

**Item No. 351S
 Recycling Agent**

351S.1 Description

This item shall govern the requirements and uses for recycling agents used in the repaving of asphaltic surfaced streets. Recycling agents are used to restore the plasticity to existing asphaltic paving. Either the agent is used independently or an emulsified agent is used in conjunction with cationic emulsified asphalt.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

351S.2 Submittals

The submittal requirements of this specification item include:

- A. Type of recycling agent (petroleum oil or petroleum oil emulsion) including an emulsion designation as cationic or anionic.
- B. Physical and chemical test results on emulsified recycling agent (Saybolt-Furol viscosity, % residue, miscibility, test results of residue from evaporation, etc.).

351S.3 Materials

The asphalt recycling agent shall be either a petroleum oil, referred as a recycling agent, or a petroleum oil emulsion, referred to as emulsified recycling agent. These agents may be used alone or the emulsified recycling agent may be used in conjunction with emulsified asphalt having the same particle charge, i.e., a cationic emulsified asphalt may be used with a cationic emulsified recycling agent and an anionic emulsified asphalt may be used with an anionic emulsified recycling agent. The supplier must state the charge of the emulsified recycling agent being furnished, i.e., cationic or anionic. Specific physical and chemical requirements are listed below:

EMULSIFIED RECYCLING AGENT

		Requirements	
Test on emulsion:		Minimum	Maximum
Viscosity, Saybolt Furol @ 25 ⁰ C (77 ⁰ F), SFS		15	100
Residue*, % w (mass) *		60	-
Miscibility **	No coagulation		
Sieve analysis, % w (mass)		-	0.1
Test of residue from Evaporation test		minimum	maximum
Flash point, C.O.C.,	202 ⁰ C (400 ⁰ F)		
Viscosity @ 60 ⁰ C, (140 ⁰ F), cst		75	250
Viscosity @ 135 ⁰ C, (275 ⁰ F), cst		-	10.0

* Residue shall be determined by the evaporation method set forth in ASTM D244, except that the sample shall be maintained at 300⁰F (150⁰C) until foaming ceases, then cooled and weighed.

** Performed according to Test Method TxDOT Test Method Tex-521-C except that 0.02 N calcium chloride solution shall be used in place of water.

The ability of the residue from the evaporation test to restore the original properties of aged asphalt cement shall be determined as follows. The residue shall be blended uniformly in the laboratory with a standard 14 to 16 penetration asphalt at a maximum rate of 20 % by weight (mass) of the asphalt. The resulting blend must comply with all the requirements of Specification Item subarticle 301S.2.(1) for AC-20 asphalt cement

The standard asphalt cement for the above blend shall be obtained by subjecting an AC-20, meeting all requirements of this item, to the thin film oven test as specified in TxDOT Test Method Tex-510-C except that the test period shall be increased so as obtain the required penetration.

When a petroleum oil recycling agent is specified, it shall meet the same requirements indicated above for the Residue from Evaporation Test on emulsified recycling agent.

351S.4 Construction Methods

The rejuvenating agent, when required, shall be applied at a rate specified by the Engineer or designated representative in accordance with Item No. 350S, "Heating, Scarifying and Repaving".

351S.5 Measurement

"Recycling Agent" will be measured by the gallon (liter: 1 liter equals 0.264 gallons), complete in place.

351S.6 Payment

The work will be performed and materials furnished as prescribed by this item and measured as provided for under "Measurement" will be paid for at the unit bid price for this item. The price shall include full compensation for the work, materials, tools and other accessories needed to complete the work.

Payment, when included as a contract pay item, will be made under:

Pay Item No. 351S: Recycling Agent, _____ Per gallon.

End

<u>SPECIFIC</u> CROSS REFERENCE MATERIALS
Specification Item 351S "Recycling Agent"

City of Austin Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 350S	Heating, Scarifying and Repaving

Texas Department of Transportation: Manual of Testing

<u>Designation</u>	<u>Description</u>
Tex-521C	Testing Emulsified Asphalts
Tex 510-C	Determining the Effect of Heat and Air on Asphaltic Material When exposed in Thin Films

<u>SPECIFIC</u> CROSS REFERENCE MATERIALS (Continued)
Specification Item 351S "Recycling Agent"

American Society for Testing and Materials (ASTM)

<u>Designation</u>	<u>Description</u>
D-92	Test Method For Flash and Fire Points by Cleveland Open Cup
D-244	Standard Methods of Testing Emulsified Asphalts
D-445	Test Method for Kinematic Viscosity of Transparent and Opaque Liquids

<i>RELATED</i> CROSS REFERENCE MATERIALS
Specification Item 351S "Recycling Agent"

City of Austin Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 206S	Asphalt Stabilized Base
Item No. 210S	Flexible Base
Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 306S	Prime Coat
Item No. 307S	Tack Coat
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
Item No. 312S	Seal Coat
Item No. 320S	Two Course Surface Treatment
Item No. 340S	Hot Mix Asphaltic Concrete Pavement
Item No. 341S	Paving Fabric
Item No. 864S	Abbreviated Pavement Markings

City of Austin Standard Details

<u>Designation</u>	<u>Description</u>
1000S-10	Local Street Sections
1000S-11(1)	Residential and Neighborhood collector Street Sections
1000S-11(2)	Industrial and Collector Street Sections
1000S-12(1)	Primary Collector Street Sections
1000S-12(2)	Primary Arterial Street Sections
1000S-13(1)	Minor Arterial Street Sections (4 Lanes)
1000S-13(2)	Minor Arterial Street Sections- (4 Lanes divided)
1000S-14	Major Arterial Street

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item 300	Asphalts, Oils and Emulsions
Item 301	Asphalt Antistripping Agents
Item 310	Prime Coat (Cutback Asphaltic Materials)
Item 314	Emulsified Asphalt Treatment
Item 345	Asphalt Stabilized Base (Plant Mixed)
Item 354	Planing and/or Texturing Pavement
Item 358	Asphaltic Concrete Surface Rehabilitation