

Item P-608-R Rapid Cure Seal Coat

DESCRIPTION

Prior to the use of Item P-608-R, the Engineer must check with federal, state, and local authorities on the use of products that contain volatile organic compounds (VOC). Asphalt Seal Coat products assist in pavement preservation through reducing the rate of pavement oxidation.

This specification covers the requirements for a rapid cure gilsonite-asphalt surface treatment. P-608-R is designed for use as an alternative to Item P-608 type treatment on pavements which could otherwise accept a standard Item P-608 but which must be accomplished under more restrictive site conditions such as night-time work, short operational windows, etc., requiring a rapid cure.

P-608-R is for taxiways and runways with the application of a suitable aggregate to maintain adequate surface friction; airfield secondary and tertiary pavements including aprons, shoulders, overruns, roads, parking areas, and other general applications with or without aggregate applied.

P-608-R may be applied to:

- Pavements in fair or better condition as defined in ASTM D5340 or advisory circular (AC) 150/5320-17, Airfield Pavement Surface Evaluation and Rating (PASER) Manuals.
- Low to moderate weathered surfaces as defined by ASTM D5340.
- New asphalt pavement.

The material properties in Item P-608-R include approximately twice the amount of gilsonite asphalt as Item P-608 which provides a seal coat that is initially harder and more durable. The typical curing time, under recommended application conditions, is one to two (2) to three (3) hours.

The Engineer must verify the selected materials comply with federal, state, and local authority requirements.

608-R-1.1 This item shall consist of the application of an asphalt surface treatment composed of natural and refined asphalt materials, additives, and light oils, for taxiways and runways with the application of a suitable aggregate to maintain adequate surface friction; and airfield secondary and tertiary pavements including aprons, shoulders, overruns, roads, parking areas, and other general applications with or without aggregate applied as designated on the plans.

Engineer must indicate locations on plans with and/or without aggregate. Aggregate is required on runways and high-speed taxiways; recommended on all taxiways; and not recommended on shoulders.

The performance of a seal coat product is contingent on the pavement condition at the time of application. The pavement condition survey provides a measure of the pavement condition by analyzing the type, amount, and severity of the distresses, and by determining the pavement condition index (PCI) in accordance with AC 150/5380-7, Airport Pavement Management Program (PMP), and ASTM D5340. A typical asphalt pavement candidate is one with a structural condition index (SCI) deduct value of less than 10 and a PCI equal to or greater than 60.

The terms seal coat, asphalt sealer, and asphalt material are interchangeable throughout this specification. The term asphalt means natural and refined asphalt materials in this specification.

MATERIALS

608-R-2.1 Aggregate. The fine-aggregate material shall be a dry, clean, sound, durable, angular shaped, with highly textured surfaces, manufactured specialty abrasive aggregate. It shall have 100% fractured faces, SiO2 content of 55% minimum, CaO of 3% max, with a sand equivalent greater than 85 and a Mohs hardness of 7 or greater. Additional characteristics as outlined in the following table(s). The Contractor shall submit specialty aggregate manufacturer’s technical data and the specialty aggregate manufacturer’s certification indicating that the specialty aggregate meets the requirements of the specification to the RPR prior to start of construction. The aggregate must be approved for use by the RPR and shall meet the following gradation limits when tested in accordance with ASTM C136:

Aggregate Material Gradation Requirements

Sieve Designation	Percentage by Weight Passing
No. 8	100
No. 14	98-100
No. 16	85-100
No. 30	15-45
No. 50	0-8
No. 70	0-2

Aggregate Characteristics

Test	Standard	Range
Micro-Deval	ASTM D7428	15% max
Magnesium Sulfate Soundness	ASTM C88	2% max
Aggregate Angularity	ASTM C1252 – Test Method A	45% min
Moisture Content (%)	ASTM C566	2% max
Bulk Dry Specific Gravity	ASTM C128	2.6 – 3.0
Absorption (%)	ASTM D2216	3% max
Mohs Hardness	Mohs Scale	7 min

The Contractor shall provide a certification of analysis (COA) showing analysis and properties of the material delivered for use on the project. The Contractor’s certification may be subject to verification by testing the material delivered for use on the project.

The gradations in the table represent the limits in determining aggregate suitability for use in the RapidCure asphalt surface treatment. The aggregate gradation used, within the limits designated in the table, should 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.

608-R-2.2 Asphalt material. The asphalt material base residue shall contain not less than 40% gilsonite, or uintaite, and shall not contain any tall oil pitch or coal tar material. The material shall be compatible with asphalt pavement, and have a 5-year minimum proven aviation performance record at airports with similar climatic conditions. The solvent-based rapid cure material shall meet the following properties:

Properties for Asphalt Sealing Material

Properties	Specification	Limits
Kinematic Viscosity at 140°F (60°C)	ASTM D4402	10-30 cSt
Percent Residue by Distillation	ASTM D402	30-45%

Tests on Residue from Distillation

Properties	Specification	Limits
Penetration at 77°F (25°C)	ASTM D5	2-12 dmm
Softening Point	ASTM D36	180-200
Solubility in 1,1,1 Trichloroethylene	ASTM D2042	99% min.
HCl Precipitation Value		18-25

The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the asphalt sealer delivered to the project. If the asphalt sealer is diluted at other than the manufacturer's facility, the Contractor shall provide a supplemental COA from an independent laboratory verifying the asphalt sealer properties. The COA shall be provided to and approved by the RPR before the asphalt material is applied. The furnishing of the vendor's certified test report for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

The asphalt sealing material must be applied in an undiluted form. The material may be stored at ambient temperature for long periods of time if necessary. Storage will follow industry standard recommendations due to the flammability of the material; avoid sparks and open flames to come into contact with the material or any gasses that might be escaping the storage vessel.

Contractor shall provide a list of airport pavement projects, exposed to similar climate conditions, where this product has been successfully applied within at least 5 years of the project.

608-R-2.3 Seal Coat with Aggregate. The Contractor shall submit friction test data from at least two (2) airport projects identified under 608-R-2.2. The test data must be from the same project and include technical details on application rates, aggregate rates, and point of contact at the airport to confirm use and success of sealer with aggregate.

Friction test data in accordance with AC 150/5320-12, at 40 or 60 mph (65 or 95 km/h) wet, must include as a minimum; the friction value prior to sealant application; two values, between 24 and 96 hours after application, with a minimum of 24 hours between tests; and one value between 180 days and 360 days after the application. The results of the tests between 24 and 96 hours shall indicate friction is increasing at a rate to obtain similar friction value of the pavement surface prior to application, and the long-term test shall indicate no apparent adverse effect with time relative to friction values and existing pavement surface.

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

COMPOSITION AND APPLICATION RATE

608-R-3.1 Application Rate. The approximate amounts of materials per square yard (square meter) for the asphalt surface treatment shall be as provided in the table for the treatment area(s) at the specified rate(s) as noted on the plans. The actual application rates will vary within the range specified to suit field conditions and will be recommended by the manufacturer's representative for control strip evaluations, and approved by the RPR from the test area/sections evaluation.

Application Rate

Dilution Rate	Quantity of Sealer gal/yd² (l/m²)	Quantity of Aggregate lb/yd² (kg/m²)
N/A	0.08-0.15 (0.36-0.68)	0.40-0.50 (0.11-0.22)

The quantities of material shown in the table above cover an average range of conditions. The quantity of aggregate, and the rate of rapid cure seal coat material spread should take into consideration local conditions and experience. The Engineer should select the rate(s) reflecting the local condition of the pavement such as surface texture, porosity, and age of the asphalt pavement to be sealed.

A higher rate is recommended for grooved, rough or course surfaces, or where the pavement is highly oxidized or badly cracked.

608-R-3.2 Control areas and control strips. A qualified manufacturer's representative shall be present in the field to assist the Contractor in applying control areas and/or control strips to determine the appropriate application rate of both sealer and aggregate to be evaluated and approved by the RPR.

If the Engineer has experience and is knowledgeable with the material, procedures, and equipment described in the specification, for control areas described in paragraph 608-R-3.2a, the varying application rates recommended by the manufacturer's representative can be provided from a site visit where the representative observed pavement condition within one month prior to application.

A test area and/or section shall be applied for each differing asphalt pavement surface identified in the project. The control area(s) and/or control strip(s) shall be used to determine the material application rate(s) of both sealer and aggregate prior to full production. The same equipment and method of operation shall be utilized on the control area(s) and/or control strip(s) as will be utilized on the remainder of the work.

a. For taxiway, taxilane and apron surfaces. Prior to full application, the Contractor shall place test areas at varying application rates as recommended by the Contractor's manufacturer's representative to determine appropriate application rate(s). The test areas will be located on representative section(s) of the pavement to receive the asphalt surface treatment designated by the RPR.

b. For runway and high-speed exit taxiway surfaces. Prior to full application, the Contractor shall place a series of control strips a minimum of 300 feet (90 m) long by 12 feet (3.6 m) wide, or width of anticipated application, whichever is greater, at varying application rates as recommended by the manufacturer's representative and acceptable to the RPR to determine appropriate application rate(s). The control strips should be separated by a minimum of 200 feet between control strips. The area to be tested will be located on a representative section of the pavement to receive the asphalt surface treatment designated by the RPR. The control strips should be placed under similar field conditions as anticipated for the actual application. Before beginning the control strip(s), the skid resistance of the existing pavement shall be determined for each control strip with a continuous friction measuring equipment

(CFME). The skid resistance of existing pavement can be immediately adjacent to the control strip or at the same location as the control strip if testing prior to application.

The Contractor may begin testing the skid resistance of runway and high-speed exit taxiway control strips after application of the asphalt surface treatment has fully cured, generally 2 to 4 hours after application of the control strips depending on site conditions. Aircraft shall not be permitted on the runway or high-speed exit taxiway control strips until such time as the Contractor validates that its surface friction meets the maintenance planning friction levels in AC 150/5320-12, Table 3-2 when tested at speeds of 40 and 60 mph (65 and 95 km/h) wet with approved CFME.

c. Control strip. If the control strip should prove to be unsatisfactory, necessary adjustments to the application rate, placement operations, and equipment shall be made. Additional control strips shall be placed and additional skid resistance tests performed and evaluated. Full production shall not begin without the RPR's approval of an appropriate application rate(s). Acceptable control strips shall be paid for in accordance with paragraph 608-R-8.1.

For projects calling for application of the asphalt surface treatment on runway and high-speed exit taxiway, the Engineer shall 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 Engineer 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 control strip on the pavement to be seal coated, it may be applied on a pavement with similar surface texture.

CONSTRUCTION METHODS

608-R-4.1 Worker safety. The Contractor shall obtain a Safety Data Sheet (SDS) for both the asphalt sealer product and aggregate and require workmen to follow the manufacturer's recommended safety precautions. All additional industry standard safety precautions regarding the storage and applications of solvent based asphalts should be understood and followed by the Contractor.

608-R-4.2 Weather limitations. The asphalt sealer 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 aggregate is blowing or when rain is anticipated within four (4) hours of application completion. The atmospheric temperature and the pavement surface temperature shall both be at, or above 55°F (14°C) and rising. The sealer will shall not be applied when pavement temperatures are expected to exceed 160F within the subsequent 72 hours if traffic will be opened on pavement within those 72 hours. During application, account for wind drift. Cover existing buildings, structures, runway edge lights, taxiway edge lights, informational signs, retro-reflective marking and in-pavement duct markers as necessary to protect against overspray before applying the

sealer. Should sealer get on any light or marker fixture, promptly clean the fixture. If cleaning is not satisfactory to the RPR, the Contractor shall replace any light, sign or marker with equivalent equipment at no cost to the Owner.

608-R-4.3 Equipment and tools. The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

a. Pressure distributor. The sealer shall be applied with a manufacturer-approved computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spray bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the sealer. 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 eight (8) miles per hour (13 km per hour) or seven (700) feet per minute (213 m per minute). The Contractor will provide verification of truck set-up (via a test-shot area), including but not limited to, nozzle tip size appropriate for application per nozzle manufacturer, spray-bar height and pressure and pump speed appropriate for the viscosity and temperature of sealer material, evidence of triple-overlap spray pattern, lack of leaks, and any other factors relevant to ensure the truck is in good working order before use. The distributor truck shall be equipped with a 12-foot (3.7-m), minimum, spray bar with individual nozzle control. The distributor truck shall be capable of specific application rates in the range of 0.05 to 0.25 gallons per square yard (0.15 to 0.80 liters per square meter). These rates shall be computer-controlled rather than mechanical. The distributor truck shall have an easily accessible thermometer that constantly monitors the temperature of the sealer, and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy.

The distributor truck shall effectively mix the material prior to application.

The distributor shall be equipped with a hand sprayer to spray the sealer in areas not accessible to the distributor truck.

b. Aggregate spreader. The asphalt distributor truck will be equipped with an aggregate spreader mounted to the distributor truck that can apply aggregate to the sealer in a single pass operation without driving through wet sealer. The aggregate spreader shall be equipped with a variable control system capable of uniformly distributing the aggregate at the specified rate at varying application widths and speeds. The aggregate spreader must be adjusted to produce an even and accurate application of specified aggregate. Prior to any seal coat application, the aggregate spreader will be calibrated onsite to ensure acceptable uniformity of spread. The RPR will observe the calibration and verify the results. The aggregate spreader will be re-calibrated each time the aggregate rate is changed either during the application of test strips or production. The Contractor may consult the seal coat manufacturer representative for procedure and guidance. The aggregate spreader shall have a minimum hopper capacity of 3,000 pounds (1361 kg) of aggregate. Push-type hand spreaders will be allowed for use around lights, signs and other obstructions, if necessary.

c. Power broom/blower. A power broom and/or blower shall be provided for removing loose material from the surface to be treated.

d. Equipment calibration. Asphalt distributors must be calibrated within the same construction season in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

608-R-4.4 Preparation of asphalt pavement surfaces. Clean pavement surface immediately prior to placing the seal coat so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film. Remove oil or grease from the asphalt pavement by scrubbing with

a detergent, washing thoroughly with clean water, and treating these areas with the oil spot primer. Any additional surface preparation, such as crack repair, shall be in accordance with Item P-101, paragraph 101-3.6.

608-R-4.5 Application of asphalt sealer. The asphalt sealer shall be applied using a pressure distributor upon the properly prepared, clean and dry surface at the application rate recommended by the manufacturer's representative and approved by the RPR from the test area/sections evaluation for each designated treatment area. Recommended material temperature for application is 70°F to 90°F, but depending on the application equipment used, good material dispersion and pavement coverage may be achieved at lower material temperatures. The material should not be heated above 100°F.

Pavement surfaces which have excessive runoff of seal coat due to excessive amount of material being applied or excessive surface grade shall be treated in two or more applications, if feasible, to the specified application rate at no additional cost to the Owner. Each additional application shall be performed after the prior application of material has penetrated into the pavement.

If low spots and depressions greater than 1/2 inch (12 mm) in depth in the pavement surface cause ponding or puddling of the applied materials, the pavement surface shall be lightly broomed with a broom or brush type squeegee. Brooming shall continue until the pavement surface is free of any pools of excess material. Ponding and/or puddling shall not cause excessive pavement tackiness and/or additional distress.

During all applications, the surfaces of adjacent structures shall be protected to prevent their being spattered or marred. Asphalt materials shall not be discharged into borrow pits or gutters or on the airport area.

Caution. *Heating asphalt binders of any kind always constitutes some degree of hazard. The most hazardous of these are cutback asphalts because of the highly volatile solvents used. Care must be taken not to allow any spark or open flame to come in contact with the cutback asphalt or the gases from cutback asphalt due to the low flash point. It is the Contractor's responsibility to understand and adhere to these standards in regards to staying within the recommended application temperatures of this material and at all times during production.*

608-R-4.6 Application of aggregate material. Immediately following the application of the asphalt sealer, aggregate at the rate recommended by the manufacturer's representative and approved by the RPR from the test area/sections evaluation for each designated application area, shall be spread uniformly over the asphalt sealer in a single-pass operation simultaneous with the sealer application. The sealer material and aggregate shall be applied simultaneously in a single pass operation, so as to not drive through the applied fresh sealer. The aggregate shall be spread to the same width of application as the asphalt material and shall not be applied in such thickness as to cause blanketing.

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

Minimize aggregate from being broadcast and accumulating on the untreated pavement adjacent to an application pass. Prior to the next application pass, the Contractor shall clean areas of excess or loose aggregate and remove from project site.

QUALITY CONTROL (QC)

608-R-5.1 Manufacturer's representation. The manufacturer's representative knowledgeable of the material, procedures, and equipment described in the specification is responsible to assist the Contractor and RPR in determining the appropriate application rates of the emulsion and aggregate, as well as recommendations for proper preparation and start-up of seal coat application. Documentation of the manufacturer representative's experience and knowledge for applying the seal coat product shall be furnished to the RPR a minimum of 10 work days prior to placement of the control strips. The cost of the manufacturer's representative shall be included in the Contractor's bid price.

608-R-5.2 Contractor qualifications. The Contractor shall provide the RPR with the seal coat Contractor's qualifications for applicators, personnel and equipment. The Contractor shall also provide documentation that the seal coat Contractor is qualified to apply the seal coat and has made at least three (3) applications similar to this project in the past two (2) years.

MATERIAL ACCEPTANCE

608-R-6.1 Application rate. The rate of application of the asphalt emulsion shall be verified at least twice per day.

608-R-6.2 Friction tests. Friction tests in accordance with AC 150/5320-12, Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces, shall be accomplished on all runway and high-speed taxiways that have received a seal coat. Each test includes performing friction tests at 40 mph and 60 mph (65 or 95 km/h) both wet, 15 feet (4.5 m) to each side of runway centerline. The Contractor shall coordinate testing with the RPR and provide the RPR a written report of friction test results. The RPR shall be present for testing.

METHOD OF MEASUREMENT

608-R-7.1 Asphalt surface treatment. The quantity of asphalt surface treatment shall be measured by the square yards [square meters] of material applied in accordance with the plans and specifications and accepted by the RPR.

The Contractor must furnish the RPR with the certified weigh bills when materials are received for the asphalt material used under this contract. The Contractor must not remove material from the tank car or storage tank until initial amounts and temperature measurements have been verified.

BASIS OF PAYMENT

608-R-8.1 Payment shall be made at the contract unit price per square yard [square meter] for the asphalt surface treatment applied and accepted by the RPR, and the contract unit price per lump sum for runway friction testing. This price shall be full compensation for all surface preparation, furnishing all materials, delivery and application of these materials, for all labor, equipment, tools, and incidentals necessary to complete the item, [including the friction testing and all work required to meet AC 150/5320-12,] and any costs associated with furnishing a qualified manufacturer's representative to assist with control strips.

[608-R-8.2 Payment shall be made at the contract unit price per lump sum for friction testing and all work required to meet AC 150/5320-12.]

Payment will be made under:

Edit brackets for project. Add additional Pay Items as necessary for multiple treatment areas shown on the plans per paragraph 608-R-3.1.

Item P-608-R-8.1 Asphalt Surface Treatment – per square yard [square meter]

[Item P-608-R-8.2 Runway and High Speed Exit Taxiway Friction Testing - per lump sum]

REFERENCES

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 C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C128	Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM C1252	Standard Test Methods for Uncompacted Void Content of Fine Aggregate
ASTM D5	Standard Test Method for Penetration of Asphalt Materials
ASTM D36	Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
ASTM D402	Standard Test Method for Distillation of Cutback Asphalt
ASTM D2042	Standard Test Method for Solubility of Asphalt Materials in Trichloroethylene
ASTM D2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D2995	Standard Practice for Estimating Application Rate of Bituminous Distributors

ASTM D4402	Standard Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer
ASTM D5340	Standard Test Method for Airport Pavement Condition Index Surveys
ASTM D6433	Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys
ASTM D6997	<u>Standard Test Method for Distillation of Emulsified Asphalt</u>
ASTM D7428	Standard Test Method for Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
Advisory Circulars (AC)	
AC 150/5320-12	Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces
AC 150/5320-17	Airfield Pavement Surface Evaluation and Rating (PASER) Manuals
AC 150/5380-6	Guidelines and Procedures for Maintenance of Airport Pavements
AC 150/5380-7	Airport Pavement Management Program (PMP)

END OF ITEM P-608-R