IS 5317 (2002): Pitch-Mastic for Bridge Decking and Roads - [CED 5: Flooring, Wall Finishing and Roofing]

BLANK PAGE

भारतीय मानक

पुल की डैकिंग और सड़कों के लिए पिच-मास्टिक — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

PITCH-MASTIC FOR BRIDGE DECKING AND ROADS — SPECIFICATION

(Second Revision)

ICS 93.040;93.080.20

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2002

Price Group 3

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Flooring, Wall Finishing and Roofing Sectional Committee had been approved by the Civil Engineering Division Council.

Pitch-mastic has proved to be a suitable surfacing material for bridge decks, bus stops and roads. The ability of pitch-mastic to absorb shocks and vibrations, to self-heal cracks and to prevent bleeding, makes it suitable for selection as a surfacing material. But in places where abundant fuel oil drippings are expected, the use of pitch-mastic as a surfacing material is not desirable. This standard was first published in 1969. In this revision, Table 1 has been revised in view of better suitability of harder grade bitumen for use in pitch-mastic surfacing specially where pavement temperature exceeds 50°C in summer months.

In this revision besides certain editorial changes, the anti-skid properties of pitch-mastic have been strengthened.

The composition of the Committee responsible for formulation of this standard is given at Annex B.

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 : 1960 '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.

Indian Standard

PITCH-MASTIC FOR BRIDGE DECKING AND ROADS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard covers the requirements of pitch-mastic used as a surfacing material for bridge decks and roads.

2 REFERENCES

The Indian Standards given at 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 agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated at Annex A.

3 TERMINOLOGY

For the purpose of this standard the terminology given in IS 334 shall apply.

4 MATERIALS

4.1 Bitumen

The physical properties of bitumen used shall conform to those specified in Table 1 when tested in accordance with the method of tests specified therein.

Table 1 Physical Properties of Bitumen

Sl No.	Characteristic	Requirement	Method of Test, Ref to IS No.
	(1)	(2)	(3)
i)	Softening point (ring and ball method)	50-90°C	1205
ii)	Penetration at 25°C in 1/100 cm	10 to 40	1203
iii)	Ductility at 27°C, *Min*, cm	3	1208
iv)	Loss of heating, percent, *Max*	1	1212
v)	Solubility in carbon disulphide, percent, *Min*	99	1216

NOTE — Paving bitumen of Grade S35 conforming to IS 73 and industrial bitumen of Grade 85/25 conforming to IS 702, are two typical examples of binder which will satisfy the requirements of this table.

4.2 Filler

The filler shall be lime stone powder passing 75 micron IS Sieve and shall have a calcium carbonate content of not less than 80 percent by weight when determined in accordance with the method specified in Annex C of IS 1195.

4.3 Aggregates

The aggregates shall be of the following two types:

a) Fine aggregate, and

b) Coarse aggregate.

4.3.1 *Fine Aggregate*

The fine aggregate shall consists of naturally occurring sand and crushed lime stone, or crushed hard-rock. The grading of the fine aggregates inclusive of the filler is given in Table 2, for guidance.

Table 2 Grading of Fine Aggregate

Sl No.	Passing IS Sieve	Retained on IS Sieve	Percent by Mass	
			Minimum	Maximum
(1)	(2)	(3)	(4)	(5)
i)	75-micron	–	0	5
ii)	212-micron	75-micron	10	20
iii)	600-micron	212-micron	5	35
iv)	2.36 mm	600-micron	0	25

4.3.2 *Coarse Aggregate*

The coarse aggregate shall consist of hard durable crushed rock having aggregate impact value of not more than 20 and abrasion value not more than 40 when tested in accordance with the method specified in IS 2386(Part 4).

5 MANUFACTURE AND COMPOSITION

The manufacture of pitch-mastic consists of two stages. The first stage shall be mixing of filler and fine aggregates and then heating the mixture to a temperature of 170 to 205°C. Required quantity of bitumen shall be heated to 170 to 180°C and added to the aggregate. They shall be mixed and cooked in mechanically agitated mixer called mastic cooker for 2 to 3 h until the materials are thoroughly mixed. During mixing, care shall be taken to ensure that the contents in the cooker are at no time heated to a temperature exceeding 205°C.

5.1.1 In cases where the material is not required for immediate use, it shall be cast into blocks weighing about 25.kg.

5.2 If required to be verified, the mastic block shall show on analysis a composition within the limits set in Table 3. The analysis of the pitch-mastic shall be done in accordance with the method specified in Annex D of IS 1195.

Table 3 Composition of Pitch-Mastic (Without Coarse Aggregates)

(Clauses 5.2 *and* 6.1)

Sl No.	Requirements	Percent by Mass of Mastic Without Coarse Aggregates	
		Minimum	Maximum
(1)	(2)	(3)	(4)
i)	Bitumen	14	17
ii)	Passing 75-micron IS Sieve	25	45
iii)	Passing 212-micron IS Sieve and retained on 75-micron IS Sieve	8	18
iv)	Passing 600-micron IS Sieve and retained on 212-micron IS Sieve	4	30
v)	Passing 236 micron IS Sieve and retained on 600-micron IS Sieve	0	22

5.3 The second stage shall consist of the incorporation of the coarse aggregates. When the pitch-mastic is to be transported directly to the site of work, a quantity of coarse aggregate 6 to 20 mm normal size to form not less than 30 percent and not more than 50 percent by mass of the final mixture shall be added and thoroughly incorporated with the mastic in the cooker. The actual percentage of the coarse aggregates to be added shall be specified according to design requirements. When the material has been cast into blocks, these shall be reheated in the cooker to a temperature of not less than 170°C and not more than 205°C and the coarse aggregate as mentioned before shall be thoroughly incorporated in the mastic.

5.3.1 As an anti-skid measure, the pitch-mastic after spreading and while still hot and in plastic condition shall be covered with a layer of coarse/carborundum aggregate 12 to 20 mm size depending on thickness of mastic layer at the rate of about 2 to 13 kg/m^2 or about 0.15 to 0.2 m^2 per 100 m^2. Anti-skid properties of newly laid mastic shall be ensured by running a pump integrator. The coarse aggregate prior to application shall be coated with 2 to 3 percent by weight of S95 or S65 grade of paving bitumen and 2 to 3 percent filler. The coarse aggregate shall be rolled or otherwise pressed into the surface of mastic layer.

6 HARDNESS NUMBER

6.1 The pitch-mastic whose composition is given in Table 3 before the mixing of coarse aggregate, shall have hardness number of 60 to 80 at 25 °C.

6.2 After the addition of the coarse aggregate as given in **5.3**, the pitch-mastic composition shall have hardness number between 10 and 20 at 25 °C.

NOTE — The range of hardness number values given under **6.1** and **6.2** are only suggestive and actual hardness number desired may be decided based on the type binder used and the pavement temperature.

6.3 The hardness number shall be determined in accordance with the method specified in Annex E of IS 1195.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 During Discharge from Mixer

Three or more separate portions of not more than 5 kg each of pitch-mastic shall be taken at intervals during the discharge of the mixer. The specimen shall include portions taken at beginning or at the end of discharge except in cases where the practice of returning to the mixer, the first and last portions discharged, is followed. The portions shall then be thoroughly mixed at a temperature of 150 to 205 °C. The mixed discharge shall be floated out on an iron plate with the aid of a wooden float to a thickness not less than 25 mm. While still warm the specimen shall be loosened from the plate and a representative portions weighing not less than 5 kg if ungritted (without coarse aggregate) and not less than 10 kg if gritted (with coarse aggregate) shall be forwarded to the laboratory for examination with full particulars as given in **7.3**.

7.2 Blocks

Material in block form shall be sampled by taking approximately equal amounts in pieces from not less than 6 blocks taken at random. The total specimen of not less than 5 kg if ungritted and not less than 10 kg if gritted shall be forwarded to the laboratory for examination with full particulars as given in **6.3**.

7.3 Labelling

The specimen shall be adequately identified and the identification shall provide for reference to a schedule which shall be sent giving the appropriate items for the following:

a) Name and address of authority giving instructions for the examination to be carried out;
b) Sample number;
c) Type of material;

d) Type of binder;
e) Type of aggregates;
f) Specification with which the material is intended to comply;
g) Name and location of mixing plant;
h) Sample taken before or after laying;
j) Date of mixing, if known;
k) Date of laying, if known;
m) Date of sampling;
n) Site where laid;
p) Position from which sample was taken;
q) Number and nominal thickness of course;
r) Nature of foundation;
s) Nature of surface treatment (if any); and
t) Test to be made, or information sought.

7.3.1 To facilitate testing and interpretation of test results, it is essential that as much information as possible shall be given to the laboratory.

7.4 Criteria for Conformity

The pitch-mastic shall be considered as conforming to this specification if the requirements given in **5.2, 6.1** and **6.2** are satisfied.

8 MARKING

8.1 If cast into blocks for storage, the date of manufacture and name of the manufacturer shall be indicated suitably.

8.2 BIS Certification Marking

The pitch-mastic may also be marked with the Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which a licence 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

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
73 : 1992	Specification for paving bitumen (*second revision*)
334 : 1982	Glossary of terms relating to bitumen and tar (*second revision*)
702 : 1998	Specification for industrial bitumen (*second revision*)
1195 : 2002	Bitumen mastic for flooring (*third revision*)
1203 : 1978	Determination of penetration
1205 : 1978	Determination of softening point
1208 : 1978	Determination of ductility
1212 : 1978	Determination of loss on heating
1216 : 1978	Determination of solubility in carbon disulphide trichloroethylene
2386 (Part 4): 1963	Methods of test for aggregates for concrete: Part 4 Mechanical properties

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Flooring, Wall Finishing and Roofing Sectional Committee, CED 5

Organization	*Representative(s)*
In Personal Capacity (*A-39/8, DDA Flats, Munirka, New Delhi 110067*)	SHRI P. B. VIJAY (***Chairman***)
All India Brick & Tile Manufacturers Federation, New Delhi	SHRI S. P. BANSAL
Bhor Industries Limited, Mumbai	SHRI K. L. SHAH SHRI R. K. PATEL (*Alternate*)
Builder's Association of India, Mumbai	SHRI W. R. TALWAR SHRI PAWAN TALWAR (*Alternate*)
Building Materials and Technology Promotion Council, New Delhi	SHRI J. SENGUPTA
CEAT Limited, Hyderabad	SHRI S. SUNDRAM SHRI RAJENDER PAL (*Alternate*)
Central Building Research Institute, Roorkee	SHRI LATHIKA JAISINGH SHRI S. K. MITTAL (*Alternate*)
Central Public Works Department, New Delhi	CHIEF ENGINEER (CSQ)
Engineer-in-Chief's Branch, Army Headquarters, New Delhi	SHRIMATI UPINDER KAUR SHRIMATI RIVOO MAHINDRU (*Alternate*)
Hindustan Zinc Limited, Udaipur	SHRI C. S. MEHTA
India Meteorological Department, New Delhi	SHRI A. V. R. K. RAO SHRI S. C. GOYAL (*Alternate*)
In Personal Capacity (*C-474B, Sushant Lok, Phase I, Gurgaon, Haryana*)	SHRI O. P. RATRA
In Personal Capacity (*5-9-101/J, Ist Floor, Public Garden Road, Hyderabad 500001, Andhra Pradesh*)	SHRI MUZAFFAR ALI KHAN
Indian Institute of Technology, Kharagpur	MS RAJNI AHUJA
Institution of Engineers (India) Limited, Kolkata	SHRI P. B. VIJAY
Maharashtra Engineering Research Institute, Nasik	CHIEF ENGINEER & DIRECTOR SCIENTIFIC RESEARCH OFFICER (*Alternate*)
Ministry of Railways (RDSO), Lucknow	EXECUTIVE ENGINEER (P&D-II) EXECUTIVE ENGINEER (P&D-I) (*Alternate*)
Modern Tiles & Marble, New Delhi	SHRI A. C. KAPOOR SHRI SUBHASH KAPOOR (*Alternate*)
National Test House, Kolkata	SHRI D. K. KANUNGO SHRI R. KAPOOR (*Alternate*)
Prodorite Anti-Corrosives Limited, Chennai	SHRI M. ANNAMALAI DR P. SACHINDRAPAL (*Alternate*)
Projects & Development India Limited, Sindri	DR P. K. JAISWAL SHRI A. K. PAL (*Alternate*)
Public Works Department, Chennai	SUPERINTENDING ENGINEER (P&D) EXECUTIVE ENGINEER (*Alternate*)
Rashtriya Pariyojna Nirman Nigam Limited, New Delhi	SHRI R. C. KEHRAM SHRI B. B. KANWAR (*Alternate*)
Steel Authority of India Limited, Ranchi	SHRI S. SAH SHRI RAVICHANDRAM (*Alternate*)
STP Limited, Kolkata	SHRI T. K. ROY SHRI B. B. BANERJEE (*Alternate*)
BIS Directorate General	SHRI S. K. JAIN, Director and Head (Civ Engg) [Representing Director General (*Ex-Officio*)]

Member Secretary

SHRI R. K. GUPTA

Joint Director (Civ Engg), BIS

(*Continued on page 5*

(*Continued from page* 4)

Bituminous Flooring, Wall Covering And Roofing Subcommittee, CED 5 : 5

Organization	*Representative(s)*
In Personal Capacity (*B-190, Sector 55, Noida 201301, UttarPradesh*)	SHRI R. S. SHUKLA (*Convener*)
Bharat Petroleum Corporation Limited, Mumbai	SHRI P. C. SRIVASTAVA SHRI J. A. JANAJ (*Alternate*)
Building Materials and Technology Promotion Council, New Delhi	SHRI J. SENGUPTA
Central Building Research Institute, Roorkee	SHRI M. ASLAM DR R. S. SRIVASTAVA (*Alternate*)
Central Road Research Institute, New Delhi	HEAD (FLEXIBLE PAVEMENTS) SHRI SATENDER KUMAR (*Alternate*)
Prodorite Anti-Corrosive Limited, Chennai	SHRI R. SRINIVASAN SHRI M. ANNAMALAI (*Alternate*)
Engineer-in-Chief's Branch, Army Headquarters, New Delhi	COL S. K. HAJELA SHIRIMATI UPINDER KAUR (*Alternate*)
Engineers India Limited, New Delhi	SHRI J. K. BHAGCHANDANI SHRI S. DAS (*Alternate*)
Hindustan Petroleum Corporation Limited, Mumbai	SHRI S. K. BHATNAGAR SHRI C. V. RAMASWAMY (*Alternate*)
Indian Oil Corporation Limited, New Delhi	SHRI K. V. GURUSWAMY
Light Roofing Limited, Chennai	SHRI A. FEZELUL HAQ SHRI V. SIVARAJ (*Alternate*)
Lloyd Insulation (India) Private Limited, New Delhi	SHRI MOHIT KHANNA SHRI K. K. MITRA (*Alternate*)
S. N. Industries, New Delhi	SHRI D. N. ROY SHRI B. MOITRA (*Alternate*)
STP Limited, Kolkata	SHRI T. K. ROY
Wasterwork Chemicals Private Limited, Mumbai	SHRI N. VEERAMANI SHRI G. R. PARAMESWARAN (*Alternate*)

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act,* 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc : No. CED 5 (5405)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :		Telephone
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110 002	323 76 17, 323 38 41
Eastern	: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi, KOLKATA 700 054	337 84 99, 337 85 61, 337 86 26, 337 91 20
Northern	: SCO 335-336, Sector 34-A, CHANDIGARH 160 022	60 38 43, 60 20 25
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600 113	254 12 16, 254 14 42, 254 25 19, 254 13 15
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East), MUMBAI 400 093	832 92 95, 832 78 58, 832 78 91, 832 78 92

Branches : AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. NALAGARH. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM

Reprography Unit, BIS, New Delhi, India