

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 1198 (1982): Code of practice for laying, fixing and maintenance of linoleum floor [CED 5: Flooring, Wall Finishing and Roofing]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS : 1198 - 1982

Indian Standard

CODE OF PRACTICE FOR
LAYING, FIXING AND MAINTENANCE OF
LINOLEUM FLOORS

(*First Revision*)

First Reprint JUNE 1996

UDC 69.025.355.2 : 006.76

© *Copyright* 1982

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

Indian Standard

CODE OF PRACTICE FOR LAYING, FIXING AND MAINTENANCE OF LINOLEUM FLOORS

(First Revision)

Flooring and Plastering Sectional Committee, BDC 5

Chairman

SHRI O. P. MITTAL
C4/56 Safdarjung Development Area
New Delhi 110016

Members

SHRI E. T. ANTIA
SHRI M. G. DANDAVATE (*Alternate*)
SHRI S. K. BANERJEE
SHRI P. R. DAS (*Alternate*)
BRIG P. M. BHATIA
SHRI DINESH A. CHOKSHI
SHRI RASIKLAL A. CHOKSHI (*Alternate*)
DIRECTOR
RESEARCH OFFICER, MATERIAL
TESTING DIVISION (*Alternate*)
DR V. S. GUPTA
SHRI K. V. GURUBWAMY
SHRI G. V. PANGARKAR (*Alternate*)
JOINT DIRECTOR (ARCH) RDSO
DEPUTY DIRECTOR (ARCH)
RDSO, (*Alternate*)
SHRI S. C. KAPOOR
SHRI A. C. KAPOOR (*Alternate*)
SHRI C. P. KAPANI
SHRI G. P. LAHRI
SHRI T. S. BHAGAT (*Alternate*)
SHRI K. E. S. MANI
SHRI RAMESH D. PATEL (*Alternate*)

Representing

Concrete Association of India, Bombay
National Test House, Calcutta
Institution of Engineers (India), Calcutta
Arcoy Industries, Ahmadabad
Maharashtra Engineering Research Institute, Nasik
The Fertilizer (Planning & Development) India
Ltd, Sindri
Indian Oil Corporation Ltd, New Delhi
Railway Board (Ministry of Railways)
Modern Tiles & Marbles, New Delhi
Builder's Association of India, Bombay
Engineers India Ltd, New Delhi
Bhor Industries Ltd, Bombay

(*Continued on page 2*)

© Copyright 1982

BUREAU OF INDIAN STANDARDS

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

IS : 1198 - 1982

(Continued from page 1)

<i>Members</i>	<i>Representing</i>
DR MOHAN RAI	Central Building Research Institute (CSIR), Roorkee
DR R. K. JAIN (Alternate)	
SHRI M. V. MURUGAPPAN	Coromandal Prodorite Pvt Ltd, Madras
SHRI R. SRINIVASAN (Alternate)	
SHRI O. P. RATRA	National Buildings Organization, New Delhi
SHRI D. B. SEN	Indian Institute of Architects, Bombay
SHRI S. B. SHIROMANY (Alternate)	
LT-COL M. P. SHARMA	Engineer-in-Chief's Branch, Army Headquarters
SHRI A. P. JAIN (Alternate)	
SHRI A. K. SHRIVASTAVA	Public Works Department, Government of Uttar Pradesh, Lucknow
SHRI DARSHAN SINGH (Alternate)	
SUPERINTENDING ENGINEER (PLANNING & DESIGNS CIRCLE)	Public Works Department, Government of Tamil Nadu, Madras
EXECUTIVE ENGINEER (BUILDING CENTRE DIVISION) (Alternate)	
SUPERINTENDING SURVEYOR OF WORKS (CZ)	Central Public Works Department, New Delhi
SURVEYOR OF WORKS I (CZ) (Alternate)	
SHRI G. RAMAN, Director (Civ Engg)	Director General, ISI (Ex-officio Member)

Secretary

SHRI K. M. MATHUR
Deputy Director (Civ Engg), ISI

Linoleum Subcommittee, BDC 5 : 2

Convener

DR R. K. JAIN
Central Building Research Institute (CSIR)
Roorkee

Members

SHRI A. T. BASAK	Directorate General of Supplies and Disposals
SHRI B. B. CHOWDHURY (Alternate)	
SHRI T. S. BIDDAPPA	National Organic Chemical Industries Ltd, Bombay
DR A. B. DIAS (Alternate)	
SHRI ANLENDU GHOSH	National Test House, Calcutta
SHRI K. K. MANIAR	Ministry of Railways
SHRI H. M. NANDKEOLYAR	India Linoleums Ltd, Birlapur

Indian Standard
**CODE OF PRACTICE FOR
LAYING, FIXING AND MAINTENANCE OF
LINOLEUM FLOORS**
(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 2 February 1982, after the draft finalized by the Flooring and Plastering Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Linoleum provides a satisfactory floor for residential and public buildings, railway coaches, ships, etc. It is also suitable for most types of non-industrial floors. In light industry such as in electronic industry, linoleum flooring may be used, as the risk of damage by cutting, to which linoleum is vulnerable, is small. However, if linoleum gets wet, it expands and eventually rots. This standard has been prepared with a view to guiding the users in regard to laying, fixing and maintenance of linoleum floors.

0.3 This standard was first published in 1958. It is being revised to incorporate improvements found necessary in the light of usage of the standard and the suggestions made by various bodies implementing it. In this revision a separate clause on suitability of linoleum for various conditions of use has been added and the materials used as underlays for aspects like preparation of subfloors, fixing of underlays, laying of linoleum has been dealt with, in detail. This revision also suggests the laying and fixing method of linoleum in tile form.

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 recommends details of work necessary for laying, fixing initial treatment, and subsequent maintenance of linoleum flooring in sheet and tile form.

2. TERMINOLOGY

2.0 For the purpose of this code, the following definitions shall apply.

2.1 Sub-Floor — The surface on which flooring is to be laid.

2.2 Underlay — A layer of prefabricated material or *in-situ* filling on the sub-floor to provide a smooth level surface to receive the flooring.

3. NECESSARY INFORMATION

3.1 For the efficient planning and execution of the work, detailed information with regard to the following is necessary:

- a) Purpose for which the floor is to be used;
- b) Floor area to be covered;
- c) Location and size of openings and ducts, drainage outlets, if any, to be left out;
- d) Details of the sub-floor;
- e) Type of soil in the sub-base and any seepage problem.

3.2 All the information stated in **3.1** shall be made available by the appropriate authority responsible for the construction of the whole building to those who are entrusted with the work of laying linoleum floor finish before the work is started. Necessary drawings and instructions for preparatory work shall also be given where required.

3.3 Arrangements shall also be made for the proper exchange of information between those engaged in laying the floor and all others whose work will affect or will be affected.

4. SUITABILITY

4.1 Linoleum is suitable for use in domestic buildings, and those of non-industrial character where the traffic is expected to be essentially pedestrian. However, the following factors must be considered before it is being laid. The thicknesses recommended are 4.5 and 3.2 mm for commercial and institutional buildings respectively and 1.6 mm for domestic or where traffic is low.

4.1.1 Resistance to Rising Damp — Linoleum requires an adequately dry sub-floor. If inconvenience of damp proofing are not acceptable, linoleum should not be used.

4.1.2 Exposure to Weather — Linoleum is not suitable for installation except where it is wholly inside a building.

4.1.3 Resistance to Chemicals — Linoleum is resistant to oils, fats and greases. Thicker gauges shall be used where heavy traffic is expected.

4.1.4 Indentation Resistance — Linoleum is not resistant to indentations particularly from heels or static load. Cork tile will withstand heavy foot traffic but indents if heavy objects are left in one position for some time or pushed.

4.1.5 Slip Resistance — Linoleum when highly polished or wet can become dangerously slippery. The polish with a reduced tendency to slippriness may be used. The cork tile flooring provide a slip resistant surface except when liquid wax polish is applied over a seal.

5. MATERIAL

5.1 Flooring — The flooring shall comply with the requirement specified in IS : 653-1981*.

5.2 Underlay — The underlay may be as given below:

- a) *For Timber Subfloors:*
 - i) Plywood at least 4 mm thick (see IS : 303-1975†);
 - ii) Hardboard at least 3 mm thick (see IS : 1658-1977‡); and
 - iii) Fibre based bitumen felt 1 mm thick (see IS : 1322-1970§).
- b) *For Concrete Subfloors:*
 - i) Bitumen mastic (see IS : 1195-1978), and||
 - ii) Bitumen (see IS : 1580-1969¶).

5.3 Adhesives — The type of adhesive to be used and the manner of use shall be those recommended by the floor covering manufacturer and the adhesive shall be compatible with the floor covering and suitable for bonding the floor covering to the underlay or sub-floor. Adhesives shall not be considered effective as damp-proof membrane. Information on types of adhesives is given in Appendix A.

*Specification for linoleum sheet and tiles (second revision).

†Specification for plywood for general purposes (second revision).

‡Specification for fibre hardboards (second revision).

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

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

¶Specification for bituminous compounds for waterproofing and caulking purposes (first revision).

6. PREPARATION OF SUBFLOORS

6.1 The linoleum flooring gives maximum service if laid on a firm base. Evaporation of the moisture from the subfloor cannot take place once linoleum is laid. Therefore, it is important that subfloors should be thoroughly dry before laying of the linoleum. An irregular subfloor surface creates poor adhesion between the subfloor and the linoleum. Therefore, the subfloor should always be smooth and level. Recommended treatments for different subfloors are given under **6.2** to **6.4**.

6.2 Timber — All timber subfloors shall be sound, rigid, level and dry. The timber should be at equilibrium moisture content at the time it is covered with the underlay or the floor covering. A timber floor should always be well-ventilated, to discourage fungal attack.

6.2.1 New Timber Floors — In the case of new construction, seasoned and treated timber shall be used and shall be of tongued and grooved boarding. Boards shall be narrow and of equal width (say 100 mm). Boards of unequal width have various degree of shrinkage. Before fixing the linoleum, all nail heads on the timber subfloor shall be punched down, irregularities planned off and the holes filled with plaster, plastic wood or similar fillers. After the boards have been nailed to the joists, the floor is usually firm enough for direct laying of the linoleum, but however, underlays such as plywood or hardboard or fibre based bitumen felt may be used prior to fixing of the linoleum to prevent any movement in the boards. Suspended timber floor shall be adequately ventilated with a minimum air gap below the underside of the joist to stop the growth of rot. Wood blocks and boarded floor on concrete on the ground shall not be covered with linoleum unless an efficient damp-proof membrane in the concrete below the blocks or boards has been provided.

6.2.2 Existing Timber Floor — In the case of an existing timber floor, covered with boarding when it is not possible to obtain an even surface or in cases of dry rot, the use of diagonal boarding is recommended, after removing and replacing some of the badly affected boarding and filling in the cracks with plastic wood or similar filler and after disinfecting the floor. Alternatively, plywood topping on the existing boarding also gives an even surface. It is important, however, to see that the floor is well-ventilated, and if it is a ground floor, by means of air-ducts in the outer walls and sleeper walls with honeycombed pattern for free circulation of air.

6.3 Concrete — All concrete subfloor may be finished with a cement and sand or fine concrete screed laid according to the recommendations of IS : 2571-1970*. The subfloor surface shall be smooth and flat. Concrete

*Code of practice for laying *in situ* cement concrete flooring (first revision).

is not completely impervious. As moisture either in liquid or in vapour form and rising damp may cause damage to linoleum, concrete subfloor intended as a base for linoleum shall contain an effective damp-proof course. The damp-proof course shall be laid in any one of the ways given below.

6.3.1 The most effective treatments for existing floors to protect it against rising damp is a layer of bitumen mastic not less than 15 mm thick laid over the subfloor according to the recommendations given in IS : 1196-1978*.

6.3.2 For new work the subfloor shall be laid as per the recommendation given in IS : 2571-1970†. Information on the limitations of damp-proof materials is given in Appendix B.

6.3.3 Waterproofing materials mixed with concrete do not produce an effective barrier against rising damp.

6.3.4 Before linoleum is laid, ample time shall be allowed for the water to dry from both suspended and ground concrete floors. It is difficult to specify the period required as this depends on weather and on the quality and thickness of the concrete, but a period of 4 to 8 weeks at least shall be allowed for drying under normal conditions. This time may be reduced if the building is heated and if the ventilation is good.

6.3.5 In new work, the finish required for laying linoleum shall be usually produced with a steel trowel on a screed applied to the base concrete. The finish may, however, be produced on the base concrete itself if a power-float is used. With old concrete, if the surface is only slightly uneven, the holes shall be filled with a skim layer of proprietary bitumen-cement or latex-cement levelling coat. For rougher surfaces, an underlay of asphalt, bitumen-cement or latex-cement is necessary. Of these, latex-cement can be used in the least thickness. If sub-floors are dusty, it is a safe practice to use a primer such as bitumen emulsion before using an adhesive. Concrete hardeners or densifiers may also be used with advantage to bind the surface of the screed.

6.4 Other Subfloors — Some bases such as clay tiles, concrete tiles or terrazzo are unaffected by dampness, but may be sufficiently porous to allow moisture to pass through to the back of the floor finish. These bases shall be damp-proofed when necessary by using underfelt. Bases such as magnesium oxychloride in good conditions are suitable for receiving linoleum but are adversely affected by dampness rising through concrete from the ground and shall not be covered with a damp-proof layer. Unless it

*Code of practice for laying bitumen mastic flooring (*second revision*).

†Code of practice for laying *in situ* cement concrete flooring (*first revision*).

can be established that there is an effective damp course below these materials, they shall be removed before laying the linoleum. Bitumen mastics are excellent bases to receive linoleum but solvent type adhesives may soften the mastic and mastics which are soft and are likely to be dented are not suitable for linoleum.

7. LAYING

7.1 General — Linoleum should be stored in room temperature of not less than 20°C for at least 48 hours before it is unrolled. It shall be laid out flat for several days before it is cut to size because, after being unrolled, it shrinks in length and expands in width. As the humidity in the room is usually greater than that at which the linoleum was rolled, it absorbs moisture and being unrestrained, expands. If the linoleum is cut to fit closely round the skirting, it will often be found necessary after a time to retrim the material. When two widths of linoleum meet, they shall be left with one overlapping the other until expansion has stopped and then cut to fit. Cork tile should be dimensionally stable in the condition of use. In order to achieve this, tiles should be removed from the cartons at least 48 hours before laying is to commence and be distributed in the room in humidity and temperature conditions similar to those likely to prevail in occupation.

7.1.1 Before starting to lay the linoleum, the position and depth of cables, water pipes in the floor screed, etc, should be ascertained and all preliminary work should be completed. The subfloor should be firm and dry and tested for dampness as given in Appendix C. Dusty subfloor should be swept and porous subfloors should be primed as recommended by the adhesive manufacturer.

7.2 Adhesives — The linoleum shall be laid either loose or fixed to the subfloor by means of suitable adhesives. Any priming coat should be allowed to dry before the adhesive is spread. Adhesives are spread with a closely notched trowel as recommended by the manufacturer to ensure even the coverage of the subfloor to the correct thickness. It is essential that where low flash solvent adhesive (containing petroleum or naphtha) are used, the use of naked lights should be prohibited in the vicinity of the laying operations. The area shall be well ventilated even when non-flammable solvents are used in the adhesives. Smoking shall be prohibited.

7.3 Fixing of Underlays — Plywood, hardboard shall be securely fixed to the subfloor in the form of sheets using staple, and nails. Fixing shall start at the centre of the sheet and secured at 100 mm intervals around the side. All nail heads shall be finished flush with the surface. Joint lines shall be staggered and every effort shall be made to prevent coincidence in joints in the sheet and timber base. A suitable gap shall be left between the sheets for possible expansion due to atmospheric changes. Except

where recommended, hardboard may be laid with the smooth face uppermost. When a felt underlay is used all surfaces to be covered shall be thoroughly cleaned free from dust and dirt. No surface shall be cleaned with water as dryness is essential. Bitumen felts shall be cut to size and fixed with the adhesives as recommended by the manufacturer. It shall be butt jointed and laid across the boards so that the joints run in a direction at right angle to the joints in linoleum. The joints shall not coincide with those in linoleum sheets. After fixing, the felt shall be smoothed down and well rolled. Bitumen mastic shall be laid in accordance with the recommendations as given in IS : 1196-1978*; where the mastic is used as underlay and damp-proof course, care shall be taken to connect it with the damp-proof course in the walls. Other underlay as given in 5.2 should be laid as per the recommendations of the manufacturer.

7.4 Fixing — The base over which the linoleum is to be fixed shall be thoroughly cleaned free from dirt and dust, chemicals, oils, paints, etc. The adhesive shall be spread evenly with a trowel as recommended by the manufacturer. The linoleum shall be firmly pressed into the adhesive within the recommended setting time of adhesive. To give maximum adhesive contact and to secure a bond, the material shall be well rolled with a floor roller weighing approximately 70 kg working from centre to the walls. If necessary the linoleum may be loaded with sand bags at various points until the adhesive has gripped. When laid directly on concrete, it is desirable to prime the back of the linoleum with the adhesive. Cork tiles shall be fixed with the adhesive which should be spread evenly with the trowel in sufficient quantity for laying only a few square metres at a time. Each tile shall be carefully placed in position to exclude air beneath the tile and also to attain proper joints between the tiles. It is advisable to use headless steel pins in conjunction with the adhesive in order to maintain contact between subfloor or screed and tile. The pins shall be driven below the surface of the tile with a hammer. If the subfloor or screed is too hard for pins, it may be necessary to weight down any lipping tiles.

7.4.1 Coving and Skirting — Linoleum coving and skirting shall be formed from sheet material on the job in grades up to 3.2 mm thick. First, cove stick shall be fixed in the angle between floor and wall to give the correct contour to the cove. The linoleum, in the lengths up to 2.5 m is turned 15 cm up the wall and runs 15 cm on to the floor. It is a skilled operation and even the best craftsman may have difficulty with angles. For thicker materials, some floor layers make their coving in the workshop in 2 m lengths but each coving is purpose-made for a job. Radius of curvature of coving and skirting shall not be less than 12.5 cm.

*Code of practice for laying bitumen mastic flooring (second revision).

7.5 Finish — After laying and fixing, all traces of adhesive shall be removed from the surface as the work proceeds within the setting time. Care shall be taken to avoid the severing of adjacent surfaces. The surplus adhesive shall never be allowed to remain longer than 24 hours. The surface may be finished with a wax polish recommended by the manufacturer. Alternatively a coat of emulsion polish may be applied. The joints in case of cork tiles shall be lightly sanded with a fine grade abrasive paper. All traces of adhesives and dirt should be removed and the surface brushed clean. After brushing, the surface shall be wiped with a clean damp cloth to remove any further traces of dust or dirt when dry the surface may then be treated with two coats of concentrated paste wax polish as recommended by the manufacturer.

7.6 Protection — When laying and finishing are completed, the flooring shall be protected with hardboard or other sheeting till completion of the building.

8. MAINTENANCE

8.1 General — A period of at least seven days should elapse after installation of the flooring before the start of the maintenance work. During this time the flooring shall be covered and protected from the effect of other contract work in progress in the site. Preventive measures are essential part of flooring maintenance and since dirt and dust are mainly trafficked into a building from the outside it is important to remove these materials by use of dustretaining mats at all door entrance extending to the full width of the door and of sufficient length. The practices stated below should be avoided:

- a) Incorrect use of cleaning agents,
- b) Application of polishes and seals on dirty and wet surfaces,
- c) Attempts to build up high thickness of polish or seal by reducing the number of applications, and
- d) Excessive use of water.

8.2 Linoleum Sheet or Tiles — The linoleum sheet or tile surfaces shall be swept clean preferably using a mop sweeper and then washed with a cloth dampened with an aqueous solution of neutral detergent. When dry the surface shall be buffed using suitable pad and two coats of dry bright water-based emulsion polish shall be applied. The surface shall be regularly maintained by sweeping, washing with neutral detergent solution, followed by polishing with a coat of water-based emulsion polish.

8.3 If the traffic is light, the floor shall be given frequent brushing, regular polishing and an application of new polish every three to six weeks. Under moderate traffic conditions, the floor shall be given an occasional wash with a wet mop but no detergents shall be used so that the polish is not removed. Application of polish shall be done every one to three weeks.

Linoleum should not be overwaxed; when this condition develops, the coatings should be cleared off with white spirit or paraffin and a light even coat of polish or two of liquid dressing applied. When the linoleum has been polished, it will remain bright for a considerable period if a dry mop is applied each day. It is this daily 'dry polish' rather than the frequent application of polish itself that maintains the glossy surface. After exceptional heavy traffic, the linoleum should be swept with a hair broom, rubbed with a mop or cloth frequently rinsed in clean water, and finally rubbed dry. Washing is seldom necessary more than once every three or four months, when only a mild soap or soapless detergent should be used. Exceptionally heavy dirt may be removed with a cloth soaked in paraffin.

8.4 Cork Tiles — The cork tiles shall be swept with a mop and then cleaned with a cloth dampened with an aqueous solution of neutral detergent and allowed to dry. Apply a thin and even coating of solvent-based liquid wax. When dry the surface shall be buffed using a fibre brush and a further coat of solvent based liquid wax shall be applied. The cork tiles shall be regularly swept and dry buffed frequently, when necessary the surface shall be cleaned with solvent-based wax remover and rewaxed.

APPENDIX A

(Clause 5.3)

INFORMATION ON ADHESIVES

A-1. VEGETABLE AND CASEIN GLUES

A-1.1 Vegetable (starch) glue is usually in the form of a paste, and casein glue usually in the form of a powder which is mixed with water before use. Both the types are spread on the base and the linoleum is pressed on to it. Vegetable adhesives are effective but take some time to harden. They are unsuitable for situations where a lot of water is likely to be spilt on the linoleum. These glues are liable to attack by fungi.

A-2. LIGNIN PASTES

A-2.1 Lignin, a by-product of paper manufacture is mixed with clay to form an adhesive which is applied thinly to the base and the linoleum pressed on to it. It resembles starch and casein glues but it is more resistant to water.

A-3. GUM-SPIRIT ADHESIVES

A-3.1 Adhesives made from gum or resin, filler and methylated spirit are characterized by their strong smell. The adhesive is spread on the base

previously rendered dry. As the spirit evaporates, a skin forms on the surface; the linoleum is pressed into the adhesive before the skin becomes too thick. The linoleum can, therefore, be spread only a few square metres at a time. Any excess of spirit evaporates slowly through the linoleum or is absorbed by the sub-floor. Gum-spirit adhesives are resistant to damp but are likely to be attacked by dilute alkaline solutions such as those that rise through wet concrete.

A-4. BITUMEN-RUBBER EMULSIONS

A-4.1 This type of adhesive is a dark coloured emulsion of rubber and bitumen or coal-tar pitch in water. There is no smell of solvent in this case. The water in the adhesive must evaporate before the linoleum is laid, as there is a risk of blistering if the linoleum absorbs the water. The evaporation is noted by the colour of the adhesive which changes from chocolate to black. When the colour is black, it is safe to lay the linoleum. This type of adhesive and the solution type described under **A-5** are what may be called 'one-chance' adhesives; when the linoleum is placed on them it is fixed and cannot be slid into position. The bitumen-rubber emulsions are resistant to water and, when set, are water-repellent. When used as adhesives they should not, however, be taken to serve as damp-proof courses.

A-5. BITUMEN-RUBBER SOLUTION

A-5.1 Bitumen-rubber solution adhesive is dark coloured, of thick consistency and is recognizable by the strong smell of petroleum solvent. The solution is applied both to the back of the linoleum and to the floor and the solvent allowed to evaporate before the linoleum is laid. During this period, as a precaution against fire, the room shall be well-ventilated and no smoking or naked flame shall be allowed. As adhesives, they are resistant to water and are water-repellent but do not serve as damp-proof courses.

APPENDIX B

(Clause 6.3.2)

INFORMATION ON THE LIMITATION OF DAMP-PROOF MATERIAL

A. Water Proofing Materials

- 1) Bitumen mastic laid according to IS : 1196-1978*

Properties/Limitations

Impervious to the transmission of moisture. May be used as floor finish or as an underlay; where concrete is laid direct to earth, an isolating membrane should be used.

*Code of practice for laying bitumen mastic flooring (*second revision*).

B. Sandwich Membranes

- | | |
|--|---|
| 1) Bitumen Mastic | Impervious to moisture. |
| 2) Bitumen felts | When joints are properly sealed, it is impervious. |
| 3) Hot applied bitumen | When laid on a primed surface with suitable thickness it may be regarded as impervious; care shall be taken to avoid pin holes. |
| 4) Cold applied bitumen, bitumen rubber emulsion | Repeated application can form an impervious layer; care in workmanship and maintenance is needed. |

APPENDIX C*(Clause 7.1.1)***TESTS FOR DETERMINATION OF DAMPNESS OF FLOORS****C-1. GENERAL**

C-1.1 The tests as described under **C-2**, **C-3** and **C-4** shall be conducted to determine the dampness of floor while laying linoleum.

C-2. RUBBER TEST

C-2.1 Place one square metre of rubber matting and place it loosely, with the smooth side down, on the floor to be tested. The matting shall be left for twenty-four hours for ordinary floors and forty-eight hours for unusually smooth floors. If, after this period, on removing the matting the concrete shows a dark patch, it is an indication that the floor is not sufficiently dry to receive linoleum.

C-3. ANHYDROUS COPPER SULPHATE TEST

C-3.1 This test is much more rigorous than the rubber test and is thus more certain. Take an ordinary piece of window glass about 40 cm square, lay the glass on the area of the floor to be tested and mark the floor round the glass with pencil. Remove the glass and lay an even beading 12 mm thick, of well-worked putty inside the pencil line. Spread evenly one teaspoonful of anhydrous copper sulphate powder inside the putty and cover

immediately with the glass, pressing the glass firmly into the putty, so that the copper sulphate is kept air-tight. The copper sulphate should be white when it is put in position; if after six hours it has turned green or blue it is clear indication that the concrete is still too damp to receive linoleum.

C-4. MOISTURE METER TEST

C-4.1 Floors may be tested for dampness by means of a pocket hygrometer placed in contact with the floor. The edges shall be sealed with putty if the floor is rough. The humidity of the enclosed air is read directly on the scale of the hygrometer. The air usually takes not less than the instrument in position overnight and take the reading in the morning. As a general rule, a value of 70 to 75 shall be below 80 before it can be assumed that the concrete above the damp-course has dried sufficiently for it to be suitable for the fixing of linoleum.

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones: 331 01 31, 331 13 75

Telegrams: Manaksanstha
(Common to all Offices)

Regional Offices:

	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002	{ 331 01 31 331 13 75
*Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktofa, CALCUTTA 700054	36 24 99
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	{ 2 18 43 3 16 41
Southern : C. I. T. Campus, MADRAS 600113	{ 41 24 42 41 25 19 41 29 16
†Western : Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093	6 32 92 95

Branch Offices:

'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001	{ 2 63 48 2 63 49
‡Peenya Industrial Area 1st Stage, Bangalore Tumkur Road BANGALORE 560058	{ 38 49 55 38 49 56
Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, BHOPAL 462003	6 67 16
Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002	5 36 27
53/5, Ward No. 29, R.G. Barua Road, 5th Byelane, GUWAHATI 781003	3 31 77
5-8-56C L. N. Gupta Marg (Nampally Station Road), HYDERABAD 500001	23 10 83
R14 Yudhister Marg, C Scheme, JAIPUR 302005	{ 6 34 71 6 98 32
117/418 B Sarvodaya Nagar, KANPUR 208005	{ 21 68 76 21 82 92
Patliputra Industrial Estate, PATNA 800013	6 23 05
T.C. No. 14/1421, University P.O., Palayam TRIVANDRUM 695035	{ 6 21 04 6 21 17

Inspection Offices (With Sale Point):

Pushpanjali, First Floor, 205-A West High Court Road, Shankar Nagar Square, NAGPUR 440010	2 51 71
Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005	5 24 35

*Sales Office in Calcutta is at 5 Chowringhee Approach, P. O. Princep 27 68 00
Street, Calcutta 700072

†Sales Office in Bombay is at Novelty Chambers, Grant Road, 89 65 28
Bombay 400007

‡Sales Office in Bangalore is at Unity Building, Narasimharaja Square, 22 36 71
Bangalore 560002