

SURFACE ENRICHMENT SPRAY TREATMENT (SEST)

INTRODUCTION

1. The purpose of this document is to set down the parameters to determine the type of Surface Enrichment Spray Treatment (SEST) and timing of a SEST application to aircraft pavements.

DESCRIPTION

2. A SEST is the application of surface membrane to an existing bituminous surfacing to counter deterioration in the surfacing due mainly to:

- a. Oxidation of the bitumen
- b. Stripping of aggregates

3. A SEST works by rejuvenating the bitumen and/or binding any loose aggregate into the surfacing.

SEST TYPES

4. There are three recognised types of SEST materials used for treatment of bituminous surfaced aircraft pavements:

- a. Cutback Bitumen.
- b. Bituminous Emulsion.
- c. Coal Tar Emulsion Rejuvenator.

Cutback Bitumen

5. Cutback bitumen consists of C170 bitumen with added kerosene to reduce the viscosity and improve the penetration of the bitumen into the surfacing. The kerosene then evaporates leaving the bitumen imbedded into the surfacing.

Advantages / Disadvantages

Advantages	Disadvantages
Lower Cost	Time pavement closed to traffic longest
No Known Carcinogenic Properties	Bitumen pools in grooves on grooved runways
Does not require specialist equipment	

Bituminous Emulsion

6. Bituminous Emulsion consists of C170 bitumen which is held in suspension in water using an emulsifier. The emulsifier will be either cationic or anionic depending on whether basic or acidic aggregates were used in the original surfacing. The bituminous emulsion is then further diluted to aid penetration.

Advantages / Disadvantages

Advantages	Disadvantages
Lowest Cost	Shorter time pavement closed to traffic
No Known Carcinogenic Properties	Bitumen pools in grooves on grooved runways
Does not require specialist equipment	Does not penetrate asphalt surfacing to same extent

Coal Tar Emulsion Rejuvenator

7. A Coal Tar Emulsion Rejuvenator consists of Coal Tar suspended in an oil based emulsifier to aid penetration into the surfacing. The emulsifying oil then evaporates leaving the tar embedded in the surfacing.

Advantages / Disadvantages

Advantages	Disadvantages
Highest Cost	Requires Specialist Equipment
Time pavement closed to traffic shortest	Carcinogenic Properties
Does not pool in grooves on grooved runways unless over applied	Must be milled off prior to an overlay and special precautions are required

GUIDANCE ON WHAT SEST TYPE TO USE?

Asphalt Taxiway:

If taxiway can be closed for at least 24 hrs	Cutback Bitumen
If taxiway must become operational immediately	Coal Tar

Asphalt Apron:

If apron can be closed for at least 24 hrs	Cutback Bitumen
If apron must become operational immediately	Coal Tar
If apron is used for refuelling operations	Coal Tar

Asphalt Runway:

Grooved:	Coal Tar
Not grooved:	
If runway can be closed for at least 24 hrs	Cutback Bitumen
If runway must become operational immediately	Coal Tar

Aggregate Sealed Taxiway:

If taxiway can be closed for at least 24 hrs	Bituminous Emulsion/Cutback Bitumen
If taxiway must become operational immediately	Bituminous Emulsion/Coal Tar

Aggregate Sealed Apron:

If apron can be closed for at least 24 hrs	Bituminous Emulsion/Cutback Bitumen
If apron must become operational immediately	Bituminous Emulsion/Coal Tar
If apron is used for refuelling operations	Coal Tar

Aggregate Sealed Runway:

If runway can be closed for at least 24 hrs	Bituminous Emulsion/Cutback Bitumen
If runway must become operational immediately	Bituminous Emulsion/Coal Tar

WHEN TO UNDERTAKE SEST

Asphalt Pavement Surface

8. An asphalt pavement surface should have a life between resurfacing of between 10 and 15 years, after about 5-7 years the aging/oxidising of the bitumen in the asphalt will allow the fine particles in the mix to be eroded. A SEST at this point will retain the larger (potential FOD) stones within the mix and seal any fine cracks in the surface. Larger cracks such as construction joints opening up should be sealed after the application of the SEST. A SEST can be applied more than once between resurfacing. A cutback or emulsion SEST should not however be applied over a previous Coal Tar SEST.

Aggregate Sealed Pavement Surface

9. An aggregate seal pavement surface should have a life between reseals of between 7 and 10 years. There are two separate reasons to undertake a SEST to an aggregate sealed pavement.

- a. Early in the life of the seal as a result of insufficient binder application and/or loss of aggregate due to stripping. A SEST at this point will retain the stones (potential FOD) within the seal.
- b. After about 5-7 years the aging/oxidising of the bitumen in the seal will allow some of the aggregate to be plucked out of the surface. A SEST at this point will retain the stones (potential FOD) within the seal and seal any fine cracks in the surface.

10. Larger cracks should be sealed after the application of the SEST. A SEST can be applied more than once between resealing. A cutback or emulsion SEST should not however be applied over a previous Coal Tar SEST.