UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
****

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 01 13.63

GILSONITE MODIFIED ASPHALT EMULSION SEAL COATS

02/16, CHG 1: 08/16

PART 1 GENERAL

1.1 MEASUREMENT AND PAYMENT PROCEDURES
1.1.1 Gilsonite Seal Coat Measurement Methods
1.1.2 Payment
1.2 REFERENCES
1.3 SYSTEM DESCRIPTION
1.3.1 Equipment, Plant and Tools
1.3.2 Asphalt Distributors
1.3.3 Aggregate Spreader
1.3.4 Power Brooms and Power Blowers
1.3.5 Vacuum Sweepers
1.3.6 Equipment Calibration
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Manufacturer's Representation
1.5.2 Samples
1.5.3 Aggregates Source
1.5.4 Gilsonite Modified Asphalt Emulsion Source
1.6 DELIVERY, STORAGE, AND HANDLING
1.7 ENVIRONMENTAL REQUIREMENTS

PART 2 PRODUCTS

2.1 GILSONITE MODIFIED ASPHALT EMULSION
2.2 AGGREGATE
2.2.1 Material Performance
2.2.2 MOHS Hardness
2.3 POLYMER
2.4 WATER

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

3.1.1 Hairline Cracks
3.1.2 Small Cracks
3.1.3 Medium Cracks
3.1.4 Large Cracks
3.1.5 Cleaning Operations
3.1.6 Weather Limitations
3.1.7 Protection of Site Facilities
3.2 GILSONITE EMULSION MIXING
3.3 QUANTITIES OF MATERIAL PER SQUARE METER YARD
3.3.1 Applicatoin of Gilsonite Modified Asphalt Emulsion
3.3.2 Application of Aggregate
3.4 TEST SECTIONS AND AREAS
3.5 FIELD QUALITY CONTROL - SEAL COAT
3.5.1 Aggregate Gradation
3.5.2 Gilsonite Modified Asphalt Emulsion Sample
3.5.3 Water Compatibility Test
3.5.4 Application Inspection
3.6 TRAFFIC CONTROL

-- End of Section Table of Contents --

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
****

SECTION 32 01 13.63

GILSONITE MODIFIED ASPHALT EMULSION SEAL COATS
02/16, CHG 1: 08/16

****

NOTE: This guide specification covers the requirements for gilsonite modified asphalt surface coatings (not coal tars products, only Gilsonite modified asphalt emulsion sea coats with a bituminous base residue containing no less than 20 percent Uintaite or Gilsonite, here after referred to as Gilsonite modified asphalt emulsion.) for low volume roads, parking areas, airfield secondary and tertiary pavements (low-speed taxiways, shoulders, overruns), and other general applications with or without aggregate applied on the applied coating. An asphalt seal coat without aggregate, more commonly called a 'fog seal", can be considered for use on pavements with low to moderate weathered surfaces (as defined by ASTM D5340). The use of Gilsonite modified asphalt emulsion should be used whenever possible. The use of this product on a runway must be approved by cognizant NAVFAC (Echelon III), AFCEC, MAJCOM or TSMCX Pavement Engineer).

This specification can be used for high volume or high speed roads, taxiways and runways only with the incorporation of a suitable aggregate in order to maintain adequate surface friction and only with the written approval of the cognizant NAVFAC (Echelon III), AFCEC, MAJCOM or TSMCX Pavement Engineer. At present, only the Gilsonite modified asphalt emulsion, seal coat product with aggregate should be considered for use on airfield runway pavements.

If used on Design/Build projects involving high volume or high speed roads or any airfield pavement, this section must be prepared by the Government RFP preparer and must not be further edited by the Contractor's Designer of Record.

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

****

UFC 3-250-03, "Standard Practice Manual for Flexible Pavements" should be used for guidance in preparing these specifications.

****

1.1 MEASUREMENT AND PAYMENT PROCEDURES

****

NOTE: Payment and Measurement must be made on a unit price bases with the test section determined application rate for emulsion and aggregate. Therefore, this requires that the contract documents reflect unit pricing for the asphalt emulsion and aggregate, if used.

****

Measure the quantities of gilsonite modified asphalt emulsion and aggregate used in the accepted work and to be paid for, provided that the measured quantities are not more than 10 percent over the test section determined application rate. Any amount of gilsonite modified asphalt emulsion and aggregate more than 10 percent over the test section determined application rate for each application will be deducted from the measured quantities except for irregular areas where hand spraying of the bituminous material and hand spreading of the aggregate is necessary.

1.1.1 Gilsonite Seal Coat Measurement Methods

The area of applied emulsion and aggregate to be paid for will be measured in square meters square yards.

1.1.2 Payment

The approximate amounts of materials per square meter square yard for gilsonite modified asphalt emulsion and aggregate used in production must be as provided in Table 6 for the treatment area[s] at the specified dilution rate[s] as noted. The actual application rates will vary within the range specified to suit field conditions and will be recommended by the manufacturer's representative and approved by the Contracting Officer from test areas and sections evaluated.

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.

****

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 C117	(2017) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D5/D5M	(2020) Standard Test Method for Penetration of Bituminous Materials
ASTM D75/D75M	(2019) Standard Practice for Sampling Aggregates
ASTM D140/D140M	(2016) Standard Practice for Sampling Asphalt Materials
ASTM D244	(2009; R 2017) Standard Test Methods and Practices for Emulsified Asphalts
ASTM D1474/D1474M	(2013) Standard Test Method for Indentation Hardness of Organic Coatings
ASTM D2007	(2011) Standard Test Method for Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method
ASTM D2042	(2015) Standard Test Method for Solubility of Asphalt Materials in Trichloroethylene

ASTM D2995	(1999; R 2009) Determining Application Rate of Bituminous Distributors
ASTM D4402/D4402M	(2015) Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 150/5320-12	(1997, Rev C; Change 1-3, 5 and 6) Measurement, Construction and Maintenance of Skid-Resistant Airport Pavement Surfaces

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009; Rev 2012) Manual on Uniform Traffic Control Devices

1.3 SYSTEM DESCRIPTION

****
NOTE: Retain equipment units required for the project and delete all others.
****

1.3.1 Equipment, Plant and Tools

Equipment, plant and tools used in the work are subject to Government approval and must be maintained in a satisfactory working condition at all times. Provide equipment which is adequate and has the capability of producing the results specified. Provide calibrated equipment, such as asphalt distributors, spreaders and similar equipment, that has been recalibrated by an approved calibration laboratory within 12 months prior to commencing work and every 6 months thereafter, by such laboratory from the date of recalibration, during the term of the contract. Submit an equipment list with calibration reports.

1.3.2 Asphalt Distributors

The emulsion must be applied with an equipment manufacturer-approved computer rate-controlled bituminous distributor. The equipment must be in good working order and contain no contaminants or diluents in the tank when product to be applied is added to the tank. Spreader bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under 13 kilometers per hour eight miles per hour or 213 meters per minute 700 feet per minute. Test the equipment under pressure for leaks and to ensure it is in good working order before use.

The distributor truck must be equipped with a 3.66 meter 12 foot, minimum, spreader bar with individual nozzle control. The distributor truck must be capable of specific application rates in the range of 0.15 to 0.80 liters per square meter 0.05 to 0.25 gallons per square yard. These rates must be computer-controlled rather than mechanical. The distributor truck must have an easily accessible thermometer that constantly monitors the temperature of the emulsion.

In the event of a temperature problem with the material, a distributor truck will be provided that is equipped to effectively heat and mix the material to the required temperature prior to application. Heating and mixing will be done in accordance with the manufacturer's recommendations. Care must be taken not to overheat or over mix the material.

The distributor must be equipped to hand spray the emulsion in areas identified either on the plans or by the Contracting Officer.

1.3.3 Aggregate Spreader

The asphalt distributor truck will be equipped with an aggregate spreader that can apply sand to the emulsion in a single pass operation without driving through wet emulsion. The aggregate spreader must be equipped with a variable control system capable of uniformly distributing the sand at the specified rate at varying application widths and speeds. Spinner type equipment will be acceptable. The sander must have a minimum hopper capacity of at least 1,360 kilograms 3,000 pounds of sand. Push-type hand sanders will be allowed for use around lights, signs and other obstructions.

1.3.4 Power Brooms and Power Blowers

A power broom or blower must be provided for removing loose material from the surface to be treated.

1.3.5 Vacuum Sweepers

Provide self-propelled, vacuum pickup sweepers capable of removing loose sand, water, and debris from pavement surface.

1.3.6 Equipment Calibration

For the calibration of the aggregate spreader, only option b. is permitted unless aggregate spreader has been calibrated with the same aggregate within the last six months. Equipment calibration for emulsion may be achieved by either one of the two following procedures:

a. First Procedure: Contractor to furnish a State Calibration Certification for the asphalt emulsion distributor, from any state providing that service, or other acceptable agency certification at the approval of the Contracting Officer, and the calibration date must have been within 6 months of the contract award, or up to 12 months if supporting documents substantiate continuous work using the same distributor.

b. Second Procedure: Furnish all equipment, materials and labor necessary to calibrate the asphalt emulsion distributor and the aggregate spreader. Perform all calibrations with the approved job materials and prior to applying the specified coatings to the prepared surface. Perform calibration of the asphalt emulsion distributor in accordance with ASTM D2995. Perform work to calibrate the tank and measuring devices of the distributor. Perform inspection and calibration at the beginning of the work and at least once a day during construction.

1.4 SUBMITTALS

****

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.

****

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

Contractor Qualifications; G[, [_____]]

Provide copies of Qualifications.

Manufacturer Representative’s Experience

Material Performance

Equipment List; G[, [_____]]

List of equipment used in the project along with calibration

reports.

Friction Test that includes date, time, weather, speed, wet or dry and operator name for each run of each test; G[, [_____]]

Inspection Reports; G[, [_____]]

Provide reports and all Quality Assurance records daily when application is made.

SD-04 Samples

Gilsonite Modified Asphalt Emulsion

Aggregates

Provide in accordance with Field Quality Control.

SD-06 Test Reports

Manufacturer's Certificate of Compliance for Bituminous Material,

Manufacturer's Certificate of Compliance for Aggregates

Recommendation by contractor/manufacturer from results of test section application.

Any additional testing as requested by Contracting Officer

Bituminous Materials; G[, [_____]]

1.5 QUALITY ASSURANCE

Provide copies of Contractor Qualifications for applicators, personnel and equipment, Certified by Manufacturer to apply product and to have made three (3) applications similar to this project in past two (2) years. Include details of previous work, schedule adherence, quality of workmanship, materials and name and work phone of contracting officer's points of contact.

Obtain Manufacturer's Certificate of Compliance for emulsion and aggregates. Obtain samples at time of delivery to the field as necessary to satisfy the requirements herein.

****

NOTE: The requirement for the Contractor to require a manufacturer's authorized representative on the job site at the beginning of the work is recommended for all DoD projects.

****

1.5.1 Manufacturer's Representation

The manufacturer’s representative must have knowledge of the material, procedures, and equipment described in the specification and must be responsible for determining the application rates and must oversee the preparation and application of the seal coat product. Documentation of the manufacturer representative’s experience and knowledge for applying the seal coat product must be furnished to the Contracting Officer a minimum of 10 work days prior to placement of the test sections. The cost of the

manufacturer's representative must be included in the bid price.

1.5.2 Samples

Take aggregate samples for laboratory tests in accordance with ASTM D75/D75M. Take samples of gilsonite modified asphalt emulsion in accordance with ASTM D140/D140M.

1.5.3 Aggregates Source

Select sources from which aggregates are to be obtained and notify the Contracting Officer within [15] days after the award of the Contract. Perform tests for the evaluation of aggregates by using an approved commercial laboratory at no expense to the Government. Tests for determining the suitability of aggregate must include: gradation in accordance with ASTM C136/C136M, and ASTM C117 and must be within the last six months. Independent laboratory testing is required for all new aggregate sources.

1.5.4 Gilsonite Modified Asphalt Emulsion Source

The Contractor must furnish the vendor's certified test reports for bituminous materials, in its concentrated form, to the Contracting Officer, showing that the material meets the properties of Table 1. Bituminous materials must meet the properties of Table 2 and Table 3.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver gilsonite modified asphalt emulsion to the site in a homogenous and undamaged condition. Inspect the materials for contamination and damage. Unload and store the materials with a minimum of handling. Protect stored aggregate from contamination and segregation. Replace defective or damaged materials.

1.7 ENVIRONMENTAL REQUIREMENTS

Apply the coating when the existing surface is dry, and when the weather is not foggy, rainy, or when the wind velocity will prevent the uniform application of the material. Apply gilsonite modified asphalt emulsion seal coat only when both the atmospheric temperature and the pavement surface temperature are above 15.5 degrees C 60 degrees F, unless otherwise directed.

PART 2 PRODUCTS

****

NOTE: The quantities of material shown in the table above cover an average range of conditions. The quantity of sand, the dilution rate of the emulsified asphalt and its rate of spread should take into consideration local conditions and experience. The Designer of Record should select the dilution rate(s) reflecting the local condition of the pavement such as surface texture, porosity, and age of the asphalt pavement to be sealed.

A dilution rate of one (1) part emulsified asphalt to one (1) part water is recommended for most applications. A dilution rate of two (2) parts

emulsified asphalt to one (1) part water is recommended for grooved, rough or course surfaces, or where the pavement is highly oxidized or badly cracked.

Application rates can vary from 0.36 to 0.68 l per m2 0.08 to 0.15 gallons per square yard. For a 1:1 dilution, 0.45 to 0.68 k per m2 0.10 to 0.15 gallons per square yard is recommended. For a 2:1 dilution, 0.36 to 0.68 l per m2 0.08 to 0.15 gallons per square yard is recommended. Exceeding recommended application rates is not advisable without consulting a responsible manufacturer's representative.

If the manufacturer's representative cannot consult on the appropriate dilution and rate to apply it is recommended that the manufacturer's representative is contacted during the design phase to discuss the appropriate dilution and rate to select.

****

2.1 GILSONITE MODIFIED ASPHALT EMULSION

The bituminous material must be a gilsonite modified asphalt emulsion. The material must meet the following requirements of the applicable portions of Table 1, 2, and 3.:

Table 1: Concentrated Bituminous Material Properties

Properties	Specification	Limits
Saybolt Furol Viscosity at 77 deg F25 deg C	ASTM D244	20-100 seconds
Residue by Distillation or Evaporation	ASTM D244	57 percent minimum
Sieve Test	ASTM D244	0.1 percent maximum
24-hour Stability	ASTM D244	1 percent maximum
5-day Settlement Test	ASTM D244	5.0 pecent maximum
Particle Charge pH, cationic (see Note 1)	ASTM D244	Positive 6.5 percent maximum pH

Note 1: pH may be used in lieu of the particle charge test which is sometimes inconclusive in slow setting, bituminous emulsions.

The bituminous material concentrate must be diluted with heated water prior to application. The bituminous material, when diluted in the volumetric proportion of [one part hot water to one part concentrate] [one part hot water to two parts concentrate] must meet the requirements shown in Table 2.:

[

Table 2: 1 Part Bitumen : 1 Part Water Dilution Emulstion Properties (see Note 2)

Properties	Specification	Limits
Saybolt Furol Viscosity at 77 deg F25 deg C	ASTM D244	10-50 seconds
Residue by Distillation or Evaporation	ASTM D244	28.5 percent minimum
Pumping Stability (see Note 3)		Pass

][

Table 2: 2 Part Bitumen : 1 Part Water Dilution Emulsion Properties (see Note 2)

Properties	Specification	Limits
Saybolt Furol Viscosity at 77 deg F25 deg C	ASTM D244	10-50 seconds
Residue by Distillation or Evaporation	ASTM D244	38 percent minimum
Pumping Stability (see Note 3)		Pass

]

Note 2: In ready-to-apply form by volume.

Note 3: Pumping stability is tested by pumping 475 ml 1 pint of diluted material at 25 deg C 77 deg F,through a 6 mm 1/4 inch gear pump operation 1,750 rpm for 10 minutes with no significant separation or coagulation.

The bituminous base residue must contain not less than 20 percent uintaite or gilsonite, and must not contain any tall oil pitch or coal tar material. This must be stated in the Manufacturer's Certificate of Compliance for bituminous material. The material must be compatible with asphaltic concrete, and have a 5-year minimum proven performance record at airports with similar climatic conditions. Curing time, under recommended application conditions, must not exceed eight hours.

Table 3: Emulsion Residue by Distillation or Evaporation Tests

Properties	Specification	Limits
Viscosity at 135 deg C 275 deg F	ASTM D4402/D4402M	1,750 cts maximum

Table 3: Emulsion Residue by Distillation or Evaporation Tests

Properties	Specification	Limits
Solubility in 1, 1, 1 trichloroethylene	ASTM D2042	97.5 minimum
Penetration	ASTM D5/D5M	50 dmm maximum
Asphaltenes	ASTM D2007	15 percent minimum
Saturates	ASTM D2007	15 percent maximum
Polar Compounds	ASTM D2007	25 percent minimum
Aromatics	ASTM D2007	15 percent minimum

The Contractor must furnish vendor's certified test reports showing that the material is the type, grade and quality specified for each load of bituminous material delivered to the project. The certification must also show the shipment number, refinery, consignee, destination, contract number and date of shipment. The test reports and certification must be delivered to the Contracting Officer before permission is granted to use the material. The furnishing of the vendor's certified test report for the bituminous material must not be interpreted as a basis for final acceptance. The manufacturer's material test report certification may be subject to verification by testing the material delivered for use on the project.

The bituminous material storage and handling temperature must be between 10 deg C - 71 deg C 50 deg F - 160 deg F and the material must be protected from freezing, or whenever outside temperature drops below 5 deg C 40 deg F for prolonged time periods.

2.2 AGGREGATE

****

NOTE:
Aggregate should be used on runways and where friction may also be an issue. Where friction is not an issue the sand requirement can be removed.

The gradations in the table represent the limits in determining aggregate suitability for use in the emulsified asphalt surface treatment. The sand gradation used, within the limits designated in the table, must provide sufficient friction levels to meet or exceed the Maintenance Planning Friction Level in Table 3-2, “Friction Level Classification for Runway Pavement Surfaces” of AC 150/5320-12, Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces.

Locally available sand or abrasive material may be available that is slightly outside of the gradation requirements listed below. These may be submitted

for review and approval by the Contracting Officer. It is recommended to obtain concurrence for use by the seal coat manufacturer; and the Designer of Record and manufacturer's field representative should verify acceptance during application of test sections
****

The aggregate material must be a dry, clean, dust and dirt free, sound, durable, angular shaped manufactured specialty sand, such as that used as an abrasive, with a Mohs hardness of 6 to 8. The Contractor must submit manufacturer's technical data and a manufacturer's certification indicating that the specialty sand meets the requirements of the specification to the Contracting Officer prior to start of construction. The sand must be approved for use by the Contracting Officer and must meet the following gradation limits when tested in accordance with ASTM C136/C136M and ASTM C117:

Table 4: Aggregate Material Gradation Requirements

Sieve Size	By Weight Min/Max
No. 8	0
No. 16	0-8
No. 30	20-78
No. 50	10-85
No. 100	0-7
No. 200	0-2

The Contractor must submit gradation and manufacturer's specification for review at or prior to the pre bid for approval. The gradations in the chart represent the limits in determining aggregate source suitability for use in the bituminous surface treatment. The final gradations approved, within the limits designated in Table 4, must provide sufficient friction levels to meet the Minimum Friction Level in Table 3-2, "Friction Level Classification for Runway Pavement Surfaces" of FAA AC 150/5320-12.

2.2.1 Material Performance

****
NOTE: The following Material Performance submittal must be required for airfield runways and taxiways.
****

Friction tests previously performed in accordance with FAA Advisory

Circular, FAA AC 150/5320-12, at 40 and 60 mph-wet, must be submitted showing, as a minimum; friction value of pavement surface prior to sealant application; two values, test between 24 and 96 hours after application, with a minimum of 24 hours between tests; and one value test at no less than 90 days or greater than 360 days after the application. The results of the two tests between 24 and 96 hours must indicate friction is increasing at a rate to obtain similar friction value on the 90th day as the orginal friction value, and the long term test must indicate no apparent adverse effect with time relative to friction values and existing pavement surface.

The contractor must submit a list of airports which meet the above requirements, as well as technical details on application rates, aggregate rates, and point of contact at these airports to confirm use and success of sealer with aggregate. Friction tests must be submitted from no less than one of the airports on the list and each set of tests described above, must be from one project.

Seal coat material submittal without required friction performance will not be approved. Friction tests performed on this project, if any, cannot be used as a substitute of this requirement.

2.2.2 MOHS Hardness

MOHS hardness must be within 6-8 in accordance with ASTM D1474/D1474M.

2.3 POLYMER

****

NOTE: If the Designer of Record determines that polymer is required, the Designer of Record must verify that the vinyl acrylic polymer is approved for use by the asphalt material manufacturer. Polymer will generally increase cost, but it also increases durability. A lifecycle cost analysis may justify its use.

****

Vinyl acrylic polymer must be approved for use by the manufacturer of the bituminous material for compatibility and must meet the requirements provided in Table 5:

Table 5: Polymer Properties

Properties	Limits
Solids Content	52-57 percent by weight
Weight	1,066-1,174 grams per liter8.4-9.4 pounds per gallon
pH	4.0 to 6.0
Particle Charge	Nonionic/Anionic

Table 5: Polymer Properties

Properties	Limits
Mechanical Stability	Excellent
Film Forming Temperature	5 deg C41 deg F, minimum
Tg	22 deg C71.6 deg F, maximum

The Contractor must submit manufacturer's specifications for the vinyl acrylic polymer with the bituminous materials submittal for review and approval.

2.4 WATER

Water used in diluting the emulsion must be potable, free from harmful soluble salts and chemicals, and at least 38 deg C 100 deg F.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

****

NOTE: If the surface to be treated requires repairs, the method of repairs and extent of work involved should be shown or described. For substantial amounts of repair work use applicable UFGS sections.

Removal of paint and rubber deposits are generally accomplished by high pressure water blasting. Few approved chemicals are effective and sandblasting is not permitted by air pollution regulations at some locations. Mechanical abrasion generally causes damage to the pavement.

****

Provide Inspection Reports of; air and surface temperature during application of seal coat, emulsion temperature and rate of application, dilution rate used, adequacy of surface cleaning and preparation, aggregate rate of application, and protection of site facilities as applicable, each day of application.

Repair and patch all major pavement defects in accordance with [Section 32 01 17.61 SEALING CRACKS IN ASPHALT PAVING][the following subparagraphs]. All cracks sealed with a joint sealant compatible with the emulsion prior to application of the emulsion.

[3.1.1 Hairline Cracks

Cracks that are less than 6 mm 1/4 inch wide do not need to be sealed.

3.1.2 Small Cracks

Cracks that are 6 to 20 mm 1/4 to 3/4 inch wide must be routed 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, waterblasted and cleaned using

compressed air.

3.1.3 Medium Cracks

Cracks that are 20 to 50 mm 3/4 to 2 inches wide must be waterblasted and cleaned using compressed air.

3.1.4 Large Cracks

Cracks that are greater than 50 mm 2 inches wide must be repaired using pothole repair techniques instead of sealing.

]3.1.5 Cleaning Operations

Provide a clean surface for the seal coat. If considered necessary by the manufacturer's representative and is approved by the Contracting Officer, flushing with water will be permitted. Water will be made available for the contractor's use from a hydrant location within [_____] km(s) mile(s) of the project site [at prevailing Government rates]. The contractor must provide tools, hoses and hauling equipment for providing and dispensing of the water.

Immediately before applying the sealcoat, the asphalt surface to be treated must be free of all dirt, sand, vegetation, loose paint, excessive oil or grease, rubber deposits or other objectionable material. The surface must be cleaned with a power broom or power blower supplemented by hand sweeping or any other means required to remove deleterious matter to the satisfaction of the Contracting Officer.

3.1.6 Weather Limitations

The asphalt emulsion shall be applied only when the existing pavement surface is dry and when the weather is not foggy, rainy, or when the wind velocity will prevent the uniform application of the material. No material shall be applied when dust or sand is blowing or when rain is anticipated within eight hours of application completion. The atmospheric temperature and the pavement surface temperature shall both be above 16 deg C 60 deg F. During application, account for wind drift.

3.1.7 Protection of Site Facilities

Cover existing buildings, structures, runway edge lights, taxiway edge lights, informational signs, retro-reflective marking and in-pavement duct markers as necessary before applying the emulsion. Should emulsion get on any light or marker, clean property promptly. If cleaning is not satisfactory to the Contracting Officer, the Contractor must replace any light, sign or marker with equivalent equipment at no cost to the Government.

3.2 GILSONITE EMULSION MIXING

The application emulsion must be obtained by blending bituminous material concentrate, polymer and water. Always add heated water to the bituminous material concentrate; never add bituminous material concentrate to heated water. Add one percent polymer, by volume, to the emulsion mix. If the polymer is added to the emulsion mix at the plant, submit weigh scale tickets to the Contracting Officer. As an option, the polymer may be added to the emulsion mix at the job site provided the polymer is added while the circulating pump is running. The mix must be agitated for a minimum

of 15 minutes or until the polymer is mixed to the satisfaction of the Contracting Officer.

3.3 QUANTITIES OF MATERIAL PER SQUARE METER YARD

The approximate amounts of materials per square meter yard for the bituminous surface treatment must be as provided in Table 6 for the treatment area(s) at the specified dilution rate(s) as noted on the plans. The exact amounts to be used must be determined by the results of the test section program as directed by the Contracting Officer. Pavements with more progressive deterioration issues may require heavier than normal application rates for emulsion and aggregate. In such cases a manufacturer's representative should be consulted as directed by the Contracting Officer.

Table 6: Application Rate

Dilution Rate	Gilsonite Modified Asphalt Emulsion l/m2 gal/yd2	Quantity of Aggregate kg/m2 lbs/yd2
[1:1 Gilsonite Modified Asphalt Emulsion]	[0.45-0.680.10-0.15]	[0.11-0.270.20-0.50]
[2:1 Gilsonite Modified Asphalt Emulsion]	[0.36-0.540.08-0.12]	[0.11-0.270.20-0.50]

3.3.1 Applicatoin of Gilsonite Modified Asphalt Emulsion

The emulsion must be applied upon the properly prepared, clean and dry surface at the application rate approved by the Contracting Officer for each designated treatment area. The emulsion temperature must be at a temperature at or above 54 deg C 130 deg F, but not exceeding 71 deg C 160 deg F or in accordance with the manufacturer's recommendation using a pressure distributor to obtain uniform distribution at all points.

During all applications, the surfaces of adjacent structures must be protected in such manner as to prevent their being spattered or marred. Bituminous materials must not be discharged into borrow pits or gutters or upon the airport area.

3.3.2 Application of Aggregate

The emulsion, along with sand at the rate specified for each designated application area must be spread uniformly over the emulsion in a single pass from a sanding attachment to the asphalt distributor. The aggregate must be spread in the same width of application as the bituminous material and must not be applied in such thickness as to cause overspreading.

Sprinkling of additional aggregate material, and spraying additional bituminous material over areas that show up having insufficient cover or bitumen, must be done by hand whenever necessary. In areas where hand work is necessitated, the sand must be applied before the sealant begins to break.

Sanding must be performed in a manner so as to prevent appreciable amounts of sand from going onto any pavement prior to the emulsion being applied.

The Contractor must clean up areas with excess or loose sand and dispose of off airport property.

3.4 TEST SECTIONS AND AREAS

****

NOTE: Note to designer: There may be more than one test section needed. Specify the number based upon the pavement surface conditions, slope, and texture.

For projects calling for application of the asphalt surface treatment on runway and high speed exit taxiway, the Designer of Record must document skid resistance in accordance with AC 150/5320-12, Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces, prior to full application.

The test areas/sections afford the Contractor and the Designer of Record an opportunity to determine the quality of the mixture in place as well as the performance of the equipment.

If operational conditions preclude placement of a test section on the pavement to be seal coated, it may be applied on a pavement with similar surface texture.

****

Prior to production seal coating applying the seal coat, place up to 3[_____] test sections at a location determined by the Contracting Officer approximately 15 meters 50 feet long by a minimum of 2.5 meters 8 feet wide in a single pass of equipment using the approved job materials in accordance with the specification requirements, unless noted otherwise. Perform tests to determine the application rates of the asphalt emulsion and aggregate. Test sections must be performed on pavement areas that are not considered critical to operations. Vary the application rates along the longitudinally along the test section in order to effectively evaluate the pavement absorption rates. If the tests indicate that the seal coat test section does not conform to the specification requirements, make necessary adjustments to the application equipment and to the spreading procedures, and construct additional test sections for conformance to the specifications. Where test sections do not conform to specification requirements, repair or remove seal coat at no expense to the Government; no separate payment will be made for seal coat materials and labor, either in placement or removal of any test section. Removal of seal coat must be performed only if 500 feet of length or greater on a runway surface do not meet the friction requirements of FAA AC 150/5320-12. Perform quality control sampling and testing during construction as specified in paragraph FIELD QUALITY CONTROL. Test sections must be performed in the presence of the Contracting Officer and the Seal Coat Manufacturer's Representative (SCMR). Notify the Contracting Officer 7[_____] days prior to the planned test section date. The SCMR must recommend to the Contracting Officer application rates of materials used in production seal coating. The Contracting Officer must approve the application rates prior to production seal coating.

A qualified manufacturer's representative must be present in the field to assist the Contractor in applying test areas or test sections to determine

the optimum rate of application of both sealant and sand.

A test area or section must be applied for each differing HMA pavement surface identified in the project. The test area or sections must be used to determine the material application rate(s) of both sealant and sand prior to full production. The same equipment and method of operations must be utilized on the test section(s) as will be utilized on the remainder of the work.

a. For Taxiway, Taxilane and Apron Surfaces - Prior to full application, the Contractor must place test areas at application rate(s) stipulated by the Contracting Officer or judged necessary by the manufacturer's representative to determine proper application rate. The area to be tested will be designated by the Contracting Officer and will be located on a representative section of the pavement to receive the bituminous surface coat.

   If the test area should prove to be unsatisfactory, necessary adjustments to the application rate, placement operations, and equipment must be made. Additional test areas must be placed and evaluated, if required. Full production must not begin without the Contracting Officer's approval.

b. For Runway and High Speed Taxiway Exit Surfaces - If friction testing is required by the contract, the Contractor will test according to FAA AC 150/5320-12. The contractor must place a series of friction test sections a minimum of 90 meters long by 2.5 meters wide300 feet long by 8 feet wide at application rate(s) determined by application test sections and areas. The area to be tested will be located on a representative section of the pavement to receive the bituminous surface coat.

   The Contractor must perform tests for skid resistance of the test sections after a time frame determined by the contractor, manufacturers representative (if present), and the Contracting Officer. Full application can proceed when the results of the friction evaluation are equal to or greater than the Maintenance Minimum levels provided in Table 3-2, "Friction Level Classification for Runway Pavement Surfaces," in FAA AC 150/5320-12. Documentation will be provided by the manufacture that demonstrates a history of rapid increase of pavement friction to above Maintenance Planning levels provided in Table 3-2 and returning to pre-application numbers shortly thereafter.

   If the test section should prove to be unsatisfactory, necessary adjustments to the application rate, placement operations, and equipment must be made. Additional test sections must be placed and evaluated, if required. Full production must not begin without the Contracting Officer's approval.

3.5 FIELD QUALITY CONTROL - SEAL COAT

3.5.1 Aggregate Gradation

Perform gradation tests in accordance with ASTM C136/C136M when directed by the Contracting Officer. When the source of materials is changed or deficiencies are found, the gradation must be repeated and the material already placed must be retested to determine the extent of the unacceptable material where friction issues exist. Replace all in-place

unacceptable material or re-apply seal coat material conforming to the specification as directed by Contracting Officer at no additional expense to the Government.

3.5.2 Gilsonite Modified Asphalt Emulsion Sample

Obtain a sample of the asphalt emulsion used under the supervision of the Contracting Officer. The sample will be retained by the contractor until the completion of the project and must be turned over to the government upon request of the Contracting Officer.

3.5.3 Water Compatibility Test

In some localities an incompatibility may exist between the asphalt emulsion and the water to be used for dilution due to their characteristics. Clear, potable water should be used. No less than thirty days prior to commencing work, 0.24 liter one half pint of the proposed asphalt emulsion and 0.24 liter one half pint of the proposed water must be combined, agitated, and allowed to sit for a period of 24 hours to test their compatibility. If they prove to be incompatible, indicated by separation of the emulsion, clotting, particles settling or other adverse properties from mixing with water, an approved chemical treatment must be provided for all water used for dilution or a different and compatible source of water must be selected. Report results to the Contracting Officer.

3.5.4 Application Inspection

Inspect application of seal coat for uniformity. Furnish a written report within 24 hours of testing citing air and surface temperature during application, emulsion temperature during application, dilution rate, and rate of emulsion application determined from testing compared to the approved production rates.

3.6 TRAFFIC CONTROL

Protect freshly placed coatings from damage by traffic. Provide sufficient warning signs and barricades to prevent traffic over freshly treated surfaces. Protect treated areas from traffic for at least [2][_____] hours after final application of seal coat material, or for such time as necessary to prevent picking up. Immediately prior to opening for subsequent construction operations (markings) or traffic, broom and vacuum to remove loose material only after material has completely cured. Provide warning signs and barricades for proper traffic control in accordance with MUTCD.

-- End of Section --