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SPECIFICATION FOR BITUMEN MASTIC FOR TANKING AND DAMP-PROOFING

(First Revision)

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(*Continued on page* 2)

(*Continued from page* 1)

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0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 30 June 1987, after the draft finalized by the Waterproofing and Damp-proofing Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Bitumen mastic has proved to be a suitable damp-proofing material for underground tanks, basements, etc. The inherent quality of mineral components and its binder to resist dampness, decay, bacterial contamination, weathering, etc, makes bitumen mastic suitable for use as a good damp-proofing material. This standard is intended to provide the required guidance in proportioning of bitumen and aggregates so as to get bitumen mastic for tanking, damp-proofing, etc. The choice of materials and proportioning aims at obtaining dense voidless mix to ensure imperviousness, the required flexibility of the mastic and the workability to ensure case of application.

0.3 This standard was first published in 1970. The present revision incorporates the changes necessary due to developments and revision of other standards referred to in the standard. In this revision, use of carbon tetrachloride and trichloroethylene have been added in the physical properties of bitumen.

0.4 In the formulation of this standard, due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in the country.

0.5 This standard is one of a series of Indian Standard specifications on materials for use in waterproofing and damp-proofing of buildings. Other specifications published so far in the series are:

IS : 1322-1982 Specification for bitumen felts for waterpoofing and damp-proofing (*third revision*)

IS : 1580-1969 Specification for bituminous compounds for waterproofing and caulking purposes (*first revision*)

IS : 3037-1986 Specification for bitumen mastic for use in waterproofing of roofs (*first revision*)

IS : 3384-1986 Specification for bitumen primer for use in waterproofing and damp-proofing (*first revision*)

0.6 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*. 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

1.1 This standard covers the requirements for bitumen mastic used as covering material for damp-proofing of underground tanks, basements of buildings, water reservoirs, swimming pools, irrigation canals, etc.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 334-1982† and IS : 4911-1968‡ shall apply.

3. GENERAL CHARACTERISTICS

3.1 The bitumen mastic shall consist of a mixture of bitumen, aggregates and mineral filler in suitable proportions so as to give it a semi-fluid consistency when heated to about 180°C. The mastic at this temperature shall be easily compressible by trowels into a compact and uniform layer.

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 methods of tests specified therein.

*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to bitumen and tar (*second revision*).

‡Glossary of terms relating to bituminous waterproofing and damp-proofing of buildings.

TABLE 1 PHYSICAL PROPERTIES OF BITUMEN

(*Clause* 4.1)

Sl No.	Characteristic	Requirements	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Softening point (ring and ball method)	50 to 90°C	IS : 1205-1978[1]
ii)	Penetration at 25°C in 1/100 cm	20 to 40	IS : 1203-1978[2]
iii)	Ductility at 27°C (*Min*) in cm	3	IS : 1208-1978[3]
iv)	Loss on heating, percent (*Max*)	1	IS : 1212-1978[4]
v)	Solubility in CS_2, percent (*Min*) or Carbon tetrachloride or trichloroethylene	99	IS : 1216-1978[5]

Note — Paving bitumen of the grade S35 conforming to IS : 73-1961[6] and industrial bitumen of the grade 65/25, conforming to IS : 702-1961[7] are typical examples of binder which will satisfy the requirements of this table.

[1]Determination of softening point.
[2]Determination of penetration.
[3]Determination of ductility.
[4]Determination of loss on heating.
[5]Determination of solubility in carbon disulphide or trichloroethylene.
[6]Specification for paving bitumen (*revised*).
[7]Specification for industrial bitumen (*revised*).

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 Appendix A of IS : 1195-1978*.

4.3 Aggregates — Fine aggregates shall only be used. Fine aggregate shall consist of naturally occurring sand or crushed lime-stone or crushed hard rock. The grading of the aggregate is given in Table 2 for guidance.

5. MANUFACTURE AND COMPOSITION

5.1 The filler and fine aggregate shall be mixed together and heated to a temperature of 190 to 205°C. The required quantity of bitumen

*Specification for bitumen mastic for flooring (*second revision*).

shall be separately heated to 170 to 180°C and added to the aggregate. These shall be mixed and cooked in a mechanically agitated mastic cooker 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. Mechanical cooker should be such that it can discharge whole of the mix in about 30 minutes time.

TABLE 2 GRADING OF FINE AGGREGATES

(*Clause* 4.3)

Type of Sieve Used [*see* IS : 460 (Part 1)-1985]	Percentage by Weight
Passing 75 micron IS Sieve	0 to 10
Retained on 75 micron IS Sieve and passing 212 micron IS Sieve	10 to 18
Retained on 212 micron IS Sieve and passing 600 micron IS Sieve	40 to 54
Retained on 600 micron IS Sieve and passing 2·36 mm IS Sieve	24 to 40
Retained on 2·36 mm IS Sieve	Nil

5.2 If the mastic has to be pre-manufactured in the factory, and be cast into blocks and then taken to site, the mastic shall be prepared as given in **5.2.1**.

5.2.1 The filler and fine aggregates shall be properly mixed and heated to a temperature of 190 to 205°C. The required quantity of bitumen shall be separately heated to 170 to 180°C and added to the aggregate. These shall be mixed and cooked in a mechanically agitated mastic cooker, until the materials are thoroughly mixed. The mastic shall then be cast into blocks weighing about 25 kg.

5.2.2 When required, the bitumen mastic blocks shall be broken into convenient sizes, and remelted and mixed in the mastic cooker at the site of the work.

5.3 Composition — The composition of the bitumen mastic, when determined in the manner specified in Appendix C of IS : 1195-1978*, shall conform to the requirements given in Table 3.

*Specification for bitumen mastic for flooring (*second revision*).

TABLE 3 COMPOSITION OF BITUMEN MASTIC BY ANALYSIS

(*Clause* 5.3)

Sl No.	Requirements	Percentage by Weight Total Mastic
i)	Soluble bitumen	15 to 17
ii)	Aggregate passing 75-micron IS Sieve	42 to 52
iii)	Aggregate passing 212-micron IS Sieve and retained on 75-micron IS Sieve	3 to 10
iv)	Aggregate passing 600-micron IS Sieve and retained on 212-micron IS Sieve	15 to 25
v)	Aggregate passing 2·36 mm IS Sieve and retained on 600-micron IS Sieve	7 to 20
vi)	Aggregate retained on 2·36-mm IS Sieve	Nil

6. HARDNESS NUMBER

6.1 The hardness number of the bitumen mastic shall be between 20 and 50 at 25°C, when determined in the manner described in Appendix D of IS : 1195-1978*.

7. SAMPLING AND CRITERIA FOR CONFORMITY

7.1 During Discharge from Mixer — Three or more separate portions of not less than 5 kg each of bitumen 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 the 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 190 to 205°C. The mixture 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 portion weighting not less than 5 kg, shall be forwarded to the laboratory for examination.

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, shall be forwarded to the laboratory for examination.

*Specification for bitumen mastic for flooring (*second revision*).

7.3 Criteria for Conformity — The bitumen mastic shall be considered as conforming to this specification if the requirements given in **5.3** and **6.1** 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 product may also be marked with Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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