

STAR SEAL

**Heavy-duty Coal Tar Emulsion Sealcoating Systems
Detailed Application Specification**

1.0 Objectives:

This specification covers the application of STAR-SEAL, a heavy-duty protective sealcoating system for existing, sound asphalt pavements.

- 1.1 To extend the service life of asphalt pavements by sealing out:
 - The sun's ultraviolet rays, which result in oxidative decomposition.
 - Deteriorating effects of deicing salts, oils, gasoline, and grease.
 - Water and the subsequent damage to the sub-base caused by water penetration and freeze-thaw cycles.
- 1.2 To beautify and enhance the appearance of the pavement.
- 1.3 To reduce the maintenance costs and extend the service life of the pavement.
- 1.4 To fill minor surface imperfections and yield an even looking surface.
- 1.5 To provide a limited degree of skid resistance.

2.0 Materials:

2.1 Coal Tar Pitch Emulsion.

- 2.1.1 Coal Tar Pitch Emulsion must meet or exceed ASTM D 5727-00, Standard Specification for Emulsified Refined Coal Tar (Mineral Colloid Type), 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 requirements of ASTM D 490-92.
- 2.1.3 The material shall be homogeneous and show no separation or coagulation of components that can not be redispersed with moderate stirring.
- 2.1.4 The material shall be suitable for application by squeegee, brush or spray, manually or by approved mechanical methods.
- 2.1.5 The material shall be applied to the asphalt surface at a spreading rate of 0.18 - 0.20 gallon of concentrated STAR SEAL / square yard in a two (2) coat application system.

STAR-SEAL meets and or exceeds the requirements as detailed above.

2.2 Sand / Aggregate Specifications: Use dry, angular silica sand or boiler slag, free of dust, clay, trash, organic materials or other contaminants. It must meet the following gradation in Table I, when tested in accordance with ASTM C 136.

TABLE I

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

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

2.4 Additive - STAR MACRO-FLEX, (meeting FAA P-627, 628 Engineering Brief No. 46) is recommended. The additive is based on Acrylonitrile/butadiene latex rubber and shall be used per mix design and specification requirements.

2.5 Crack Fillers: Must be certified by the supplier for compatibility with the sealcoating material. Cold pour crack fillers, STAR STA-FLEX and premium grade STA-FLEX SUPREME, are recommended. Hot pour rubberized crack fillers may also be used.

2.6 Primers: Pavement Primer: Must be certified by the sealcoat manufacturer for compatibility with the sealcoating material.

2.6.1 Oil Spot Primers: Must be certified by the sealcoat manufacturer for compatibility with the sealcoating material. **STAR S.O.S.** Primer/Sealer is recommended.

2.6.3. Specialty Coatings/Primers may be recommended by the manufacturer for problematic areas, e.g. rust streaks in the pavement, excessive surface contamination with oil, grease, fat etc. **STAR ONE STEP**, prediluted with water (in 1:2 volume ratio; product: water) is recommended. It is also recommended for fresh laid asphalt patches and polished aggregate.

3.0 Surface Preparation

The pavement surface to be sealcoated must be sound and surface cured to achieve optimum performance. Sound pavements are those that;

- Have oil free surface (for additional notes see 3.1)
- Are compacted properly over the base and sub-base courses.
- Are well drained and stable.

3.1 New Asphalt Pavement Surfaces: Allow new asphalt pavement surfaces to cure so that there is no concentration of oils on the surface. A period of at least 90 days at +70 °F daytime temperature must elapse between the placement of a hot-mixed asphalt pavement and the application of **STAR SEAL**.

Perform a water-break-free test to confirm that the surface oils have degraded and dissipated. Cast one gallon of clean water over the surface to be tested. If the water sheets out uniformly, without crawling or showing oil rings, the pavement is suitable for sealcoating.

3.2 Old and or badly oxidized asphalt pavements: Pavement priming may be required for older, highly oxidized pavements which often have trouble allowing sealcoatings to adhere. To insure adhesion to sound but oxidized pavements, all loose aggregate and powder shall be removed from the surface and other preparations done in accordance with sections 3.3,3.4 and 3.5. Prime with either of the following priming compositions;

3.2.1. Diluted **STAR SEAL**, use one (1) part by volume thoroughly mixed with three (3) parts of clean water. Apply the diluted mix at 0.04 to 0.06 Gal./ Sq. yard (or 0.01-0.015 gallon of concentrated STAR SEAL). Allow the primer coat to dry thoroughly, about 2-4 hours under normal drying conditions, prior to sealcoating with **STAR SEAL**.

3.2.2. **STAR ONE STEP**, prediluted with water (in 1:2 volume ratio; product: water) is recommended. Apply the diluted mix at 0.03 to 0.05 Gal./ Sq. yard (or 0.01-0.015 gallon of concentrated STAR ONE STEP).

- 3.3 Clean the surface thoroughly to remove all foreign debris (dirt, gravel, silt, etc.) using air blowers or by flushing with water. Embedded dirt and silt shall be removed with steel bristle hand brooms.
- 3.4 Treat all grease and oil spots by scraping off the excess oil and dirt with a wire bristle broom and coat with **STAR OIL SPOT PRIMER (S.O.S.)** in accordance with directions. **STAR ONE STEP** is recommended for areas contaminated extensively with oil, grease fuel etc.
- 3.5 Make all necessary repairs, patch soft spots, fill all cracks and holes in the pavement before applying **STAR SEAL**.
- 3.5.1 **Patching:** Patch asphalt pavement surfaces which have been softened by petroleum products (gasoline, oil, fats, etc.) or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt mix similar to that of the existing pavement. Allow to cure in accordance with the details in section 3.1. If a solvent-based material is used, patching must be completed a minimum of 90 days, to allow the solvent to escape, before sealcoating with **STAR SEAL**.
- 3.5.2 **Crack Filling:** Remove all debris and vegetation from cracks to a minimum depth of 1/2". If extensive vegetation exists, treat the specific areas with a concentrated solution of a water- based herbicide approved by the engineer.

4.0 Materials and Recommendations:

4.1 Materials Calculations:

STAR SEAL- For a standard two (2) coat sealcoating system, calculate at the rate of 0.18-0.20 gallons of undiluted sealer per square yard of the asphalt surface to be sealcoated.

Ist coat requires- 0.10-0.12 gal./square yard,
IInd. coat requires- 0.08-0.10 gal./square yard.
Other Ingredients (water, sand/aggregates)-see section 4.2, Table II.

4.2 Recommended Systems:

TABLE II

Usage area	Coats	STAR SEAL Gals.	WATER Gals.	SAND Lbs.	MACRO-FLEX Gals.	COVERAGE Rate Sq.Yd./Gal
Low Traffic Home Driveways, Parking stalls Walkways, cart and bicycle paths, etc.	Ist.	100	30-40	200-300	0-3	0.15-0.20
	IInd.	100	25-40	0- 300	0-3	0.10-0.15
Moderate Traffic Driveways, Parking lots, airfield and Highway shoulders, gas station aprons, etc.	Ist.	100	30-50	300-500	0-4	0.15-0.20
	IInd.	100	30-50	0-500	0-4	0.10-0.15
Heavy Traffic Industrial & commercial Parking lots, Airfield Taxiways, Service stations, Steep grades, etc.	Ist.	100	30-60	400-600	0-5	0.15-0.20
	IInd.	100	30-60	400-600	0-5	0.15-0.20
	IIIRD.	100	30-40	0-500	0-4	0.10-0.15

4.3 Sand Slurry (STAR SEAL mixed with sand, water and additives) Preparation:

- Add the required amount of water to the sealer in the mixing tank and mix thoroughly.
- Keep the mixer running at a moderate rate.
- Add the sand in a steady stream of about one 100 Lbs. bag per minute. When adding sand, be sure of firm footing and never place hands and arms in the agitating mixer.
- After adding all the sand, close the lid of the mixing tank and raise the speed of the mixer to "high" setting.
- Mix for 10 minutes to allow the contents of the tank to mix thoroughly and break any sand clumps.
- Reduce the agitator speed to moderate 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 it running during the entire application period.

5.0 Application of Material:

The material shall be applied according to the specifications detailed in Section 4.0. These systems provide a protective coating that is free of voids, pinholes, and holidays.

- 5.1. The first coat, STAR-SEAL sand slurry, shall be uniformly applied over the entire surface. If the surface temperature is more than 90 ° F, pre-dampen with a light mist. Avoid puddles. There should be no free standing water. Allow the first coat to dry sufficiently to take light vehicular and pedestrian traffic without scuffing.
- 5.2 If the specification calls for a second coat, apply it perpendicular to the previous coat, if practical and allow the coating to dry sufficiently prior to the application of the third coat, if specified.
- 5.3 The completed application shall be allowed to cure for at least 24 hours and then tested for trafficability prior to opening for regular use.

<p>Note: Cure time will vary according to temperature and humidity at the time of application. Insufficiently cured films will wear prematurely. Low temperature, high humidity and lack of direct sunlight will prolong the cure time, whereas higher temperatures, lower humidity and direct sunlight will accelerate the cure.</p>
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5.4 The amount of material needed will vary according to the porosity and texture of the pavement. The mix designs (i.e. STAR SEAL and other ingredients) expressed in section 4.0 are for guidelines only.

6.0 Method of Application:

6.1 Squeegee/ Brush (Hand Application) method:

- 6.1.1 The agitator in the sealer tank should be kept on at all times to insure uniform mix. The machine should be equipped with a fog bar to be used for pre-dampening if the pavement temperature exceeds 90 ° F.
- 6.1.2 Coat the edges first. Pour a continuous ribbon of the STAR-SEAL mix along the pavement edge 6-12 inches from curbing.
- 6.1.3 Draw STAR-SEAL mix away from the pavement edge by pulling a squeegee or brush perpendicular through the ribbon of material at a slight angle. Walk parallel to the pavement edge. Repeat the process in the opposite direction, pulling the excess material toward the center of the pavement. For best results use the squeegee followed by the brush.
- 6.1.4 Pour more STAR-SEAL mix to maintain a working ribbon of material and

continue across the pavement until it is completely covered.

6.2 Machine application:

6.2.1. When applying by machine, seal the edges of the pavement by hand. The machine should then be used to apply the **STAR-SEAL** mix to the remaining area. A self-propelled machine that squeegees and brushes the sealer into the pores of the pavement is recommended.

6.2.2. Spray application should deposit the material according to the coverage rates recommended for the specified job.

7.0 Striping:

If striping is required, use STAR-BRITE Latex Traffic Paint (TT-P-1952b), STAR BRITE PLUS, Fast-Drying, 100% Acrylic Traffic Paint or STAR PERMALINE, Alkyd based traffic Paint (TTP-115F, TTP-85E). Allow the sealcoat to dry at least 24 hours before striping. Refer to the Technical Data Sheet for details.

8.0 Precautions:

8.1 STAR-SEAL must be protected from freezing. Do not store at temperatures below 32 deg. F.

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

8.3 Drying is retarded by excessive moisture in the air or ground. Examples: rain, fog, prolonged humidity and seasonal extremes (early Spring - late Fall). Under such conditions, the use of STAR MACRO-FLEX, MACRO-FAST or a combination of both is recommended to obtain optimum and uniform drying.

8.4 Follow the recommended coverage rates.

8.5 STAR-SEAL is based on Refined Coal Tar Pitch. Prolonged and/or repeated contact may cause skin irritation. A protective cream should be used. Avoid breathing vapors. Wear protective clothing. See the Material Safety Data Sheet for STAR-SEAL for details.

8.6 Keep out of reach of children.

8.7 Refer to "Personal Safety and Environment when using Refined Coal Tar Emulsion " (PCTC 02, March, 1992. publication) for additional safety details.

9.0 Disclaimer:

These specifications report accurate and reliable information to the best of our knowledge, however, no expressed or implied warranties are extended by the manufacturers due to the fact that the conditions of use and workmanship are beyond the controls of the manufacturer. STAR Inc. assumes no responsibility for the use of information presented herein and hereby disclaims all liability in regard to such use.

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