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Draft Indian Standard

TRACKLESS EMULSION – SPECIFICATION

ICS 93.080.20

Bitumen, Tar and Related Products Sectional
Committee, PCD 06

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FOREWORD

(Formal clauses will be added later)

Trackless emulsions may be used as a binder for tack coat, penetration macadam, surface dressing (chip seal) and fog seal. Its implementation is especially beneficial in scenarios where curing time is limited, facilitating better adhesion between existing and new layers.

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.

Based on the comments on earlier wide circulated document and analysis report of CSIR – Central Road Research Institute, following changes have been made in the document:

- i) Specific requirements of residue (from 0.3 to 0.1), penetration (from 5 – 25 to 10 – 30), and solubility (from 97.5 to 99) have been modified.*
- ii) Dimension of granite specimen mounting plate, natural rubber sheet / rubber sheet, and condition of loading of wheel have been modified.*
- iii) Marking clause for supply of material in bulk has been incorporated.*
- iv) Uses of emulsion have been incorporated in the foreword.*

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 (*second revision*)’. 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 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:

<i>IS No.</i>	<i>Title</i>
IS 73 : 2013	Paving bitumen — Specification (<i>fourth revision</i>)
IS 334 : 2023	Glossary of terms relating to bitumen and tar (<i>fourth revision</i>)
IS 1201 : 2021	Methods of testing tar and bituminous materials — Sampling of Bituminous Materials (<i>second revision</i>)
IS 1203 : 2022	Methods of testing tar and bituminous materials — Determination of penetration (<i>second revision</i>)
IS 1205 : 2022	Methods for testing tar and bituminous materials — Determination of softening point ring and ball apparatus (<i>second revision</i>)
IS 1216 : 2023	Tar and Bituminous Materials — Methods for Test — Determination of Solubility in Trichloroethylene (<i>second revision</i>)
IS 3117 : 2004	Bitumen emulsion for roads and allied applications (anionic type) — Specification (<i>first revision</i>)
IS 8887 : 2018	Bitumen emulsion for roads (Cationic Type) — Specification (<i>third revision</i>)
IS 15462 : 2019	Polymer modified bitumen (PMB) — Specification (<i>first revision</i>)
IS 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 4.2 and 4.4)

Sl No.	Characteristics	Requirements	Methods of Test Ref to IS/ Annex
(1)	(2)	(3)	(4)
i)	Residue on 600 μm IS Sieve ¹ , percent by mass, <i>Max</i>	0.1	Annex B of IS 8887
ii)	Residue by evaporation, percent, <i>Min</i>	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, <i>Max</i>	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	10 - 30	IS 1203
	b) Softening point, °C, <i>Min</i>	55	IS 1205
	c) Solubility, percent, <i>Min</i>	99	IS 1216
ix)	Deposition on tyre rate, percent by mass, <i>Max</i>	10	Annex A

NOTES

- 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 min 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) Type/Grade,
- d) Batch No., and
- e) Date of expiry.

6.1.1 For supplies of material in bulk, a test certificate containing the following information shall be provided for each container.

- a) Name of the manufacturer and his recognized trade mark, if any
- b) Name and grade of the material,
- c) Month and year of manufacture
- d) Batch number,
- e) Supply date,
- f) Tanker/ Container ship number,
- g) Quantity, and
- h) Date of expiry

6.1.2 BIS Certification Marking

The container may also be marked with the Standard Mark.

6.1.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standard Act, 2016* and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

[Table 1, Sl No. (ix)]

METHOD OF TEST FOR TYRE DEPOSITION RATE

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 0.01g or less.

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

A-2.3 A granite specimen mounting plate, with 400 mm (l) × 400 mm (w) × 10 mm (t).

A-2.4 Tyre Deposition Rate Test Equipment

Soft rubber wheel dia ranging from 7 cm to 10 cm with 56.7 kg, reciprocating to a length of minimum 25 cm in 40 to 50 cycles per min. The tyre deposition rate test equipment is shown in Fig 1 below:

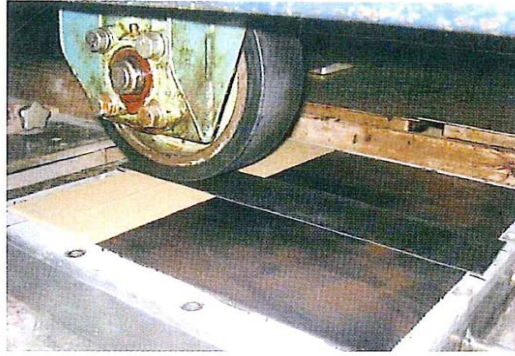


FIG. 1 TYRE DEPOSITION RATE TEST EQUIPMENT

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.

Using tyre width and stroke length, the area for tyre deposition in m^2 to be calculated

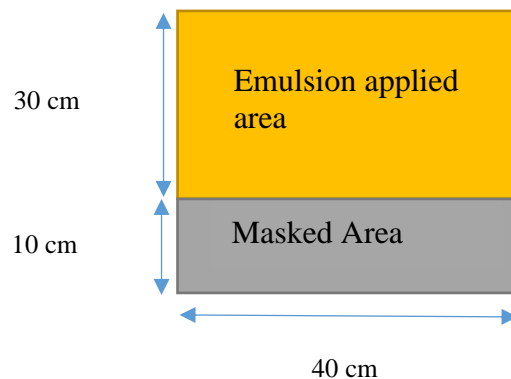
A-2.4.2 Natural Rubber Sheet / rubber sheet, with (300 ± 100) mm (l) \times (60 ± 10) mm (w) \times 3 mm (t)

A-3 PREPARATION OF SPECIMEN

A-3.1 Apply specific amount of emulsion, to achieve the emulsion 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 min). Cure at ambient temperature until the emulsion is completely broken (color turn to black). After breaking of emulsion, the sample shall be placed in oven at $60 \text{ }^\circ\text{C}$ for 4 h.

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:

<i>Parameter</i>	<i>Condition</i>
Amount of emulsion to be applied	300 g/m ²
Temperature	(60 ± 1) °C
Curing time	4 h, min
Loading of wheel	56.7 kg ± 1kg
Number of wheel pass	10 cycle (back and forth)

NOTES

- 1) Emulsion shall be applied corresponding to a residue content of 300 g/m².
- 2) 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) within 3 min of removing from the oven. After the wheel has passed, remove the rubber sheet in a vertical direction within 2 s. 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

$$\text{Tire Deposition Rate (percent)} = \frac{W_2 - W_1}{A_1 \times AE} \times 100$$

where,

- W_1 = Deposition mass before test in g;
- W_2 = Deposition mass after test in g;
- A_1 = Area of tyre pass in m²; and
- AE = Applied Emulsion in g/m²

A-6 REPORT

The report shall include:

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