers the requirements for sealing cracks in bituminous pavements.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

****

PART 1 GENERAL

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NOTE: For additional information concerning crack sealing of bituminous pavements see UFC 3-250-08FA "Standard Practice for Sealing Joints and Cracks in Rigid and Flexible Pavements."

****

1.1 UNIT PRICES

****

NOTE: Paragraphs Measurement and Payment will be deleted for lump sum bidding.

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1.1.1 Measurement

Determine the quantity of each sealing item to be paid for by actual measurement of the number of linear meters feet of in-place material that has been approved.

1.1.2 Payment

Payment will be made at the contract unit bid prices per linear meter foot for the sealing items scheduled. Include in the unit bid prices the cost of all labor, materials, and the use of all equipment and tools required to complete the work.

1.2 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C509	(2006; R 2015) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM D789	(2015) Determination of Relative Viscosity and Moisture Content of Polyamide (PA)
ASTM D6690	(2015) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

1.3 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals

required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Installation of Sealant

SD-04 Samples

Materials; G[, [_____]]

SD-06 Test Reports

Laboratory Tests

1.4 QUALITY ASSURANCE

Test the crack sealant and backup material, when required, for conformance with the referenced applicable material specification. [The materials will be tested by the Government. Submit samples of the materials [60] [_____] days prior to their use on the project. No material will be allowed to be used until it has been approved. The cost of the first test of samples will be borne by the Government. If the samples fail to meet

specification requirements, replace the materials represented by the sample and test the new materials at the Contractor's expense.] [Perform testing of the materials in an approved, independent laboratory; submit certified copies of the test reports for approval [_____] days prior to the use of the materials at the job site. Costs of the tests will be borne by the Contractor.] Submit reports of all tests. Samples will be retained by the Government for possible future testing, should the materials appear defective during or after application. Furnish samples of materials, in sufficient quantity to be tested upon request. Conformance with the test requirements of the laboratory tests specified will not constitute final acceptance of the materials. Final acceptance will be based on the performance of materials that have been satisfactorily installed.

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the job site for defects; unload, and store them with a minimum of handling to avoid damage. Provide storage facilities at the job site to protect materials from weather and maintain them at the temperatures recommended by the manufacturer.

1.6 EQUIPMENT, TOOLS, AND MACHINES

Equipment, tools, and machines used in performance of the work are subject to approval by the Contracting Officer. Maintain in a satisfactory working condition at all times.

1.6.1 Routing Equipment

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NOTE: Rotary impact routers that are equipped with vertical sided, carbide tipped bits have been used successfully to rout cracks in bituminous pavements. Impact routers that are not equipped with carbide tipped bits normally chip and damage the surrounding pavement and should not be permitted.

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Provide routing equipment which is a self-powered machine operating a power driven tool or bit specifically designed for routing bituminous pavements. Use a bit rotating about a vertical axis at sufficient speed to cut a smooth vertical-walled reservoir in the pavement surface and maintain accurate cutting without damaging the sides or top edges of the reservoir. Provide a router capable of following the trace of the crack without deviation. The use of rotary impact routing devices [will not be permitted for cleaning cracks.][may be permitted if vertical-sided carbide tipped bits are used.]

1.6.2 Concrete Saw

Provide a self-propelled power saw with small diameter (152 mm 6 inches or less) water-cooled diamond or abrasive saw blades for cutting cracks to the depths and widths specified and for removing filler that is embedded in the cracks or adhered to the crack faces. Use a saw blade with a diameter small enough to allow the saw to closely follow the trace of the crack.

1.6.3 Sandblasting Equipment

****

NOTE: Sandblasting of cracks may not be permitted under certain conditions. Blowing sand and dust may either violate atmospheric pollution statues, or may drift into areas where it would be objectionable. When sandblasting is prohibited, cleaning the cracks with waterblasting equipment or wire brushes may be substituted. If wire brushes are used, attention should be given to ensure that worn brushes are not used. Waterblasting equipment varies considerably with respect to design of wand, nozzle, water pressure, and water volume depending on the manufacturer. Consequently, the effectiveness of a particular set of equipment cannot be predicted. Care must be used with high pressure water to ensure that excessive damage to the sides of the crack does not occur. The Contractor should demonstrate its equipment to show that it will clean the crack satisfactorily before being allowed to proceed.

****

Include in the sandblasting equipment an air compressor, hose, and long-wearing venturi-type nozzle of proper size, shape and opening. Use a nozzle with a maximum opening not exceeding 6.4 mm 1/4 inch. Use air compressors that are portable and capable of furnishing not less than 0.071 cubic meters/second 150 cfm and maintaining a line pressure of not less than 621 kPa 90 psi at the nozzle while in use. Demonstrate compressor capability under job conditions before approval. Equip the compressor with traps that will maintain the compressed air free of oil and water. Use nozzle with an adjustable guide that will hold the nozzle aligned with the crack about 25 mm 1 inch above the pavement surface. Adjust the height, angle of inclination and the size of the nozzle as necessary to secure satisfactory results.

1.6.4 Waterblasting Equipment

Include with the waterblasting equipment a trailer-mounted water tank, pumps, high-pressure hose, wand with safety release cutoff control, nozzle, and auxiliary water resupply equipment. Use water tank and auxiliary resupply equipment with sufficient capacity to permit continuous operations. Use hoses, wands, and nozzles capable of cleaning the crack faces and the pavement surface on both sides of the crack for a width of at least 13 mm 1/2 inch beyong the crack. Use pump with a mounted pressure gauge that shows the pressure in kPa psi at which the equipment is operating at all times. Limit the pressure so that the sides of the crack are not damaged during the cleaning operation.

1.6.5 Hand Tools

****

NOTE: In areas that have cracks larger than 37 mm 1-1/2 inches, it may be necessary to employ other types of small tools to remove damaged asphalt or crack sealant material. Such tools should be carefully evaluated for potential damaging effects to adjacent pavement prior to approval for use. For sealing cracks in bituminous pavements, the Designer

is referred to UFC 3-250-08FA Standard Practice for Sealing Joints and Cracks in Rigid and Flexible Pavements.
****

Hand tools may be used, when approved, for removing defective sealant from cracks and repairing or cleaning the crack faces.

1.6.6 Crack Sealing Equipment

Provide unit applicators, used for heating and installing the hot-poured crack sealant materials, that are mobile and equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the crack to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. Allow the sealant to circulate through the delivery hose and return to the inner kettle when not in use, due to the applicator unit design.

1.7 ENVIRONMENTAL REQUIREMENTS

Apply the materials only when the ambient air temperature and the pavement temperature within the joint wall are at least 10 degrees C 50 degrees F and rising. Do not apply sealant if moisture is observed in the crack.

PART 2 PRODUCTS

2.1 SEALANTS

****
NOTE: Select crack sealants based on the proposed use and local experience. The local Department of Transportation (DOT) is an excellent resource for what materials are available and how well they have worked for the DOT.

If the bituminous pavement is covered by a fuel-resistant pavement sealer, the cracks should be sealed using the above mentioned sealants and then covered by a fuel-resistant pavement sealer. Fuel-resistant crack sealants should not be used in asphalt pavements for compatibility reasons.

Complete brackets in Table.
****

Provide sealants conforming to ASTM D6690, Type II or ASTM D6690, Type I. Use sealing materials for sealing cracks in the various paved areas indicated on the drawings as follows:

Area	Sealing Material
[_____]	[ASTM D6690, Type II]

Area	Sealing Material
[_____]	[ASTM D6690, Type I]

2.2 BACKER ROD MATERIALS

****
NOTE: The use of backer rod materials in bituminous pavements is to minimize waste of sealant material. Backer rod material is not required in cracks with a sealant reservoir depth of less than 20 mm 3/4 inch unless the crack width is sufficiently large resulting in excessive sealant being wasted.
****

Provide backer rod material that is a compressible, nonshrinking, nonstaining, nonabsorptive material and nonreactive with the crack sealant. Use backer rod with a melting point temperature of at least 2 degrees C 5 degrees F greater than the maximum pouring temperature of the sealant being used, when tested in accordance with ASTM D789. Use material that has a water absorption of not more than 5 percent by weight when tested in accordance with ASTM C509. Use backer rod material that is 25 percent (plus or minus 5 percent) larger in diameter than the nominal width of the crack.

PART 3 EXECUTION

3.1 PREPARATION OF CRACKS

****
NOTE: In bituminous pavements that have large quantities of hairline cracks or cracks less than 6 mm 1/4 inch, a bituminous fog coat or a bituminous seal coat should be used to prevent water intrusion into the base material. The Designer is referred to Technical Manual 5-624, Section 32 01 13.62 ASPHALT SURFACE TREATMENT and Section 32 12 36.13 BITUMINOUS SEAL AND FOG COAT. If the pavement being sealed is to receive a hot asphalt concrete overlay, then small cracks should not be sealed. Medium and large cracks can be filled or sealed but the top of the sealant should be below the pavement surface. Prior to the overlay, the cracks can be filled using a slurry mixture of sand and emulsion. It should be noted that this is a crack filler not a crack sealant; therefore, it should only be used when the pavement will receive an overlay. The cracks should be filled or sealed to a depth of 6 mm 1/4 inch below the pavement surface to prevent "bleeding" of the material through the overlay. If the cracks are overfilled, the sealant material will be tracked onto the pavement.
****

Immediately before the installation of the crack sealant, thoroughly dry and clean the cracks to remove oxidized pavement, loose aggregate and foreign debris. Prepare cracks as follows:

3.1.1 Cracks

3.1.1.1 Hairline Cracks

[Cracks that are less than 6 mm 1/4 inch wide do not need to be sealed.] [Seal cracks that are less than 6 mm 1/4 inch wide in accordance with Section [_____].]

3.1.1.2 Small Cracks

Route cracks that are 6 to 20 mm 1/4 to 3/4 inch wide to a nominal width 3 mm 1/8 inch greater than the existing nominal width and to a depth not less than 20 mm 3/4 inch, [sandblasted] [waterblasted] [wire brushed] and cleaned and dried using compressed air.

3.1.1.3 Medium Cracks

[Sandblast] [Waterblast] [Wire brush] cracks that are 20 to 50 mm 3/4 to 2 inches wide and clean and dry using compressed air.

3.1.1.4 Large Cracks

Repair cracks that are greater than 50 mm 2 inches wide using pothole repair techniques instead of sealing.

3.1.2 Existing Sealant Removal

****
NOTE: Delete this paragraph if the cracks have never been sealed in the past.
****

Cut loose the in-place sealant from both crack faces and to a depth shown on the drawings using a concrete saw or hand tools as specified in paragraph EQUIPMENT, TOOLS, AND MACHINES. Remove sealant to a depth sufficient to accommodate any backer rod material that is required to maintain the depth of new sealant to be installed. Prior to further cleaning operations, remove all old loose sealant remaining in the crack opening by blowing with compressed air.

3.1.3 Routing

Perform routing of the cracks using a rotary router with a bit that is at least 3 mm 1/8 inch wider than the nominal width of the crack to remove all residual old sealant (resealing), oxidized pavement and any loose aggregate in the crack wall.

3.1.4 Sawing

Perform sawing of the cracks using a power-driving concrete saw as specified in paragraph EQUIPMENT, TOOLS, AND MACHINES. Stiffen the blade as necessary with suitable dummy (or used) blades or washers. Immediately following the sawing operation, clean the crack opening using a water jet to remove all saw cuttings and debris.

3.1.5 [Sandblasting][Waterblasing]

[Sandblast][Waterblast] clean the crack faces and the pavement surfaces

extending a minimum of 13 mm 1/2 inch from the crack edges. Use a multiple-pass technique until the surfaces are free of dust, dirt, old sealant residue, or foreign debris that might prevent the sealant material from bonding to the asphalt pavement. After final cleaning and immediately prior to sealing, blow out the cracks with compressed air and leave them completely free of debris and water. Ensure that [sandblasting][waterblasting] does not damage the pavement.

3.1.6 Backer Rod Material

When required, use backer rod material in all cracks that otherwise would require excessive sealant. Insert the backer rod material into the lower portion of the crack as shown on the drawings. Place the backer rod so that the top of the backer rod is at least 19 mm 3/4 inch below the top of the pavement. Ensure that the backer rod material is placed at the specified depth and is not stretched or twisted during installation.

3.1.7 Rate of Progress of Crack Preparation

Limit the stages of crack preparation, which include routing, sandblasting of the crack faces, air pressure cleaning and placing of the backer rod material, to only that linear footage that can be sealed during the same day.

3.2 PREPARATION OF SEALANT

Do not heat hot-poured sealants in excess of the safe heating temperature recommended by the manufacturer, as shown on the sealant containers. Withdraw and waste sealant that has been overheated or subjected to application temperatures for over 4 hours or that has remained in the applicator at the end of the day's operation.

3.3 INSTALLATION OF SEALANT

Submit manufacturer's instructions [_____] days prior to the use of the material on the project. Installation of the material will not be allowed until the instructions are received.

3.3.1 Time of Application

Seal cracks immediately following final cleaning and drying of the crack walls and following the placement of the backer rod material (when required). Place sealant only when cracks are dry. Reclean cracks that cannot be sealed under the conditions specified, or when rain interrupts sealing operations, and allow to dry or dry by machanical means prior to installing the sealant.

3.3.2 Sealing the Crack

****

NOTE: Cracks should be slightly underfilled to preclude tracking the material onto the pavement surface. For airfield pavements, the sealant should be recessed 3 mm 1/8 inch below the pavement surface; for roads, streets and parking lots, the sealant should be recessed 6 mm 1/4 inch. For pavements that are to receive an overlay, the sealant should be recessed a minimum of 6 mm 1/4 inch and a maximum of 13 mm 1/2 inch below the pavement

surface.
****

Immediately preceding, but not more than 15 m 50 feet ahead of the crack sealing operations, perform a final cleaning and drying with compressed air. Fill the cracks from the bottom of reservoir formed by the routing or the top of the backer rod up to [3] [6] mm [1/8] [1/4] inch below the pavement surface. Remove excess or spilled sealant from the pavement by approved methods and discard it. Install the sealant in a manner which prevents the formation of voids and entrapped air. Several passes with the applicator wand may be necessary to obtain the specified sealant depth from the pavement surface. Do not use gravity methods or pouring pots to install the sealant material. Do not permit traffic over newly sealed pavement until authorized by the Contracting Officer. Check cracks frequently to ensure that the newly installed sealant is cured to a tack-free condition within 3 hours. Immediately notify the Contracting Officer of the location of any sealant that has not cured to a tack-free condition within 3 hours.

3.4 CRACK SEALANT INSTALLATION TEST SECTION

Prior to the cleaning and sealing of the cracks for the entire project, construct a test section at least 60 m 200 feet long using the specified materials and approved equipment to demonstrate the proposed sealing of all cracks of the project. Following the completion of the test section and before any other crack is sealed, inspect the test section to determine that the materials and installation meet the requirements specified. If materials or installation do not meet requirements, remove the materials and reclean and reseal the cracks at no cost to the Government. [When the test section meets the requirements, it may be incorporated into the permanent work and paid for at the contract unit price per linear foot for sealing items scheduled. Seal all other cracks in the manner approved and sucessfully completed for sealing the test section.]

3.5 CLEANUP

Upon completion of the project, remove unused materials from the site and leave the pavement in a clean condition.

3.6 QUALITY CONTROL PROVISIONS

3.6.1 Crack Cleaning

Provide quality control provisions during the crack cleaning process to correct improper equipment and cleaning techniques that damage the bituminous pavement in any manner. Cleaned cracks must be approved by the Contracting Officer prior to installation of the crack sealant.

3.6.2 Crack Seal Application Equipment

Inspect the application equipment to ensure conformance to temperature requirements and proper installation. Evidences of bubbling, improper installing, and failing to cure or set will cause to suspend operations until causes of the deficiencies are determined and corrected.

3.6.3 Crack Sealant

Inspect the crack sealant for proper cure and set rating, tack free

surface, bonding to the bituminous pavement, cohesive separation within the sealant, reversion to liquid, and entrapped air and voids. Remove sealants exhibiting any of these deficiencies, at any time prior to the final acceptance of the project, and replace as specified herein at no additional cost to the Government.

-- End of Section --