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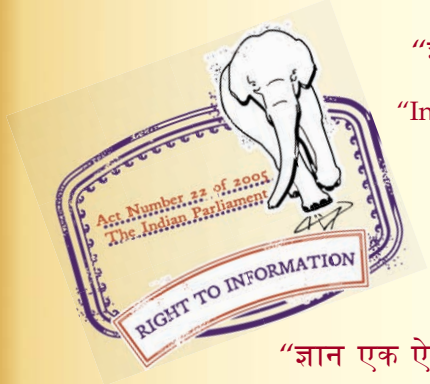

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CODE OF PRACTICE FOR LAYING BITUMEN MASTIC FLOORING

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(Second Revision)

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CODE OF PRACTICE FOR LAYING BITUMEN MASTIC FLOORING

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 31 January 1978, after the draft finalized by the Flooring and Plastering Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 This standard was first published in 1958 and subsequently revised in 1968. The second revision has been based on further experience gained during course of these years in the use of bitumen mastic. The salient features of this revision include information to the users regarding resistance of bitumen mastic floor finishes to chemical attack so that the use of bitumen mastic is fully appreciated in practice. Provisions for surface armouring to increase abrasion resistance for industrial purposes have also been incorporated. Information regarding provision of an isolating membrane has been suitably elaborated.

0.3 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 this country. This has been met by referring to BS CP 204 : 1965 '*In situ* floor finishes' issued by the British Standards Institution.

0.3.1 This code of practice represents a standard of good practice and, therefore, takes the form of recommendation.

0.4 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.

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

1. SCOPE

1.1 This standard lays down the procedure for laying bitumen mastic flooring and its maintenance.

1.2 It does not include provisions of acid resistant bitumen mastic.

1.3 Details of floor finishes, fixings and adhesives when bitumen mastic is used as a damp-proofing base are not included in this specification.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 334-1965* shall apply.

3. GENERAL

3.1 Necessary Information — For efficient planning and execution of flooring work, detailed data and information as given below shall be taken into account:

a) The function which the bitumen mastic flooring has to fulfil;

b) Type of traffic — light, medium or heavy;

c) Wheeled conveyors, loads and rates of travel, types and widths of wheel or tyre;

d) Weight of standing loads, nature of load and bearing area;

e) Maximum and minimum temperatures to which the bitumen mastic is to be subjected;

f) Type of surface finish;

g) Age, nature and present condition of the base over which the bitumen mastic is to be laid;

h) Type and thickness of concrete screed to be laid on the base;

j) Type of underlay, or separating layer, if any;

k) Space available for plant and means of storing and hoisting materials; and

m) Any other special requirements.

4. DESIGN CONSIDERATIONS

4.1 Bitumen mastic is dustless, odourless, jointless and impervious to the transmission of moisture, either in liquid or vapour form. The surface is easily cleaned, noiseless under traffic and resilient. Bitumen mastic is also durable. While it may carry heavy loads, application of concentrated point load may cause indentation. In designing the bitumen mastic flooring consideration shall be given to the anticipated service conditions. Bitumen mastic is, therefore, suitable for a variety of uses under a wide range of climatic and service conditions.

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

4.1.1 *Limitations of Use* — The surface of bitumen mastic is liable to become gradually softended by prolonged contact with greases, fats and oils. Contamination with such materials shall be avoided.

4.1.2 Susceptibility of bitumen mastic floor finishes to chemical attack is given in Table 1.

4.2 Thickness — The total thickness to which bitumen mastic should be laid depends upon the traffic conditions to which the flooring will be subjected. Usually the bitumen mastic should be laid in one coat, but two-coat work may be used, depending on the thickness of floor finish. As a general guide the thicknesses as given in Table 2 are recommended.

5. MATERIALS

5.1 Bitumen mastic shall conform to the requirements given in IS : 1195-1968*.

5.2 The bitumen mastic may be delivered to the site either in the form of blocks weighing about 25 kg or in molten condition in a mobile mixer or prepared at the site.

5.3 Surface Armouring — Special types of metal armouring may be incorporated in bitumen mastic flooring for industrial purposes to increase resistance of abrasion.

6. EQUIPMENT

6.1 The equipment shall consist of a bitumen boiler, a mechanically agitated mixer called mastic cooker and other accessories. The equipment shall be set up as near the site of work as possible so as to avoid cooling of the molten material.

7. CONSTRUCTION

7.1 The base on which the bitumen mastic flooring is to be laid shall be adequately strong to receive the mastic and to carry the anticipated traffic over it.

7.2 Preparation of the Base — The base shall have a true, even and dry surface which has been slightly coarsened by means of a stiff broom or wire brush and should be free from ridges and hollows. A steel trowelled finish is not desirable. The levels of the base should be such that the specified thickness of bitumen mastic may be applied uniformly. If the finished floor is likely to have water or industrial liquors upon it, a straight fall of not less than 1 in 75 should be provided. Channels should be provided as necessary to ensure adequate drainage.

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

TABLE 1 SUSCEPTIBILITY OF BITUMEN MASTIC FLOOR FINISHES TO CHEMICAL AND TEMPERATURE ATTACK

(*Clause* 4.1.2)

Sl No.	Agency	Susceptibility to Attack
(1)	(2)	(3)
i)	Acids and vegetable extracts other than oils	Normal grades of bitumen mastic are subject to attack by acids, but special grades are available to withstand attack by dilute solutions
ii)	Alcoholic liquors	Normal grades of bitumen mastic are subject to attack by certain alcoholic liquors and the use of special grades may be necessary in some situations, for example, breweries and distilleries
iii)	Alkalis	Alkali solutions of low concentration, at normal temperatures, have little or no effect on bitumen mastic. Alkali solutions above 38°C, particularly of high concentration, will affect bitumen mastic
iv)	Brine (sodium and calcium chloride) and sulphate salts	Under normal conditions, bitumen mastic is unaffected by these agencies
v)	Complex industrial liquors and radio-active materials	Laboratory tests are essential to ensure that a suitable grade of bitumen mastic is used
vi)	Radio-active materials	Special grades of bitumen mastic are required
vii)	Dairy products and milk	Where hygienic conditions are maintained by adequate cleansing, a normal grade is suitable. Where churns or milk cans are handled, it is advisable to incorporate metal armouring in the floor surface, otherwise the floor will become indented and in these areas fats may accumulate and attack the mastic
viii)	Mineral, animal and vegetable oils, fats and greases	Bitumen mastic floor finish is subject to attack by these oils, fats and greases
ix)	Sugar, syrup, sugar solutions, etc	Bitumen mastic is unaffected by dry sugar or solutions of low concentration at normal temperatures. Syrups, molasses and other concentrated solutions will affect bitumen mastic at all temperatures
x)	Water	Bitumen mastic is unaffected unless frequently in contact with hot water; under such circumstances, a high-temperature grade mastic should be used. Hot and cold water frequently discharged on to the floor may cause cracking

TABLE 2 THICKNESS OF BITUMEN MASTIC FOR DIFFERENT SERVICE CONDITIONS

(*Clause* 4.2)

Sl No.	Examples of Service Conditions	Type of Flooring	Recommended Thickness mm
(1)	(2)	(3)	(4)
i)	Medium wear due to foot traffic *Example:* Small scale industries, such as those manufacturing electronic and electrical equipment	Light duty	15 to 20
ii)	Severe abrasion due to continuous foot traffic *Example:* Passenger platforms, footpaths, workshops, etc	Medium duty	20 to 25
iii)	Severe abrasion combined with impact *Example:* Heavy engineering workshops, despatch yards, loading docks, goods platforms, loading platforms for trucks carrying milk bottles in dairy, etc	Heavy duty	25 to 30 and more

7.3 Treatment of the Base — The treatment of the base shall be decided by the designer in consultation with those responsible for the flooring. One of the following may be used:

a) A screeded bed of cement concrete or lime concrete not less than 25 mm thick; or

b) An isolating membrane or underlay (*see* **7.4**); or

c) On metal floors, a thin priming coat of bitumen paint applied over a clean and dry surface. The paint should be dry before the mastic is laid.

7.4 Isolating Membrane — An isolating membrane conforming to Type 1 of IS: 1322-1970* is normally used where bitumen mastic up to 20 mm in thickness is laid. Where the base is in direct contact with the ground, glass fibre felt (*see* IS: 7193-1974†) may be used as an alternative.

*Specification for bitumen felts for waterproofing and damp-proofing (*second revision*).

†Specification for glass fibre base coal tar pitch and bitumen felts.

Thickness of bitumen mastic exceeding 20 mm on new concrete are usually laid without an isolating membrane except in circumstances described in (b) below. Isolating membranes should be laid loose.

a) An isolating membrane is essential:
   1) on a timber base;
   2) on a base of porous or open texture, such as no-fines or light-weight concrete;
   3) where the concrete surfaces contains fine cracks;
   4) on a concrete base which has received a surface treatment, such as sodium silicate solution;
   5) when concrete has been contaminated by foreign matter from industrial processes, such as oils, greases, sugar solutions or chemicals; and
   6) when the mastic is to be laid over a thermal insulating medium, for example, in cold stores.

b) An isolating membrane may also be found necessary in circumstances arising immediately before or at the time of laying, such as the following:
   1) When the bitumen mastic cools too rapidly to allow it to be manipulated and properly finished. Premature cooling may be caused by the dissipation of heat through the base or by weather conditions, or both. It may also occur when it is necessary to transport the material far from the cauldron or mixer. Under these conditions, an isolating membrane may act as a thermal insulating medium to assist the retention of heat for a longer time after laying.
   2) When 'blowing' of the mastic asphalt occurs and cannot be avoided by dusting the base with a suitable powder. The reasons for 'blowing' are obscure, but it may be due to extreme dampness or dryness or by the nature of the surface texture of the concrete. Where it is known in advance that these conditions may arise, those entrusted with laying bitumen mastic should be notified.

7.5 Placing the Underlay — The underlay, when required should be laid loose with lapped joints.

7.6 Setting Out — The setting out of the floor area into bays is normally decided according to workable requirements. The arrangement of the bays depends upon the design of the floor and the number of spreaders engaged, so that the laying and finishing processes may both be easily controlled by the operatives.

7.7 Re-melting at Site — Re-melting is the term applied to the melting at the site or in a mobile mixer of the pieces of broken bitumen mastic blocks. The blocks shall be broken to convenient size not exceeding 60 mm cubes and loaded into the mechanically agitated mixer or mastic cooker at the site of work. The material shall then be carefully remelted. At this stage any coarse aggregate preferably preheated shall be fed in successive portions until the complete charge is thoroughly incorporated. After all the coarse aggregate has been incorporated, the material shall be mixed continuously for a period of not less than one hour before laying is begun, and mixing shall be continued until laying operation is completed, so as to maintain the coarse aggregate in suspension. At no stage during the re-melting and mixing process, shall the temperature exceed 205°C.

7.8 Laying

7.8.1 *Transport of Molten Material* — When the material is sufficiently molten to be workable, it should be carried in flat mortar pans, to the point of laying. To prevent the molten material from sticking to the pans they may be sprinkled inside with a minimum quantity of inorganic dust, such as limestone dust, cement, ash or oil shall not be used.

7.8.2 *Spreading* — Bitumen mastic should generally be laid in bays in one coat. It should be spread to the specified thickness by means of suitable hand tools, gauges, straight edges and hand levels being used to ensure accuracy. The bitumen mastic should then be floated to a uniformly level surface by a heavy wooden float and should be free from roughness and imperfections.

7.8.2.1 If 'blowing' occurs, the bubbles should be punctured and the area affected carefully made good while the mastic is still hot.

7.8.2.2 Two-coat work should be treated in a manner similar to that for single-coat work, but care should be taken to arrange that the joints in successive layers are staggered.

7.8.3 *Surface Finish* — The type of surface finish required should be specified by the designer. The following are the two types:

a) *Matt finish* — The surface should be rubbed in with sand during the final floating operation. The sand should be clean and free from foreign matter. All surplus material should be removed after rubbing is completed, and

b) *Polished finish* — The surface should be finished with a float in a manner similar to that used for a matt finish but without the use of an abrasive.

7.8.3.1 Immediately after completion of the laying, the bitumen mastic should be protected from damage till the material cools to the surrounding temperature.

7.8.4 *Slipperiness* — Bitumen mastic has reasonable slip-resistance, but frequent polishing tends to make it slippery. Where mastic is used as paving to stairs a suitable-non-slip safety nosing or inset should be incorporated in the tread.

7.9 Junctions — Special care should be taken in effecting proper junctions between new and previously laid sections of work. The contact edges of the previously laid mastic should be cleaned and warmed by additional applications of hot mastic. This procedure should also be adopted at junctions between the floor finish and skirtings, coves or fillets.

7.10 Skirtings — Skirtings should be executed in not less than two coats, particular care being taken to ensure proper adhesion of the first coat to the base. Special care should be taken at external angles to ensure the full thickness of the material.

7.11 Protection of the Surface — The newly laid surface should be protected from damage due to careless handling of construction equipment, spillage of oils, paints, chemicals, plying of vehicles, etc. Concrete or mortar shall not be mixed directly on the bitumen mastic surface.

7.12 Bringing into Service — The mastic flooring should not be subjected to traffic until the material has cooled throughout to the temperature of the surrounding atmosphere.

8. INSPECTION

8.1 The work shall be inspected while in progress and after completion, special attention shall be paid to the following points:

a) General condition of the base;

b) Irregular surface of the base, and correct laying of the underlay, when used;

c) Cleanliness of plant for re-melting;

d) Correct temperature of the mixture prior to laying;

e) Use of the correct kind of dust to assist removal of mixture from the buckets;

f) Making good all 'blows';

g) Correct thickness throughout;

h) Removal of all asphalt tailings;

j) Correctness of finished level and specified finish; and

k) Correct pattern of decorative designs, if any.

9. MAINTENANCE

9.1 The bitumen mastic surface requires relatively little maintenance, though attention is necessary to obtain maximum service. Superficial dirt may normally be removed by washing with warm water and suitable detergents. Where there is much dirt on the floor, the additions of a small quantity of washing soda to the warm water may be desirable. After the dirt has been removed the floor should be mopped with clean water. It is essential that all oils, fats and greases spilled on the floor should be removed immediately.

9.2 Repairs

9.2.1 When a damaged section has to be removed, it should be done carefully. Considerable damage may result from an attempt to cut away an affected area with the hammer and chisel or to soften it with a blow lamp. The correct method is to place hot mastic around and over the area concerned, and after this has had a sufficient softening effect, the area shall be carefully cut away and made good, with fresh bitumen mastic.

9.2.2 When two-coat work is being restored or made good, the edge along the perimeter of the area shall be cut back not less than 75 mm to half the total thickness of the mastic, to form a lapped joint.

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