**Doc: PCD 06 (14176) F**

***भारतीय मानक***

***Indian Standard***

**IS XXXXXX**

**ट्रैकलेस इमल्शन — विशिष्टि**

**Trackless Emulsion —**

**Specification**

ICS 75.140

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भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

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**August 2024 Price Group X**

Bitumen, Tar and Related Products Sectional Committee, PCD 06

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards after the draft finalized by the Bitumen, Tar and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Product Division Council.

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 and CSIR - Central Road Research Institute, New Delhi.

The Composition of the Committee responsible for formulation of this standard is given in Annex C.

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.

*Indian Standard*

TRACKLESS EMULSION — SPECIFICATION

**1 SCOPE**

This 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 standards listed in Annex A 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 edition of these standards.

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**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) |
|  | Residue on 600 µm IS Sieve1, percent by mass, *Max* | 0.1 | Annex B of IS 8887 |
|  | Residue by evaporation, percent, *Min* | 50 | Annex J of IS 8887 |
|  | Saybolt furol viscosity (SFS) at 25 ℃, s | 10 to 50 | Annex A of IS 3117 |
|  | Storage stability after 24 h, percent, *Max* | 1 | Annex D of IS 8887 |
|  | Coagulation of emulsion at low temperature2 | Nil | Annex C of IS 8887 |
|  | Particle charge | Positive | Annex E of IS 8887 |
|  | Miscibility with water | No coagulation | Annex H of IS 8887 |
|  | Tests on Residue by evaporation |  | Annex J of IS 8887 |
|  | a) Penetration at 25 ℃, 100 g, 5 s | 10 to 30 | IS 1203 |
|  | b) Softening point, ℃, *Min* | 55 | IS 1205 |
|  | c) Solubility, percent, *Min* | 99 | IS 1216 |
| ix) | Deposition on tyre rate, percent by  mass, *Max* | 10 | Annex B |
|  | | | |

**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 upending 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:

1. Name of the manufacturer and his recognized trade mark; if any
2. Name and grade of the material;
3. Month and year of manufacture;
4. Batch number; and
5. 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.

1. Name of the manufacturer and his recognized trade mark; if any
2. Name and grade of the material;
3. Month and year of manufacture;
4. Batch number;
5. Supply date;
6. Tanker/container ship number,

g) Quantity; and

h) Date of expiry

**6.1.2** *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 *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

**ANNEX A**

(*Clause* 2)

**LIST OF REFERRED STANDARDS**

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**ANNEX B**

[*Table* 1, *Sl No*. (ix)]

**METHOD OF TEST FOR TYRE DEPOSITION RATE**

**B-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.

**B-2 APPARATUS**

**B-2.1 Balance —** Capable of weighing 0.01g.

**B-2.2 Brush and/or rubber spatula —** Which enables applying emulsion uniformly.

**B-2. 3** A granite specimen mounting plate, with 400 mm (l) × 400 mm (w) ×10 mm (t).

**B-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 cycles per min to 50 cycles per min. The tyre deposition rate test equipment is shown in Fig 1 below:



Fig. 1 Tyre Deposition Rate Test Equipment

**B-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 m2 to be calculated.

**B-2.4.2** *Natural Rubber Sheet / rubber sheet,* with (300 ± 100) mm (l) × (60 ± 10) mm (w) × 3 mm (t)

**B-3 PREPARATION OF SPECIMEN**

**B-3.1** Apply specific amount of emulsion, to achieve the emulsion content of 300 g/m2, as mentioned in test conditions (*see* **B-3.4**), on a slate board with brush or spatula. The emulsion shall be applied uniformly. Apply emulsion in a single stroke.

**B-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 °C for 4 h.

**B-3.3** Prior to the test, mask a tape on a part of specimen (*see* Fig. 2) where loading wheel stands by, to prevent error due to the difference of contact time.

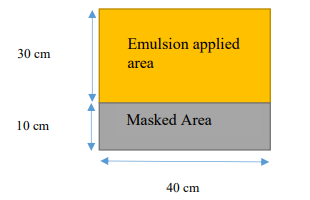


Fig. 2 Illustration of Area of Specimen

**B-3.4** **Testing Condition or Specimen Condition**

Testing Condition of the specimen is given below:

|  |  |  |
| --- | --- | --- |
| *Sl No.* | *Parameter* | *Condition* |
|  |  |  |
|  | Amount of emulsion to be applied | 300 g/m2 |
|  | Temperature | (60 ± 1) ºC |
|  | Curing time | 4 *h, min* |
|  | Loading of wheel | 56.7 kg ± 1 kg |
|  | Number of wheel pass | 10 cycle (back and forth) |
|  | | |

**B-4 PROCEDURE**

**B-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.

**B-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.

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

**A-5 CALCULATION**

Tire deposition rate (percent) =

where

, in g,

*W1* = Deposition mass, in g, before test;

*A1*= Area, in m2, of tyre pass; and

*AE* = Applied, in g/m2, emulsion.

**B-6 REPORT**

The report shall include:

* 1. Type of emulsion;
  2. Applied emulsion;
  3. Testing temperature;
  4. Loading; and
  5. Tyre deposition rate.

**ANNEX C**

(*Foreword*)

**COMMITTEE COMPOSITION**

Bitumen, Tar and Related Products Sectional Committee, PCD 06



| *Organization* | *Represenative(s)* |
| --- | --- |
| CSIR - Central Road Research Institute, New Delhi | Prof Manoranjan Parida **(Chairperson)** |
| Airports Authority of India, New Delhi | Shri Vinod Kumar Sharma  Shri Suprio Gosh (Alternate) |
| Bharat Oman Refineries Limited, Bina | Shri Saumyakanta Panda  Shri Adalazhagan K (Alternate) |
| Bharat Petroleum Corporation Limited Corporate Research & Development Centre, Greater Noida | Shrimati Sonal Maheshwari  Shrimati Jaya Rawat (Alternate) |
| Bharat Petroleum Corporation Limited, Mumbai | Dr Tushar S. Thorat  Shri Vinay V. Suve (Alternate) |
| Birla Institute of Technology and Science, Pilani | Prof Sridhar Raju  Prof V. Vinayaka Ram (Alternate) |
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| Chennai Petroleum Corporation Limited, Chennai | Shri H. Ramakrishnan  Shri M. Balaguru (Alternate) |
| CSIR - Central Building Research Institute, Roorkee | Dr P. C. Thapaliyal  Dr Jeeshan Khan (Alternate) |
| CSIR - Central Road Research Institute, New Delhi | Dr Ambika Behl  Dr Siksha Swaroop Kar (Alternate) |
| CSIR - Indian Institute of Petroleum, Dehradun | Shri Manoj Srivastava  Dr Kamal Kumar (Alternate) |
| CSIR - North East Institute of Science and Technology, Jorhat | Dr Shashi D. Baruah  Dr B. P. Baruah (Alternate) |
| Dilip Buildcon Limited, Bhopal | Shri B. B. Kameswara Rao  Shri Ravi Kumavath (Alternate) |
| Directorate General Border Roads, New Delhi | Lt Col Nitin Chandra Joshi |
| Directorate General of Quality Assurance, Ministry of Defence, Kanpur | Shri Om Prakash Singh |
| Directorate General of Quality Assurance, New Delhi | Shri A. K. Kanaujia  Shri Sachin Vinayak Zope (Alternate) |
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| GP Global Asphalt Private Limited, New Delhi | Shri Amit Bhardwaj |
| G R Infra-Projects Limited, Gurugram | Shri U. C. Gupta |
| Highways Research Station, Chennai | Shrimati Er S. Usha Devi  Shri Er S. Yamini (Alternate) |
| Hindalco Industries Limited, Mumbai | Shri Harshad Kumar Pandit  Shri Krishnan Venkatesh (Alternate) |
| Hindustan Colas Private Limited, Mumbai | Shri T. K. Subhaash  Shri K. G. Ranganatha (Alternate) |
| Hindustan Petroleum Corporation Limited (HP Green R & D Center), Bengaluru | Shri B. Ravi  Shri K. Raghava Krishna (Alternate) |
| Hindustan Petroleum Corporation Limited, Mumbai | Shri Santosh Dhaku Bhogale  Shri Abhishek Dosodia (Alternate) |
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| Indian Institute of Technology Delhi, New Delhi | Shri Aravind Swamy |
| Indian Institute of Technology Madras, Chennai | Dr Atul Narayanan |
| Indian Institute of Technology Roorkee, Roorkee | Shri Sham Sundar Ravindranath |
| Indian Oil Corporation Limited, New Delhi | Dr N. S. Raman |
| Indian Oil Corporation Limited - Refineries and Pipelines Division, New Delhi | Ms Anindita Moitra  Shri Soumen Mondal (Alternate) |
| Indian Oil Corporation (R and D Centre), Faridabad | Dr I. Devotta  Shri Dhanesh Kumar (Alternate) |
| Indian Oil Total Private Limited, Mumbai | Dr. Pankaj Kumar Jain  Shri Gaurav Gogne (Alternate) |
| Indian Road Congress, New Delhi | Shri S. K. Nirmal  Shri R. V. Patil (Alternate) |
| IIT Guwahati | Shri Rajan Choudhary |
| IRB Infrastructure Developers Limited, Mumbai | Shri Sudhir Hoshing  Shri Jitender Chauhan (Alternate) |
| Larsen and Toubro Infotech Limited, Mumbai | Shri S. Naga Srinivasa Sarma  Shri Deepak Gaikwad (Alternate) |
| Mangalore Refinery and Petro Chemical Limited, Mangalore | Shri Yogeesha  Shrimati Anitha Shetty (Alternate) |
| Ministry of Road Transport and Highways, New Delhi | Dr Bidur Kant Jha |
| National Highways Authority of India, New Delhi | Shri S. K. Mishra  Shri A. K. Sabharwall (Alternate) |
| National Institute of Technology, Warangal | Dr Venkaiah Chowdary  Dr S. Shankar (Alternate) |
| National Rural Roads Development Agency, New Delhi | Shri B. C. Pradhan |
| National Test House, Kolkata | Ms Anshumala Shukla |
| Nayara Energy Limited, Mumbai | Shri Narhar Deshpande  Shri Ketankumar Patel (Alternate) |
| Om Infracon Private Limited, Guwahati | Shri A. N. Das  Shri Manish Bajaj (Alternate) |
| Ooms Polymer Modified Bitumen Private Limited, Gurugram | Shri B. R. Tyagi  Shri Palash Kathal (Alternate) |
| Shell Bitumen India Private Limited, Gurgaon | Shri Nilanjan Sarker |
| Zydex Industries Limited | Dr Mikhil Ranka  Shri Himanshu Agarwal (Alternate) |
| In Personal Capacity (*Karanpura House, 50 Raj Bhawan Road Civil Lines, Jaipur - 302006*) | Shri P. S. Kandhal |
| BIS Directorate General | Shrimati Meenal Passi, Scientist ‘F’/Senior Director and Head (Petroleum, Coal and Related Products) [Represenating Director General (Ex-officio)] |
| *Member Secretary*  Shri Hari Mohan Meena  Scientist ‘C’/Deputy Director  (Petroleum, Coal and Related Products), BIS | |

PCD 06: P4 Panel for Trackless Emulsion

|  |  |
| --- | --- |
| *Organization* | *Representative(s)* |
| CSIR - Central Road Research Institute, New Delhi | Dr Siksha Swaroop Kar **(*Convenor*)** |
| Hindustan Colas Private Limited, Mumbai | Shri T. K. Subhaash |
| Indian Oil Total Private Limited, Mumbai | Dr. Pankaj Kumar Jain |
| Ooms Polymer Modified Bitumen Private Limited, Gurugram | Shri B. R. Tyagi |
| Shell Bitumen India Private Limited, Gurugram | Shri Nilanjan Sarker |