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BUREAU OF INDIAN STANDARDS

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Draft Indian Standard

TRACKLESS EMULSION – SPECIFICATION

ICS 93.080.20

Bitumen, Tar and Related Products Sectional Committee, PCD 06	Last date for receipt of comment is **23 June 2022**

FOREWORD

(*Formal clauses will be added later*)

Trackless emulsions may be used as a binder for tack coat, penetration macadam, surface dressing (chip seal), fog seal, cold recycling, and preparation of cold pre-mix for construction and maintenance of roads as well as a binder for micro-surfacing and slurry seal applications.

One of the major constraints for bitumen emulsions when used for tack coat is that bitumen residue sticks to the construction truck tyres which leads to inefficient tack coat. Therefore, to address such issue, trackless emulsion may be used as a binder for tack coat. However, its application is not limited to the tack coat and fog sealing. These may also be used for other applications of construction and maintenance like cold mixes, storable cold mixes for patch repairs etc. These applications are not covered in this standard. In the preparation of this standard, considerable assistance has been derived from the Japan Emulsified Asphalt Association standard on Trackless Asphalt Emulsion (PKM – T).

The Composition of Committee responsible for formulation of this standard is given at Annex (*will be added later*).

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values *(revised)'*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This draft Indian Standard specifies the requirements, methods of sampling and tests of trackless emulsions for various roads construction and maintenance activities like tack coat and cold mixes.

2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to an agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

IS No.	*Title*
73 : 2013	Paving bitumen ─ Specification (*Fourth revision*)
334 : 2002	Glossary of terms relating to bitumen and tar (*Third revision*)
1201 : 2021	Methods of testing tar and bituminous materials: Sampling (*Second revision*)
1203 : 1922	Methods of testing tar and bituminous materials: Determination of penetration (*First revision*)
1205 : 2022	Methods For Testing Tar And Bituminous Materials - Determination Of Softening Point Ring And Ball Apparatus
1216 : 1978	Methods of testing tar and bituminous materials: Determination of solubility in trichloroethylene (*First revision*)
3117 : 2004	Specification for bitumen emulsion for roads and allied applications (anionic type) (*First revision*)
8887 : 2018	Bitumen emulsion for roads (Cationic Type) - Specification (Third Revision)
15462 : 2019	Polymer modified bitumen (PMB) — Specification *(First Revision)*
17079 : 2019	Rubber modified bitumen (RMB) — Specification

3 TERMINOLOGY

For the purpose of this standard, the definition given in IS 334 shall apply, in addition to the following:

3.1 Trackless Emulsion

A cationic emulsion in which the cation of the emulsifier is at the interface of the bitumen particle; an emulsion in which the particles are positively charged and the aqueous phase is acidic. Breaking of these emulsions occurs by neutralization of charge.

4 REQUIREMENTS

4.1 Material — Any suitable grade of bitumen as given in IS 73 or polymer modified bitumen as given in IS 15462 or rubber modified bitumen as given in IS 17079 with or without addition of suitable flux, shall be used. For modification in bituminous phase, modifier shall be compatible with bitumen.

4.2 Any emulsifying agent or any other ingredient, which either quality-wise or quantity-wise, is likely to affect or harden the residue bitumen beyond the limits specified of Table 1, Sl. No. (iv) shall not be used.

4.3 Trackless emulsion shall be homogeneous without any separation of components, undispersed bitumen within six months of manufacturing after thorough mixing.

4.4 Trackless emulsions shall also comply with the requirements specified in Table **1**.

TABLE 1 REQUIREMENTS OF TRACKLESS EMULSION
(*Clause* **4.4**)

Sl No.	Characteristics	Requirements	Methods of Test Ref to IS
(1)	(2)	(3)	(4)
i)	Residue on 600 µm Sieve[1], percent by mass, *Max*	0.3	Annex B of IS 8887
ii)	Residue by evaporation, percent, *Min*	50	Annex J of IS 8887
iii)	Saybolt Furol Viscosity (SFS) at 25°C, s	10 - 50	Annex A of IS 3117
iv)	Storage Stability after 24 h, percent, *Max*	1	Annex D of IS 8887
v)	Coagulation of emulsion at low temperature[2]	Nil	Annex C of IS 8887
vi)	Particle charge	Positive	Annex E of IS 8887
vii)	Miscibility with water	No Coagulation	Annex H of IS 8887
viii)	Tests on Residue by evaporation		Annex J of IS 8887
	a) Penetration at 25°C, 100 g, 5 s	5 - 25	IS 1203
	b) Softening point, °C, *Min*	55	IS 1205
	c) Solubility, percent, *Min*	97.5	IS 1216
ix)	Deposition on tyre rate, percent by mass, *Max*	10	Annex A

NOTE –

1 The sieve result is tested for reporting purpose only or as agreed between buyer and supplier.
2 This requirement shall be applicable only under conditions where the ambient temperature is below 15°C.

5 SAMPLING AND CRITERIA OF CONFORMITY

5.1 For the purpose of testing, the size of the sample and the sampling procedure from drums, barrels or bulk supply shall be as described in IS 1201 subject to the following:

5.1.1 *From Drums or Barrels* ― The content of drum or barrel from which the sample is to be taken shall be thoroughly mixed by rolling the container to and for a period of 2 to 3 min, for a distance of 50 m, successively in opposite direction, allowing at least five revolutions of the container in each direction and then up-ending the container through two revolutions first in one direction and then in the opposite direction.

5.1.2 *From Bulk* ― Where practicable, bulk delivery of bitumen emulsion shall be agitated by the forced circulation or air agitation, before sampling.

5.1.3 The sample of bitumen emulsion shall be drawn within 24 h after delivery and tested within 7 days from the date of the drawing unless otherwise specified.

5.2 Preparation of Samples

Before carrying out any of the tests, the sample shall be mixed by gentle shaking to ensure uniformity.

5.3 If the single sample from a single run fails to fulfill the test requirements specified in **4**, the sample shall be drawn on the basis of **5.1** for testing in the same manner. If these samples conform to the requirement of **4,** the lot shall be accepted otherwise the lot shall be rejected.

6 MARKING

6.1 Each container shall be legibly and indelibly marked with the following:

a) Indication of the source of manufacture;
b) Month and year of manufacture;
c) Batch number;
d) Date of expiry; and
e) Any other statutory requirements.

6.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the BIS Act, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

Annex A
Method of Test for Tyre Deposition Rate
[*Table* 1, *Sl No.* (ix)]

A-1 GENERAL

This test is conducted to evaluate the effect of tyre adhesion resistance of Trackless Bitumen Emulsion. This test method is used to identify the adhesiveness of Trackless Type Emulsion and Conventional Emulsion to vehicle tyre.

A-2 APPARATUS

A-2.1 Balance, capable of weighing 0.01 g or less.

A-2.2 Brush and/or rubber spatula, which enables applying emulsion uniformly.

A-2. 3 A slate board, with 300 mm (l) x 300 mm (w) x 3 mm (t).

A-2.4 Tyre Deposition Rate Test Equipment

The tyre deposition rate test equipment is shown in Fig 1 below:

FIG. 1 TYRE DEPOSITION RATE TEST EQUIPMENT

A-2.4.1 *Wheel Tracking Test Apparatus* − Number of wheel pass and loading must be adjustable. The wheel can be loaded at specific place on the specimen.

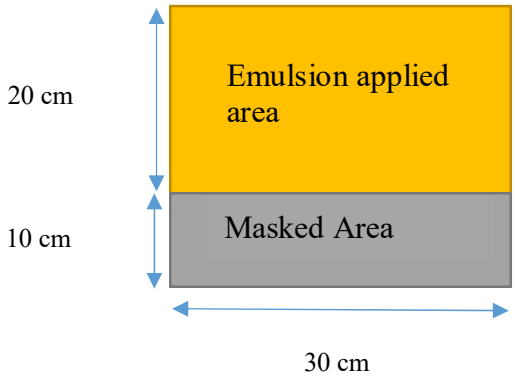
A-2.4.2 *Natural Rubber Sheet,* with 300 ± 100 mm (l) x 3 mm (w).

A-3 PREPARATION OF SPECIMEN

A-3.1 Apply specific amount of emulsion, to achieve the residue content of 300 g/m^2, as mentioned in test conditions (*see* **A-3.4**), on a slate board with brush or spatula. The emulsion shall be applied uniformly. Apply emulsion in a single stroke.

A-3.2 The specimen shall be kept at room temperature, till it sets (~30 minutes). Cure until the emulsion is completely broken (color turn to black).

A-3.3 Prior to the test, mask a tape on a part of specimen where loading wheel stands by, to prevent error due to the difference of contact time.



A-3.4 Testing Condition or Specimen condition

Testing Condition of the specimen is given below:

Parameter	*Condition*
Amount of emulsion to be applied	Converted in solid: 300 g/m^2
Temperature	60 $\pm$ 1 ºC
Curing time	4 *h, min*
Loading of wheel	624N ± 10 N
Number of wheel pass	1 cycle (back and forth)

Emulsion shall be applied corresponding to a residue content of 300 g/m^2.

Testing temperature shall be 60 ± 1°C

Place the wheel on the masked part of the specimen. Then, pass the wheel back and forth at once.

A-4 PROCEDURE

A-4.1 Maintain the prepared specimen and rubber sheet in oven at 60 ± 1°C and cure them for a minimum time of 4 h.

A-4.2 Measure the mass of rubber sheet just prior to testing. Place the rubber sheet on the specimen where wheel passes, then run the wheel back and forth (1 pass each). After the wheel has passed, remove the rubber sheet in a vertical direction within 2 seconds. Weigh the mass of rubber sheet as soon as possible, record the mass of deposited bitumen.

A-4.3 Repeat **A-4.2** at least at 3 points per specimen.

A-5 CALCULATION

Based on the test result, calculate the tyre deposition rate as follows:

$$\text{Tire Deposition Rate (\%)} = \frac{W2 - W1}{A1 \times AER} \times 100$$

where,

W_1 = Deposition mass before test in g;
W_2 = Deposition mass after test in g;
A_1 = Area of tyre pass in m^2; and
AER = Applied Emulsion residue in g/m^2

A-6 REPORT

The report shall include:

a) Type of emulsion;
b) Applied emulsion residue;
c) Testing temperature;
d) Loading; and
e) Tyre deposition rate.