

STAR-AVIATOR[®]

FAA COMPLIANT REFINED TAR SEALER

MEETS OR EXCEEDS FAA PERFORMANCE TESTS & SPECIFICATIONS



Superior performance, better than conventional mix designs.

Pre-shipment FAA certification is available.

FAA specified rubber is hot-blended during manufacturing.

Job site mixing is not Necessary.

Independent Lab Test Data & Specification Compliance:
Meets and/or exceeds required FAA specifications.

TESTING PROPERTIES	FAA SPECIFICATION	TEST RESULTS	TEST COMMENTS
Brookfield Viscosity	Visual Compatibility 10-90 Poises	Materials Appear Compatible, 44.5 Poises	PASSED
Scuff Resistance 8 hr. 24 hr.	165 in-lb. 175 in-lb.	>100 in-lb. 8 hr. torque	PASSED PASSED
Freeze / Thaw	5 Cycles - 1 Max. 10 Cycles - 3 Max.	0 2	PASSED PASSED
Adhesion	5A	5A	PASSED
Fuel Resistance	No Penetration	No Penetration	PASSED

An innovative product: First of it's kind in the industry, used worldwide since the mid 90's.



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Meets and or Exceeds Required FAA Specifications

Detailed Application Specifications

1.0 OBJECTIVE

- 1.1 This specification covers the application of STAR AVIATOR® a premium grade rubberized protective sealcoating system designed for airport pavements requiring compliance to FAA specifications for asphalt pavements.

NOTE: If the application of STAR AVIATOR is intended to be used in compliance to FAA specifications on any airfield surface, you should be familiar with the most recent FAA publications regarding Specification P-630 and P-631 for the application of Refined Coal Tar Emulsion Surface Treatments. www.faa.gov/regulations_policies/advisory_circulars/

- 1.1.1 STAR AVIATOR® is used to extend the service life of asphalt pavements by providing protection from elements and petrochemicals that attack and degrade those pavements for example:
- The sun's ultraviolet rays, which result in oxidative decomposition.
 - Deteriorating effects of de-icing salts, oils, gasoline, jet fuel and grease.
 - Water and subsequent damage to the sub-base caused by water penetration through porosity, cracks and surface defects.
- 1.2 STAR AVIATOR® will reduce maintenance costs and extend service life.
- 1.3 STAR AVIATOR® will fill minor surface imperfections and yield an even looking surface coating.
- 1.4 STAR AVIATOR® will enhance the visibility of traffic control and airfield pavement markings

2.0 MATERIALS

2.1 Specialty Refined Tar Pitch Emulsion. STAR-AVIATOR® functionally meets and or exceeds FAA requirements as detailed below.

- 2.1.1 Refined Tar Pitch Emulsion must meet or exceed ASTM D 5727-00 (formerly Federal specification RP-355e), U.S. Air Force and FAA requirements. The Coal Tar Pitch Emulsion shall also be in compliance with ASTM Specification D 3320-90.
- 2.1.2 The material shall be prepared from straight run high temperature coke-oven tar meeting the requirement of ASTM D 490-92.
- 2.1.3 The material shall be homogeneous and show no separation or coagulation components that can not be re dispersed with moderate stirring.
- 2.1.4 The material shall be suitable for application and complete coverage, by squeegee, brush or by approved mechanical methods, to the bituminous surface at a spreading rate of approximately 0.18 - 0.20 gallon (of the concentrated sealer) per square yard in a two (2) coat application system.

2.2 Physical Properties and Independent Laboratory Testing Results

PROPERTIES & CONSTANTS	TEST METHOD	SPECIFIED LIMITS	STAR-AVIATOR	STATUS
Solids, % By Weight	ASTM D5727-00	Min. 47-53%	50% (+/-) 1	Passes
Ash % NVM (Solids) By Weight	ASTM D5727-00	30-40%	37% (+/-) 1	Passes
Specific Gravity 25/25° C	ASTM D5727-00	Min. 1.2	1.22 - 1.24	Passes
Drying Time, Hrs.	ASTM D5727-00	Max. 8 Hrs.	Approx. 4 Hrs.	Passes
Flexibility	ASTM D2939	Bend Test on 1" Mandrel	No Cracking or Flaking	Passes
Resistance to Heat	ASTM D2939	176° +/- 5° for 2hr.	No Blistering, Sagging, Slipping	Passes
Redispersibility	ASTM D2939	No Settlement/Segmentation	Readily Dispersed When Mixed	Passes
Resistance to Water	ASTM D2939	No Loss of Adhesion/Blistering	No Reemulsification	Passes
Fuel Resistance to kerosine	ASTM D2939	No Penetration	No Penetration	Passes

2.3 Sand / Aggregate Specifications

- 2.3.1 Sand shall be clean, hard and irregular silica sand, free of clay, dust, salt, and organic matter. It must meet the following gradation:

U.S. Sieve Size	Percentage Retained	Minimum		Maximum	
		Minimum	Maximum	Minimum	Maximum
No. 20 or coarser (0.850 mm)	0	0	0	0	0
No. 30 (0.600 mm)	0	0	5	0	5
No. 40 (0.425 mm)	7	7	25	7	25
No. 50* (0.300 mm)	15	15	50	15	50
No. 70* (0.212 mm)	20	20	40	20	40
No. 100 (0.150 mm)	3	3	30	3	30
No. 140 (0.106 mm)	0	0	10	0	10
No. 200 (0.075 mm)	0	0	7	0	7

*50/70 U.S. Sieve Size is recommended for STAR AVIATOR®

2.4 Water Specifications

- 2.4.1 Water shall be clean and potable, free of harmful soluble salts, within a temperature range of 50-80° F.

2.5 Additives Specifications - NONE REQUIRED

- 2.5.1 Acrylonitrile/butadiene latex rubber (meeting FAA specifications) is hot blended into the sealcoating during the manufacturing process. The addition of additives at the job site is not necessary.
- 2.5.2 WARNING: Using other additives or additives manufactured by companies other than STAR, Inc. in conjunction with this product might produce undesirable results. Consult your STAR representative for recommendations.

2.6 Crack Filler Specifications

- 2.6.1 Any crack filler/sealer must be certified by the supplier for compatibility with the sealcoating material and approved by the Engineer. Cold pour crack fillers manufactured by STAR® such as STAR® STA-FLEX™ STAR® STA-FLEX TROWEL GRADE™ and STAR® SURE-FLEX™ are compatible. Hot pour rubberized crack fillers such as STAR® ELASTO-BOND™ may also be used successfully.

2.7 Primer Specifications

- 2.7.1 Oil spot primers must be certified by the sealcoat manufacturer for compatibility with the sealcoating material and approved by the Engineer. STAR® S.O.S. SEALER™ oil spot primer/sealer is compatible and recommended.
- 2.7.2 Specialty coatings/primers may be recommended by the manufacturer for problematic areas such as rust streaks in the pavement, excessive surface contamination with oil, grease, fat, tree sap etc., areas of highly polished aggregate due to high traffic use, or in areas that might require extra attention due to high traffic use. In these cases; STAR® RUST-ARREST™ and STAR® GENESIS PRIME™ RTS are recommended products and are also useful for promoting adhesion on fresh asphalt installations.

3.0 SURFACE PREPARATION

- 3.1 **Important:** STAR AVIATOR® must be applied to structurally sound pavements. Do not apply over chip seal or gilsonite sealed surfaces.
- 3.1.1 New asphalt pavement surfaces must have time to properly cure so that there is no concentration of oils on the surface. 90 days at 70° F+ daytime temperatures must elapse between the placement of the hot-mixed asphaltic concrete surface course and the application of the sealcoating. Check the suitability of the asphalt pavement by performing a "water-break-free" test; Cast one gallon of potable water onto the surface, the water should sheet out without crawling, beading or showing oil rings confirming that the surface oils have oxidized and dissipated.
- 3.1.2 The surface must be cleaned thoroughly immediately prior to application of the sealcoating to remove all foreign debris (dirt, gravel, silt, vegetation, etc.) using manual/mechanical brooming, air blowers or by flushing with water. Embedded dirt and silt will need to be removed with steel bristle hand brooms or with the careful use of pressure washers. Time must be allowed for the surface to dry.
- 3.1.3 Mudded areas need to be thoroughly scraped and carefully pressure washed with clean water. Time must be allowed for the surface to dry.
- 3.1.4 Treat all grease and oil spots by scraping off the excess oil and dirt with a wire bristle broom and coat with STAR® S.O.S. SEALER™ oil spot primer/sealer in accordance with directions. STAR® GENESIS PRIME™ RTS is recommended for areas contaminated extensively with oil, grease, fuel, tree saps etc. or areas with highly polished aggregate surfaces that can create challenging adhesion situations for sealcoatings.
- 3.1.5 Make all necessary pavement repairs; patch soft spots, fill and seal all cracks, properly patch pot holes and level any "bird baths". All patched areas must be cured before applying STAR AVIATOR®.
- 3.1.6 Treat old or badly oxidized asphalt pavement with a primer coat of diluted STAR AVIATOR® as one (1) part by volume thoroughly mixed with three (3) parts of clean water. Apply the primer at 0.04 to 0.06 gallon per square yard or 0.18-0.27 liter per square meter (concentrated sealer). Allow the primer coat to dry thoroughly, about 2-4 hours under normal drying conditions, prior to sealcoating with STAR AVIATOR®.

4.0 MATERIAL USE RECOMMENDATIONS

4.1 Material Calculations

- 4.1.1 For a standard two (2) coat sealcoating system, calculate at the rate of 0.18-0.20 gallons per square yard (0.81-0.90 liter/sq. meter) of concentrated sealer on the asphalt surface to be sealcoated.

First Coat Requires: 0.10-0.12 gal./sq. yard, (0.45-0.54 liter/sq. meter)

Second Coat Requires: 0.08-0.10 gal./sq. yard, (0.36-0.45 liter/sq. meter)

- 4.1.2 For the quantities of other ingredients, water, sand/aggregates see section 4.2 "Recommended Systems".

4.2 Recommended Systems

Important - Consult FAA Specifications P-630 & P-631 for mix design and application rate. All mix designs must include clean, quartz, angular sand. The following is a commonly recommended mix design.

INTENDED USAGE AREA	No. of COATS	STAR AVIATOR	WATER	SAND	ADDITIVE	COVERAGE RATE
LOW TRAFFIC AREAS:		Gallon / Liter Concentrate	Gallon / Liter Clean/Potable	Lb. / Kg. 50/70 Sieve	(i.e. Macro-Flex®) Gallon / Liter	(Mixed Sealer) Gal/sq yd / Lt/sq mtr
Parking Stalls, Roadway and Taxiway Shoulders, Cart and Light Vehicle Paths	1st.	100 / 100	25-30 / 25-30	300-500 / 36-60	Included	.12-.17 / .54-.77
	2nd.	100 / 100	25-30 / 25-30	300-500 / 36-60	Included	.12-.17 / .54-.77
HEAVY TRAFFIC AREAS:						
Aircraft & Commercial Parking Areas, Airfield Taxiways, Service Areas, Runways and Airfield Roads, etc.	1st.	100 / 100	25-30 / 25-30	300-500 / 36-60	Included	.12-.77 / .54-.77
	2nd.	100 / 100	25-30 / 25-30	300-500 / 36-60	Included	.12-.77 / .54-.77
	3rd.	100 / 100	25-30 / 25-30	NONE / NONE	Included	.10-.13 / .45-.59

4.3 Priming Prior To Sealcoating

4.3.1 Prime Coat - For old, oxidized pavements, a primer coat is recommended.

The suggested materials are;

- STAR AVIATOR® diluted with clean potable water in 1:3 volume ratio (sealer:water) applied at 0.04 to 0.06 gallons per square yard, 0.18-0.27 liter per square meter (of the concentrated sealer).
- STAR® GENESIS PRIME™ diluted with clean potable water in 1:2 volume ratio (GENESIS:water) applied at 0.05-0.08 gallons per square yard, 0.23-36 liter per square meter of the mixture.

4.4 Sand Slurry Preparation / Addition Of Sand To The Mix Design

4.4.1 Before the addition of sand/aggregate, add the required amount of water and additives to the sealer in the mixing tank and mix thoroughly.

4.4.2 SAND SLURRY PREPARATION

4.4.3 Keep the mixer running at a moderate rate.

4.4.4 Add the sand in a steady stream of about one 100 lb. bag per minute.

4.4.5 When adding sand, be sure you have firm footing and never place hands and arms in the agitating mixer. Always wear proper protective gear; gloves, eye protection, long sleeves and a breathing mask or respirator.

4.4.6 After adding all the sand, close the lid of the mixing tank and raise the speed of the mixer to "high" setting.

4.4.7 Agitate tank for 10 minutes to allow the contents of the tank to mix thoroughly and break up any sand clumps.

4.4.8 Reduce the agitator speed to "medium" setting and keep running. If the mixer is shut off during transport to the job site, it must be restarted and the contents mixed for at least 10 minutes before the application begins. Keep the agitation running during the entire application period.

4.4.9 **IMPORTANT:** The sieve (mesh) size of the sand has an important correlation to the thickness of the cured sealer film. Using a sand that is either too coarse or too fine will not produce the desired results of durability, traction, uniformity of the cured film and if too large can "roll out" of the sealer under traffic. STAR AVIATOR® is specified to be used with a 50/70 U.S. sieve size sand gradation for best results.

5.0 APPLICATION OF MATERIAL

5.1 Recommended As A Multi-Coat System Installation

5.1.1 The material shall be applied according to the specifications detailed in Section 4. These systems provide a protective coating that is free of voids, pinholes, and holidays (skips).

5.1.2 **The First Coat;** The STAR AVIATOR® sand slurry shall be uniformly applied over the entire surface according to the recommended coverage rate. If the surface temperature is more than 90° F, pre-dampen with a light mist avoiding the creation of puddles of water. There should be no free standing water on the surface when applying the sealer.

5.1.3 Allow the first coat to dry sufficiently to take light traffic without scuffing. It could take approximately 4-6 hours under ideal drying conditions.

5.1.4 **The Second Coat;** If the specification calls for a second coat, apply it in a perpendicular direction to the previous coat, if practical, to ensure the profile of the asphalt surface is evenly coated on all possible sides.

5.1.5 **The Third Coat;** If the specification calls for a third coat, then the mix design should not include any sand or aggregate and the coating shall be applied at a lighter rate of approximately 30% less coverage. Refer to the application rates in section 4.2 for more detail.

5.1.6 The completed application will need to be allowed to cure at least for 24 hours and then tested for traffic suitability prior to opening for regular use.

5.1.7 The amount of material needed will vary according to the porosity and texture of the pavement. The mix designs (i.e. STAR AVIATOR® and other ingredients) expressed in section 4.2 are guidelines only.

6.0 METHOD OF APPLICATION

6.1 Hand Tool Application Using Squeegee Or Sealcoaters Brush

6.1.1 **Mixing Tank Details;** The agitator in the sealer tank should be kept on at all times during application to keep the sealer mix design in proper suspension.

6.1.2 **Cut In / Edging;** Apply coating around edges of the pavement first by pouring a continuous ribbon of STAR AVIATOR® mix along pavement edge approximately 6-12 inches from curbing/pavement edge. Draw the STAR AVIATOR® mix away from the pavement edge by pulling a squeegee or brush through the ribbon of material at a slight angle while walking parallel to the pavement edge.

6.1.3 **Manual Sealer Application With A Squeegee or Brush;** Pour out STAR AVIATOR® mix to maintain a working ribbon of material and in a continuous motion keep moving the material across the pavement until it is completely and uniformly covered. Continue the process in reverse direction pulling the excess material toward the intended end point of the pavement.

6.2 Machine Squeegee Application / Self Propelled Driven Unit

6.2.1 When applying by machine, first seal the edges of the pavement by hand as described in 6.1.2. The machine should then be used to apply STAR AVIATOR® mix to the remaining larger pavement area. A self-propelled machine that squeegees and brushes the sealer into the pores of the pavement is recommended. The machine should be equipped with a fog bar to be used for pre-dampening if the pavement temperature exceeds 90° F.

6.2.2 Care should be taken to ensure that the proper coverage rate is maintained, and frequent quality control checks should be made to confirm that the proper amount of sealer is being applied. Too much or too little sealer on the surface can cause complications in the proper cure out, lead to tire tracking and ultimately reduced durability/longevity of the finished sealcoating system.

6.3 Spray Application By Self Propelled Driven Unit Or By Hand (Wand)

6.3.1 **Mechanical Considerations;** If using a traditional diaphragm pump to deliver the sealer to the spray bar, an approximate pressure starting point should be at about 40-80psi. Start out with a lower psi setting and adjust as needed after a test patch is made. In most cases an 80/40 or 80/50 spray tip can be used. Note: the size of the spray tip and the amount of pressure is related, changing one will likely require an adjustment to the other. Spray tips should always be kept clean and free of dried sealer. Store spray tips in a sealed container of water to keep them clear.

6.3.2 **HAND SPRAY APPLICATION WITH WAND;** Spray application should deposit the material per specified coverage rates. When material is being sprayed the sealcoating spray pattern should be slightly angled (10-20°) and a back-and-forth fanning motion used. As you make each pass from right to left and then back left to right, tilt the angle of the spray in opposite directions so as to apply an even coating on all sides of the pavement profile. As you advance across the pavement you should overlap your application by 1/3 to 1/2 onto the previously applied row/area.

6.3.3 **SPRAY APPLICATION WITH DRIVEN MACHINE;** Spray application should deposit material per specified coverage rates. Care should be taken to ensure that the proper coverage rate is maintained and frequent quality control checks should be made to confirm the proper amount of sealer is being applied. Too much or too little sealer on the surface can cause complications in the proper cure out, lead to tire tracking and ultimately reduced durability/longevity of the finished sealcoating system.

7.0 PRECAUTIONS

7.1 Storage and Temperature

7.1.1 STAR AVIATOR® must be protected from freezing. Do not store at temperatures below 32° F. Always store unused sealer in tightly closed containers.

7.2 Application and Temperature

7.2.1 Do not apply STAR AVIATOR® during rainy or foggy weather. Ground and air temperature must be 50° F and rising prior to and after application.

7.2.2 Drying is retarded by low temperatures and excessive moisture in the air or on the ground. Examples: rain, fog, prolonged humidity and seasonal extremes (early Spring and late Fall).

7.3 Personal Protection and Safety

7.3.1 STAR AVIATOR® is based on Refined Coal Tar which may cause irritation to unprotected skin, Use all precautions as detailed in the Safety Data Sheets for personal and environmental protection. Always wear full protective clothing and gear when handling STAR AVIATOR® and protect exposed skin with minimum SPF 50 sunscreen lotion.

7.3.2 Keep out of reach of children.



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GENERAL DESCRIPTION

STAR AVIATOR[®] is designed as a premium grade, Refined Tar emulsion (water based) sealcoating that is superior to other conventional FAA mix design sealers. STAR AVIATOR[®], as supplied, already contains the rubber necessary to meet FAA specifications. The rubber is "Hot Blended" during the manufacturing process to ensure that it is properly fused into the Refined Tar. Cold mixing simply does not achieve the same level of bonding to the tar particles. The superiority of STAR AVIATOR[®] has been well established in the field for more than two decades. STAR AVIATOR[®] has been certified by an independent testing laboratory and compliance certification to FAA specifications is available upon request. STAR AVIATOR[®] has toughness and flexibility at all temperatures as well as resistance to kerosene, gasoline, oil, chemicals and de-icing salts.

OUTSTANDING PROPERTIES

- A Unique Product – No other product on the market has employed this highly effective manufacturing approach yielding far superior performance than conventional FAA mix designs.
- Excellent Durability – STAR AVIATOR[®] delivers outstanding performance demanded by engineers adhering to FAA specifications.
- Superior Flexibility – Ability to bridge minor surface (non-working) cracks in the pavement to eliminate water penetration and extend the life of runway, tarmac and apron surfaces.
- Dries to an appealing dark charcoal color that enhances the visibility of airfield markings. Snow removal becomes easier and runway markings last longer.
- Allows Mix Design Consistency – Rubber is the most critical component in FAA mix designs. Factory blending of the rubber in STAR AVIATOR[®] assures the accuracy of the mix.

RECOMMENDED USES

STAR AVIATOR[®] is recommended for all airfield asphalt pavement surfaces including; runways, taxiways, fueling areas, aprons and vehicle parking lots.

MIX DESIGN RECOMMENDATIONS

Important - Consult FAA Specifications P-630 & P-631 for mix design and application rate. All mix designs must include clean, quartz, angular sand. The following is a commonly recommended mix design.

	US	METRIC
STAR-AVIATOR [®]	25-35 Gal.	100 Liters
Water (Clean, Potable)	25-35 Gal	25-35 Liters
Sand/Aggregate 50-70 AFS*	300-500 Lbs.	36-60 Kg.

* Crushed slag (i.e. Black Beauty) may be used as the aggregate, provided it is clean, angular and within 50-70 AFS gradation and is approved by the project engineer.

APPLICATION RATES

Must be applied to structurally sound pavements. The application rates shall be dictated by the traffic pattern and usage. Consult FAA Specifications P-630 & P-631 and follow all directives given by the project engineer.

1 For Low to Medium Traffic Areas Apply Two (2) Coats:

- a) Concentrated Sealer - the total coverage rate of 0.18 - 0.20 Gal./Sq. Yd. or 45 - 50 Sq. Ft./Gal. (1.1 - 1.22 Sq. Meter/Liter).
- b) Mixed Sealer - 0.26 - 0.29 Gal./Sq. Yd. or 31 - 35 Sq. Ft./Gal. (0.76 - 0.86 Sq. Meter/Liter).

2 For High Traffic Areas Apply Three (3) Coats:

- a) Concentrated Sealer - the total coverage rate of 0.25 - 0.28 Gal./Sq. Yd. or 32 - 36 Sq. Ft./Gal. (0.8 - 0.9 Sq. Meter/Liter).
- b) Mixed Sealer - 0.36 - 0.40 Gal./Sq. Yd. or 23 - 25 Sq. Ft./Gal. (0.56 - 0.61 Sq. Meter/Liter).

IMPORTANT WEATHER LIMITATIONS

- Surface and air temperature should be a min. 50° F (10° C) and rising.
- Do not apply on rainy, foggy, or extremely humid days, or when rain is in the forecast within 24 hours.
- If the pavement temperature is over 100° (38°C) dampen the pavement with a fine mist of water to facilitate even spreading. Do not allow water to puddle on the surface.

APPLICATION TOOLS

- Use conventional tools; Brush, rubber squeegee or spray rig.
- Clean up with water. Do not discard washings in the bodies of water or down sewer drains.
- Dried sealer on tools - Wire brushing, scarping and peeling.
- Keep stored containers sealed tightly.

CURING TIME

Cure time will vary according to temperature and humidity at the time of application. Insufficiently cured films wear prematurely. Lower temperatures, high humidity and lack of direct sunlight will prolong the cure time. Higher temperatures, lower humidity and direct sunlight accelerate the cure process. If a second coat is to be applied, allow the first coat to dry sufficiently to withstand light vehicular and pedestrian traffic without damaging or scuffing the coating. After the application of the last coat, allow the coating to cure at least 20-24 hours under good drying conditions prior to opening to traffic.

SPECIAL INSTRUCTIONS

Apply on unsealed asphalt or surfaces previously sealed with either Asphalt Emulsion or Refined Tar based sealers. Do not apply over surfaces sealed with gilsonite and other solvent based seal coatings. New asphalt pavements must be allowed to cure at least 90 days in hot weather. Perform a water break free test to confirm that the surface oils have dissipated, by spreading water on the pavement. If the water does not bead, pavement is ready for seal-coating. Not recommended for steeply inclined surfaces, as they may become slippery when wet.

CAUTIONS

KEEP FROM FREEZING / KEEP OUT OF REACH OF CHILDREN
Contains REFINED TAR. May cause skin irritation. Wear gloves and protective clothing. In case of contact, flush skin or eyes immediately with fresh water. If the product gets in the mouth or eyes see a physician immediately. Consult a Safety Data Sheet for details.

PACKAGING & AVAILABILITY

5-Gallon plastic pails, 55-gallon drums & 275-gallon plastic totes, and bulk at all STAR plant locations.

WARRANTY & DISCLAIMER Using additives not manufactured by S.T.A.R., Inc. may result in inconsistent or undesired results. STAR's additives are designed specifically for use with the RTS and AE sealcoatings our Member Plants produce. The suggestions and related data contained on these pages are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use of our products are beyond our control. S.T.A.R., Inc. will not be responsible for any indirect or consequential damages. We will either replace or refund the purchase price in the event the products are proved to be defective, at our option.



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