

Anionic Asphalt Emulsions

RS-1 · RS-2 · MS-1 · MS-2 · MS-2h · SS-1 · SS-1h · HFRS-2 · HFMS-1 · HFMS-2 · HFMS-2h · HFMS-2s

In accordance with AASHTO M 140 / ASTM D977 — Standard Specification for Emulsified Asphalt

1. Description

Asphalt emulsions are homogeneous dispersions of fine asphalt cement droplets suspended in water, stabilised by the action of chemical emulsifiers and by electrochemical surface reactions. Emulsification overcomes the insolubility of asphalt in water and removes the need to heat it to achieve the fluidity required for application, which reduces energy consumption, vapour emission and the risk of burns on site.

Anionic emulsions carry a negative surface charge and are compatible with positively charged aggregates, principally those of limestone and dolomitic origin. They are used where the nature of the available aggregate justifies it and in high-float (HF) systems, in which the binder film formed is thicker and offers better resistance to aggregate loss in surface treatments exposed to wide thermal swing.

The nomenclature of asphalt emulsions has three elements. The leading letter "C" identifies cationic, positively charged emulsions; its absence indicates an anionic, negatively charged emulsion. Next comes the setting rate: RS (rapid setting), MS (medium setting), SS (slow setting) and QS (quick setting, controlled break for seal treatments). The final number relates to viscosity — a "2" is more viscous than a "1" — and the suffix "h" indicates a harder asphalt residue (penetration 40–90 instead of 100–250). The prefix "HF" designates high-float emulsions, which form a thicker film.

2. Applications

- Tack coats between asphalt layers (SS, CSS, CSS-1h).
- Prime coats over granular bases (diluted CSS-1h, priming emulsions).
- Single and double surface treatments and sand seals (RS, CRS).
- Slurry seals and cold micro-surfacing (SS, CSS, CQS).
- Cold dense-graded and cold open-graded mixes (MS, CMS).
- Cold in-place and in-plant recycling, stabilised bases and soils (SS, CSS).
- Fog seals and curing seals.

3. Specifications

Conventional grades

Property	Method	RS-1	RS-2	MS-1	MS-2	MS-2h	SS-1	SS-1h
Saybolt Furol viscosity at 25 °C (s)	T 59	20–100	—	20–100	100 min.	100 min.	20–100	20–100
Saybolt Furol viscosity at 50 °C (s)	T 59	—	75–400	—	—	—	—	—
Storage stability, 24 h (%), max.	T 59	1	1	1	1	1	1	1
Demulsibility, 35 mL 0.02 N CaCl ₂ (%), min.	T 59	60	60	—	—	—	—	—
Sieve test, retained on No. 20 (850 µm) (%), max.	T 59	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Cement mixing test (%), max.	T 59	—	—	—	—	—	2.0	2.0
Coating, dry aggregate	T 59	—	—	Good	Good	Good	—	—
Coating, after water spraying	T 59	—	—	Fair	Fair	Fair	—	—
Coating, wet aggregate	T 59	—	—	Fair	Fair	Fair	—	—
Residue by distillation (%), min.	T 59	55	63	55	65	65	57	57
Tests on the distillation residue								
Penetration at 25 °C, 100 g, 5 s (0.1 mm)	T 49	100–200	100–200	100–200	100–200	40–90	100–200	40–90
Ductility at 25 °C, 5 cm/min (cm), min.	T 51	40	40	40	40	40	40	40
Solubility in trichloroethylene (%), min.	T 44	97.5	97.5	97.5	97.5	97.5	97.5	97.5

High-float grades

Property	Method	HFRS-2	HFMS-1	HFMS-2	HFMS-2h	HFMS-2s
Saybolt Furol viscosity at 25 °C (s)	T 59	—	20–100	—	—	—
Saybolt Furol viscosity at 50 °C (s)	T 59	75–400	—	50 min.	50 min.	50 min.
Storage stability, 24 h (%), max.	T 59	1	1	1	1	1
Sieve test, retained on No. 20 (850 µm) (%), max.	T 59	0.10	0.10	0.10	0.10	0.10
Demulsibility (%)	T 59	60 min.	—	—	—	—
Residue by distillation (%), min.	T 59	63	55	65	65	65
Oil distillate, % by volume	T 59	—	—	—	—	1–7
Penetration at 25 °C, 100 g, 5 s (0.1 mm)	T 49	100–200	100–200	100–200	40–90	200 min.
Ductility at 25 °C, 5 cm/min (cm), min.	T 51	40	40	40	40	40
Float test at 60 °C (s), min.	T 50	1,200	1,200	1,200	1,200	1,200

Values cross-checked against the specifications of road agencies declaring conformity with AASHTO M 140 (Nebraska, South Dakota, Minnesota, Iowa, North Dakota and Montana, Asphalt Institute emulsion database). Important notes: (i) the anionic emulsion table does NOT include a particle charge test: the negative charge is definitional to the family, not a requirement of the standard; (ii) RS-2 residue is 63 % min in most agencies, although North Dakota requires 65 %; (iii) residue penetration for the RS and MS grades is 100–200 in the majority family, while Iowa, North Dakota and Montana use 90–150; (iv) ash content is NOT part of AASHTO M 140 — only Montana adds it — and has therefore been excluded from the table; (v) the viscosity of the HFMS grades is disputed between agencies: Minnesota sets it at 50 s min at 50 °C, while South Dakota sets it at 100 s min at 25 °C (50 s min for HFMS-2s). Always state the governing specification.

4. Storage and transport

Asphalt emulsions must be stored above 5 °C, to prevent breaking by freezing of the water phase, and below 85 °C, to prevent boiling. During heating the product must be recirculated to avoid local overheating that would cause premature breaking. Bulk storage shall be in clean tanks, preferably vertical, to avoid product contamination and minimise the area in contact with air. The tank must have an agitation and/or recirculation system that guarantees complete homogeneity during storage. Where storage for extended periods is required, the product must be recirculated at least once every five days. Avoid contact with pressurised water, with emulsions of the opposite charge and with cement or lime residues in tanks and equipment.

5. Packaging and logistics

In bulk in tank trucks from 9 to 35 t · 20 t isotanks and flexitanks for export · 200 kg steel drums · 1,000 L IBCs · 1,000 kg lined big bags. HS code: 2715.00 (bituminous mixtures based on petroleum bitumen).

6. Quality control

Every batch shipped is accompanied by a laboratory-issued quality certificate reporting the tests required by the applicable standard, with traceable batch identification. Additional testing or independent third-party inspection (SGS, Bureau Veritas, Intertek, Cotecna) at origin or destination can be arranged at the customer's request.

Consult the product Safety Data Sheet (SDS) before handling.

The information in this data sheet is offered in good faith, based on PRO-ROAD®'s technical knowledge of its products and on the requirements of the standards cited. It does not constitute a sales specification or a warranty of results. The customer is responsible for verifying the suitability of the product for its intended use, for its correct handling and for its application in accordance with project specifications. Values guaranteed per batch are certified in the corresponding quality certificate.