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Installation of resilient floor coverings – Code of practice

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Contents

Summary of pages
This document comprises a front cover, and inside front cover, pages i to ii, pages 1 to 30, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 March 2017. It was prepared under the authority of Technical Committee PRI/60, *Resilient and Laminate Floor Coverings*. A list of organizations represented on this committee can be obtained on request to their secretary.

Supersession

This British Standard supersedes BS 8203:2001+A1:2009, which is withdrawn.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

The word "should" is used to express recommendations of this standard. The word "may" is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word "can" is used to express possibility, e.g. a consequence of an action or an event.

Notes and commentaries are provided throughout the text of this standard. Notes give references and additional information that are important but do not form part of the recommendations. Commentaries give background information.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This British Standard gives recommendations for the installation of the following floor coverings on both new and existing construction:

a) cork floor coverings;

b) linoleum floor coverings;

c) plastic floor coverings; and

d) rubber floor coverings.

NOTE Special measures are necessary for successful installation of floor coverings such as those used for static control, and are not included in this British Standard.

This British Standard does not cover the installation of these floor coverings on access flooring.

This British Standard does not include advice on cleaning and maintenance (for which, see BS 6263-2) but does include guidance on the decisions made at the design stage which assist cleaning and maintenance and enable the installation to give satisfactory service.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 6263-2, *Care and maintenance of floor surfaces – Part 2: Code of practice for resilient sheet and tile flooring*

BS 8103-3, *Structural design of low-rise buildings – Part 3: Code of practice for timber floors and roofs for housing*

BS 8204-1, *Screeds, bases and in-situ floorings – Part 1: Concrete bases and cementitious levelling screeds to receive floorings – Code of practice*

BS 8204-5, *Screeds, bases and in-situ floorings – Part 5: Mastic asphalt underlays and wearing surfaces – Code of practice*

BS 8204-7, *Screeds, bases and in-situ floorings – Part 7: Pumpable self-smoothing screeds – Code of practice*

BS EN 204, *Classification of thermoplastic wood adhesives for non-structural applications*

BS EN 300, *Oriented strand boards (OSB) – Definitions, classification and specifications*

BS EN 312, *Particleboards – Specifications*

BS EN 350, *Durability of wood and wood-based products – Testing and classification of the durability to biological agents of wood and wood-based materials*

BS EN 622-2, *Fibreboards – Specifications – Part 2: Requirements for hardboards*

BS EN 635-2:1995, *Plywood – Classification by surface appearance – Part 2: Hardwood*

BS EN 636, *Plywood – Specifications*

BS EN 650, *Resilient floor coverings – Polyvinyl chloride floor coverings on jute backing or on polyester felt backing or on polyester felt with polyvinyl chloride backing – Specification*

BS EN 651, *Resilient floor coverings – Polyvinyl chloride floor coverings with foam layer – Specification*

BS EN 652, *Resilient floor coverings – Polyvinyl chloride floor coverings with cork-based backing – Specification*

BS EN 655, *Resilient floor coverings – Tiles of agglomerated composition cork with polyvinyl chloride wear layer – Specification*

BS EN 686, *Resilient floor coverings – Specification for plain and decorative linoleum on a foam backing*

BS EN 687, *Resilient floor coverings – Specification for plain and decorative linoleum on a corkment backing*

BS EN 688, *Resilient floor coverings – Specification for corklinoleum*

BS EN 1816, *Resilient floor coverings – Specification for homogeneous and heterogeneous smooth rubber floor coverings with foam backing*

BS EN 1817, *Resilient floor coverings – Specification for homogeneous and heterogeneous smooth rubber floor coverings*

BS EN 12104, *Resilient floor coverings – Cork floor tiles – Specification*

BS EN 12199, *Resilient floor coverings – Specifications for homogeneous and heterogeneous relief rubber floor coverings*

BS EN 13845, *Resilient floor coverings – Polyvinyl chloride floor coverings with particle based enhanced slip resistance – Specification*

BS EN 13986:2004+A1:2015, *Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking*

BS EN 14085, *Resilient floor coverings – Specification for floor panels for loose laying*

BS EN 14565, *Resilient floor coverings – Floor coverings based upon synthetic thermoplastic polymers – Specification*

BS EN 14904, *Surfaces for sports areas – Indoor surfaces for multi-sports use – Specification*

BS EN ISO 10581, *Resilient floor coverings – Homogeneous poly(vinyl chloride) floor covering – Specifications*

BS EN ISO 10582, *Resilient floor coverings – Hetereogeneous Poly(vinyl chloride) floor coverings – Specification*

BS EN ISO 10595, *Resilient floor coverings – Semi-flexible/vinylcomposition (VCT) poly(vinyl chloride) floor tiles – Specification*

BS EN ISO 24011, *Resilient floor coverings – Specification for plain and decorative linoleum*

BS EN ISO 26986, *Resilient floor coverings – Expanded (cushioned) poly(vinyl chloride) floor covering – Specification*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS 6100 (all parts) and the following apply.

3.1 agglomerated composition cork

compound of cork granules with a binder generally not derived for cork cells

3.2 agglomerated composition cork with polyvinyl chloride wear layer

floor covering whose main component is agglomerated cork and whose wear layer is a homogeneous polyvinyl chloride layer

3.3 base

supporting structure to which the floor covering is to be applied

3.4 concrete base

concrete slab cast as part of the building construction

3.5 cork floor covering

floor covering whose main component is agglomerated cork and whose wear layer is intended to be used with a finishing coat(s)

3.6 cork linoleum

product produced by calendering a homogeneous mixture of linoleum cement, granulated cork, pigment and inorganic filler onto a fibrous backing

3.7 corkment

product produced by a homogeneous mixture of linoleum cement, granulated cork, pigment and inorganic fillers on a fibrous backing

3.8 fabricated underlay

wood-based panel applied to a subfloor/base/floating floor to provide a smooth, even surface suitable for the installation of a floor covering

3.9 flexible

generic term for floor coverings which can be bent over a mandrel under specified conditions

3.10 floor covering

product prefabricated in sheet or tile form, which can be used to cover floors from wall to wall

3.11 in situ underlay

aggregate filled underlay based on mastic asphalt or specially formulated cement and binder that is applied over cementitious and similar bases to provide a smooth, even surface

3.12 levelling screed

screed finished to obtain a defined level and to receive the final flooring

3.13 linoleum

product produced by calendering a homogeneous mixture of linoleum cement, cork- and/or wood-flour, pigments and inorganic filler onto a fibrous backing

3.14 linoleum cement

binder in linoleum, consisting of a mixture of linseed oil and/or other vegetable drying oils, rosin and normal drying oil catalysts, converted to a semi-elastic mass by an oxidative curing process

3.15 nosing

metal or plastic finishing profile protecting the edge of a stair nose

3.16 plastic floor covering

vinyl sheet or tile floor coverings

3.17 polyvinyl chloride floor covering

floor covering with surface layers produced using polyvinyl chloride (and modifications thereof) as binder

NOTE Polyvinyl chloride floor coverings include the following:

a) *expanded polyvinyl chloride floor covering (cushioned polyvinyl chloride), with a transparent wear layer over a layer of foamed polyvinyl chloride carrying a printed pattern, which can be embossed in register with the printed pattern;*

b) *polyvinyl chloride floor covering on jute backing, consisting of a polyvinyl chloride layer applied to a jute felt backing;*

c) *polyvinyl chloride floor covering on polyester backing, consisting of a polyvinyl chloride surface layer applied to a polyester felt backing;*

d) *polyvinyl chloride floor covering on polyester felt with polyvinyl chloride backing, consisting of a polyvinyl chloride surface layer applied to a polyester felt with a polyvinyl chloride backing;*

e) *polyvinyl chloride floor covering with cork-based backing, consisting of a homogeneous or heterogeneous polyvinyl chloride surface layer over a layer of corkment (see **3.7**) or of cork with a polyvinyl chloride binder; and*

f) *semi flexible polyvinyl chloride floor covering, consisting of tiles made from polyvinyl chloride (and modifications thereof) which can only be deflected under specified conditions.*

3.18 primer

liquid product applied to a subfloor, or base, prior to the application of either smoothing compound or adhesive, to seal a porous base and aid adhesion of the subsequent application

3.19 resilient

material able to recover after compression

NOTE For example plastic, rubber, cork or linoleum.

3.20 riser

vertical part of a step

3.21 rubber floor covering

floor covering in sheets or tiles, based on natural or synthetic rubber

3.22 screed

cement and sand or calcium sulphate topping applied over the base and finished to receive the floor covering

3.23 smoothing compound

see smoothing underlayment (**3.24**)

3.24 smoothing underlayment

smoothing and or self smoothing compound applied to a subfloor to achieve a smooth, flat or level surface, suitable for the installation of the floor covering

3.25 subfloor

see base (**3.3**)

3.26 surface damp-proof membrane

material applied to the surface of the subfloor to control the passage of water vapour

3.27 surface preparation

set of operations carried out on the subfloor to allow the floor covering to be laid correctly

3.28 transition strip

finishing element which helps to protect a junction between two floor coverings which could be different in type or thickness

3.29 tread

horizontal part of a step

3.30 underlay

layer applied to the subfloor to achieve a smooth, flat or level surface

3.31 underlayment

see smoothing underlayment (**3.24**)

3.32 vinyl

term commonly used to describe polyvinyl chloride

3.33 welding

formation of a sealed joint between sheets or tiles

4 Exchange of information

4.1 General

In order for the correct floor covering to be installed in appropriate conditions, at the required time, etc., all parties should have a clear understanding of the requirements of the project, e.g. new build or refurbishment, and of the implications for all concerned. To ensure that this is achieved, there should be consultation between all parties involved in the project, including sub-contractors and material suppliers.

This consultation should start early in the design stage but is necessary throughout the contract, especially should requirements or time scales change and as new sub-contract work is initiated.

*NOTE As each project is unique it is impossible to give a definitive list of the information to be exchanged, but **4.2** to **4.11** are typical examples.*

4.2 Project

The name and location of projects and personnel involved in pre-contract negotiations should be identified.

4.3 Design

The floor layout, and specifications, based on building type and occupational uses should be provided, e.g.:

a) type and density of foot and/or wheeled traffic;

b) resilience characteristics;

c) acoustic absorption levels; and

d) particulars of wet, corrosive, staining or potentially abrasive conditions.

4.4 Floor details

The completed drawings/specification should provide comprehensive information on:

a) whether upper floor, ground floor or below ground level;

b) whether ground-supported or suspended construction;

c) particulars of any underfloor heating installation or security installation;

d) position and treatment of movement joints;

e) curing and drying times of screeds and bases likely to be required before the installation of floor coverings;

f) screed or based with finished floor level, permissible departure from datum and class of surface regularity required;

g) in refurbishment work, the type and condition of existing base or floor finish and any type of treatment required;

h) type of damp-proof membrane and position within the floor construction, in particular, the need for surface-applied membrane where likely drying times for the base exceed time available in the programme;

i) choice of underlay, underlayments and adhesives, or special requirements, e.g. seam welding and direction of material; and

j) size, position and design of entrance flooring systems.

4.5 Entrance floor systems

COMMENTARY ON **4.5**

Entrance flooring systems reduce the dirt, grit and water carried into the building by foot traffic, hence reducing the risk of slipping when the building is in service.

The size, position and design of entrance flooring systems should be considered at the design stage (see BS 7953).

4.6 Associated details

Details of abutments, skirtings, services (embedded or sleeved), movement joints, separating strips, pattern or border details and junctions with other adjacent flooring and door clearances should be provided.

4.7 Contract conditions

A programme for commencement and completion of work should be defined, including any specific requirement for sequenced completion [see especially **4.4** e)].

4.8 Special attendance

Access, unloading, hoisting and storage facilities, heat, light and power and any additional items considered necessary to expedite the work should be provided.

4.9 Testing

For any conformity testing of the base, screed, floor covering, etc. details should be provided and responsibilities defined.

The responsibility for ensuring that bases or screeds meet the specified standards for level, smoothness, dryness and soundness (impact crushing resistance) should be defined before any

subsequent or finishing trades are called to commence work. This should be the responsibility of the main contractor unless otherwise specified.

4.10 Responsibilities

Responsibilities for cleaning the construction on completion and providing initial protection should be defined.

4.11 Maintenance

Clear written instructions on the recommended maintenance methods appropriate for the various floor coverings should be provided for the occupier (see BS 6263-2).

NOTE Attention is drawn to the Construction (Design and Management) Regulations 2015 [1] with regard to duties and responsibilities.

5 Materials

5.1 Underlays

*COMMENTARY ON **5.1***

*Guidance on the selection and use of underlays appropriate to the various floor coverings and bases is given in **6.7**, **6.8** and **6.9**.*

NOTE Proprietary loose lay and floating underlay systems are not within the scope of this British Standard. Where such systems are being considered, advice is to be obtained from both the underlay/system and floor covering manufacturer in relation to the system's suitability and application.

5.1.1 Fabricated underlays

Fabricated underlays conforming to BS EN 13986 should be selected from the following:

a) plywood conforming to BS EN 636 and Annex A (see **6.7.2**); and

b) hardboard Type HB.H (oil tempered) conforming to BS EN 622-2.

5.1.2 In situ underlays

In situ underlays should be selected from the following:

a) mastic asphalt conforming to grade 1 of BS 8204-5; and

b) cementitious underlay consisting of a specially formulated blend of cement and binder and both fine and coarse aggregates.

NOTE The binder is commonly a natural rubber latex or synthetic polymer.

5.1.3 Underlayments

Underlayments should be selected from the following:

a) cementitious underlayment consisting of a specially formulated blend of cement, binder and fine aggregate;

NOTE The binder is commonly a natural rubber or synthetic polymer dispersion.

b) powder/water mixes based on casein/cement or polymer and fine aggregate; and

c) epoxy or other resin compounds.

5.2 Floor covering materials

5.2.1 General

Resilient floor coverings should conform to the appropriate European/British Standards.

NOTE Floor coverings of different specifications might become available during the life of this British Standard and separate standards could be issued to cover them. Unless the manufacturers of these products state to the contrary, the installation techniques described in this British Standard also apply for these materials.

5.2.2 Cork floor coverings

Cork tiles should conform to BS EN 12104.

5.2.3 Linoleum floor coverings

Linoleum floor coverings should be one of the following types:

a) plain and decorative linoleum conforming to BS EN ISO 24011;

b) linoleum on a foam backing conforming to BS EN 686;

c) linoleum with corkment backing conforming to BS EN 687; and

d) cork linoleum conforming to BS EN 688.

5.2.4 Plastic floor coverings

Plastic floor coverings should be one of the following:

a) homogeneous flexible unbacked polyvinyl chloride conforming to BS EN ISO 10581;

b) heterogeneous flexible unbacked polyvinyl chloride conforming to BS EN ISO 10582;

c) jute- or polyester-backed polyvinyl chloride and polyvinyl chloride on polyester felt with polyvinyl chloride backing conforming to BS EN 650;

d) flexible polyvinyl chloride with polyvinyl chloride foam layer conforming to BS EN 651;

e) flexible polyvinyl chloride with cork-based backing conforming to BS EN 652;

f) expanded (cushioned) polyvinyl chloride conforming to BS EN ISO 26986;

g) semi-flexible polyvinyl chloride tiles conforming to BS EN ISO 10595;

h) PVC floor coverings with particle based enhanced slip resistance conforming to BS EN 13845; and

i) tiles on a base of agglomerated composition cork with a polyvinyl chloride wear layer conforming to BS EN 655.

5.2.5 Rubber floor coverings

Rubber floor coverings should be one of the following:

a) homogeneous and heterogeneous floor covering consisting of smooth rubber with foam backing conforming to BS EN 1816;

b) homogeneous and heterogeneous floor covering consisting of smooth rubber conforming to BS EN 1817; and

c) homogeneous and heterogeneous relief rubber conforming to BS EN 12199.

5.2.6 Other resilient floor coverings

Other resilient floor coverings should include the following:

a) loose lay floor coverings – floor panels for loose laying conforming to BS EN 14085;

b) resilient floor coverings for multi sports use conforming to BS EN 14904; and

c) floor coverings based upon thermoplastic polymers conforming to BS EN 14565.

NOTE Other floor covering types not listed in this British Standard, or covered by any ISO, EN or British Standard at the time of publication can reference this British Standard with regards to installation practice, e.g. woven vinyl flooring in sheet and tile form.

5.3 Adhesives

*COMMENTARY ON **5.3***

The choice of adhesive is influenced by the floor covering material, the nature of the subfloor and the underlay, if any, site conditions during installation and service conditions.

The special recommendations of the floor covering and adhesives manufacturer should be followed. If these recommendations differ, further consultation between the interested parties should take place.

*NOTE 1 For safety aspects of adhesives, see **7.4.3.4**.*

NOTE 2 None of the adhesives can be considered effective as a damp-proof membrane.

6 Design

6.1 Damp-proofing solid floors and eliminating construction moisture

6.1.1 Damp-proofing solid floors

As the floor coverings covered by this British Standard, together with many adhesives and smoothing compounds used with them, might be adversely affected by moisture, subfloors should be so constructed as to protect the floor covering installation from moisture or water vapour from the ground.

NOTE 1 Materials and methods for damp-proofing solid floors are described in BS 8215.

It should not be assumed that existing ground-supported concrete floors are adequately damp-proofed. Where existing structures do not incorporate adequate moisture protection, proprietary surface applied membranes or mastic asphalt should be used.

NOTE 2 Integral waterproofers incorporated in the concrete or screed do not provide adequate damp protection for the floor coverings and retard the drying process.

Beam and block construction floors, whether finished with cement-sand, screed or particle board, should incorporate a vapour control layer.

6.1.2 Eliminating construction moisture

*COMMENTARY ON **6.1.2***

Before moisture sensitive flooring is laid on a concrete base it is necessary to ensure, not only that the floor is constructed to prevent moisture from reaching it from the ground, but also that any excess water from construction is dissipated.

Excess water in the base (above any membrane) should be allowed to evaporate, and the time for this to happen taken into account at the planning stage.

The flooring should not be laid until a hygrometer test, carried out in accordance with Annex B, gives a reading of not more than 75% relative humidity.

For cement-sand screeds laid directly over a damp-proof membrane, one day should be allowed for each millimetre of thickness for the first 50 mm, followed by an increasing time for each millimetre

above this thickness. It is thus reasonable to expect a screed 50 mm thick, drying under good conditions, to be sufficiently dry in two months.

NOTE 1 Estimated drying times are necessarily very approximate as drying is influenced by ambient conditions, concrete quality, surface finish and thickness. Of these, surface finish and thickness are the most important.

NOTE 2 The moisture content of any supporting concrete can be of great importance when impermeable floor coverings are to be laid over parts of a wood floor.

NOTE 3 For thick concrete bases laid directly over a damp-proof membrane, long drying times are required. The time/thickness relationship used to predict the drying time of cement(s) and screeds does not apply to concrete bases. In practice it has been found that even under good drying conditions concrete bases 150 mm thick often take more than one year to dry from one face only. Moderate and heavy use of power-float/power-trowel finished methods further delays drying.

NOTE 4 Suspended concrete bases laid onto permanent metal shuttering or other impermeable materials have similar drying times to those laid over damp-proof membranes. For slabs which can dry from both sides, about half the thickness can be considered to dry downwards.

Where screeds are laid directly onto the concrete bases, without a damp-proof membrane between them, account should be taken of the time required to dry the total thickness of the construction.

NOTE 5 Commonly, where floor coverings are to be laid, time schedules do not permit extended drying times for concrete bases. The use of sandwich damp-proof membranes between the base concrete and the screed significantly reduces the time that needs to be allowed for drying.

Proprietary systems either based on admixtures for normal screed and concrete mixes or special cements should be used to produce early drying screeds and concrete.

6.1.3 Protection against construction moisture

Where time scales do not allow sufficient drying times and the use of a sandwich damp-proof membrane is inappropriate, the need for a surface damp-proof membrane to control the excess construction moisture in the subfloor and any associated preparatory works, e.g. diamond grinding/shot blasting and the drying/curing times for the chosen damp-proof membrane, should be taken into account at the design stage.

6.1.4 Testing

Cementitious subfloors should be tested in accordance with Annex B and the floor covering not laid until readings have been obtained which indicate a relative humidity of 75% or less.

6.2 Concrete and screed bases

6.2.1 General

NOTE The appearance and performance of floor coverings covered by this British Standard are determined to a large extent by the quality of the prepared base or screed on which the various floor coverings are laid.

The subfloor should be constructed in accordance with the recommendations given in BS 8204-1.

Those responsible for the design and construction of the subfloor should ensure that it meets the requirements for hardness, strength, soundness, levels and surface regularities (see BS 8204-1), dryness and other design parameters before floor covering installation is commenced.

6.2.2 Surface treatments for power floated concrete

Chemical hardening solutions and resinous seals should not be used on bases and screeds due to risk of interaction between the hardener and the floor covering adhesives. In cases where hardening solutions have been used, the treated surface should be mechanically removed.

Curing membranes might affect adhesion and should be mechanically removed.

NOTE Power floating/power trowelling of directly finished concrete might affect adhesion.

The surface should be mechanically prepared by suitable means, e.g. shotblasting, to provide a clean, sound micro-textured dust-free surface.

6.2.3 Surface regularity

*COMMENTARY ON **6.2.3***

*Surface irregularities can affect the overall visual appearance and wear life of the finished floor, resulting in premature wear, localized soiling problems, loss of bond with the installation of tile products, particularly large format tiles and geometric designs, and potential difficulties with the installation of sheet floor coverings where site-formed cove skirting details are used (see **6.12**).*

Additional resources both in terms of materials and time might be required to improve subfloors that do not meet the specified class of surface regularity.

The class of local surface regularity of a directly finished base or levelling screed, if used, should be selected in accordance with Annex C, Table C.1, according to the use of the floor. In making this selection, account should be taken of the type and thickness of the wearing screed or flooring to be applied and the standard of surface regularity required of the finished floor. The highest standard (SR1) should be used where a thin flooring is to be applied and where the minimum irregularity is required of the finished floor, e.g. for a television studio.

NOTE Conversely, the lowest standard (SR3) can be selected where a thicker type of wearing surface is applied and where the regularity of the finished floor is not a significant factor.

The designer should specify the maximum permitted abrupt change in level across joints and the required surface regularity of direct finished slabs and levelling screeds, taking into account the type and thickness of the floor finish, the service conditions and the type and density of trafficking. Where there is any doubt, the default should always be towards a higher standard.

6.3 Timber bases

6.3.1 General

Timber bases should be sound, rigid, level and dry. The timber should be at equilibrium moisture content, i.e. the state of dryness attained in normal service conditions, at the time it is covered.

All timber bases should be covered with a suitable fabricated underlay, see **5.1.1**.

Suspended timber floors at ground level should be adequately ventilated (see BS 8102).

6.3.2 Board and strip floors

Where plain edged boards or tongued and grooved boards have been nailed to joists or battens, one of the underlays listed in **5.1.1** should be used.

NOTE This acts as a buffer and thereby helps to minimize movement in the boards which might affect the appearance of the floor covering.

Uneven timber floors should be levelled by sanding, planing or by patch-filling with a suitable proprietary flexible cementitious smoothing underlayment before a fabricated underlay is laid. Boarded floors nailed into joists secured by clips set in concrete, or dovetailed battens set in concrete, or boards nailed direct into concrete at ground level should be adequately ventilated and protected by a damp-proof membrane.

6.3.3 Wood blocks

NOTE The laying of resilient floor coverings over bases of wood blocks might lead to problems.

Any installation should ensure the following:

a) the surface of the wood blocks is clean and free from wax, sealers etc.;

b) the condition of the floor is such that the blocks are sound and firmly bonded; and

c) the wood blocks are adequately protected against passage of moisture from below.

If the resilient floor covering is to be totally adhered, the following should be determined:

1) the possibility that the blocks could lift from the subfloor during the life of the resilient floor covering; and

2) when the resilient floor covering is to be lifted for renewal.

It is often found that the action of installing the fabricated underlay causes the blocks to fracture, or the wood block adhesive to fail, particularly if it is embrittled by age, and therefore the likelihood of removal of the wood blocks and repair of the base prior to installation of the resilient floor coverings should be determined.

If any doubts exist regarding any of the conditions set out in a) to c), the wood blocks should be removed.

6.4 Wood-based panel bases

6.4.1 General

Wood-based panels should be at equilibrium moisture content i.e. the state of dryness attained in normal service conditions, at the time it is covered. A grade and thickness appropriate for the construction of the floor, nature of the building and the expected design loading should be used. The grades should be selected from those panel types listed in **6.4.2**, **6.4.3**, **6.4.4** and **6.5.1**, that are appropriate for the end-use service class conditions, and a thickness as specified by the designer, or for domestic low rise buildings, deemed to satisfy board types and thicknesses conforming to BS 8103-3.

Square-edged OSB and plywood should be laid with its long edge supported by noggins across the joints with the short edges resting on the joint, whereas square edge particleboard should be laid with its long edges resting on the joists and the short edges supported by noggins.

Tongued and grooved panels should be laid across the joists with the short edges resting on the joists.

All tongued and grooved joints should be glued using an adhesive conforming to BS EN 204, class D3 or better.

NOTE 1 For tongued and grooved boards, noggins are not necessary unless there are unsupported (i.e. no tongued and grooved joint) edges.

An expansion gap of at least 10 mm or a minimum of 2 mm per metre, whichever is greater, should be left free of debris around the perimeter of the floor decking and all edges should be supported either by a tongued and grooved joint, joist or noggin.

NOTE 2 More detailed information on fixing, laying, storage, conditioning, cutting and machining can be found in PD CEN/TR 12872 or PanelGuide Version 4 [2].

All wood-based panel bases should be covered with a suitable fabricated underlay and/or a flexible smoothing underlayment. The use of smoothing underlayments over wood-based panels might not always be appropriate and the smoothing underlayment manufacturer's advice should be sought in respect of product suitability and installation.

6.4.2 Particleboard bases

Particleboard should conform to BS EN 312, Type P4 (dry), Type P5 (humid), Type P6 (heavy duty dry), or Type P7 (heavy duty humid).

6.4.3 Oriented strand board (OSB) bases

OSB should conform to BS EN 300, Type OSB/2 (dry), Type OSB/3 (humid) or Type OSB/4 (heavy duty humid).

6.4.4 Plywood bases

Plywood should conform to BS EN 636 and be classified as either EN 636-1S for use in dry conditions, EN 636-2S for use in humid conditions, or EN 636-3S for use in exterior conditions.

6.5 Floating floors

6.5.1 Wood-based floating floors

The structural deck of the floating floor should be of a suitable type and grade and fixed as specified by the designer of the floor.

Where particleboard is employed as the top layer of the floating floor, BS EN 312, Type P5 (humid), or Type P7 (heavy duty humid) should be used, and where OSB is used it should be OSB/3 with tongued and grooved profiles and of a thickness and type specified by the designer. All tongued and grooved joints should be glued in accordance with BS EN 204, class D3 adhesive or better.

NOTE Guidance on the specification and installation of floating floors is given in the WPIF Industry Standard 3/2014 [3] for particleboard and OSB, and in BS EN 13810-1:2002, Annex A for all board types.

The top layer of the floating floor should be covered with a suitable fabricated underlay (see **5.1.1**).

6.5.2 Proprietary floating floors

*COMMENTARY ON **6.5.2***

There are a number of proprietary floating floor systems available, some of which are based on calcium sulphate fillers.

Proprietary floating floors should be installed in accordance with the manufacturers' instructions.

Such systems might require alternative and/or additional surface preparation prior to the installation of the floor covering, therefore, the manufacturer of both the smoothing underlayment and floor covering should be contacted before proceeding with the installation.

6.6 Other subfloors

NOTE Some existing bases such as clay tiles, concrete tiles or terrazzo are unaffected by dampness, but might be sufficiently permeable to allow moisture to pass through to the back of the floor covering.

These bases should be sound and well bonded to a structural concrete base and be protected, when necessary, by covering with a surface damp-proof membrane or mastic asphalt to suppress passage of moisture from below. Joints between tiles might cause problems with thin surface damp-proof membranes, therefore the manufacturer of the membrane should be consulted before proceeding.

Existing subfloors such as magnesium oxychloride (magnesite) or those based on polyvinyl acetate/cement or gypsum-based screeds are adversely affected by dampness rising through concrete from the ground and should not be covered with a damp-proof layer or with relatively impervious floor coverings. Unless it can be established that there is an effective damp-proof membrane below these materials they should be removed.

Permanently bonding floor coverings covered by this British Standard on top of existing sheet and tile floor coverings should not be carried out. Existing floor coverings and sufficient residual adhesive should be removed to enable the subfloor to receive the appropriate underlay/underlayment and floor covering. The level of dryness of the subfloor with regard to both rising moisture from the ground and residual moisture should be in accordance with **6.1**.

6.7 Fabricated underlays

6.7.1 General

Fabricated underlays should be laid, where required, over existing timber bases and wood-based panel bases (see **6.3** to **6.5**). Wood-based fabricated underlays (see **5.1.1**) should be at the equilibrium moisture content they have in service at the time they are covered. Plywood fabricated underlays should have a minimum nominal thickness of 5.5 mm, and oil tempered hardboard a minimum nominal thickness of 4.8 mm. The thicker the board, the greater its rigidity. Hardboard should be checked for suitability when used in high traffic commercial and light industrial areas.

6.7.2 Plywood

Plywood should conform to BS EN 636 and Annex A (see **5.1.1**).

6.7.3 Hardboard

Hardboard grade HB.H (oil tempered) should conform to BS EN 622-2 (see **5.1.1**).

Hardboard underlay can be laid either mesh side up or smooth side up, however, where it is critical that there is no transfer of the pattern to the surface, especially when using very thin floor coverings, the underlay should be laid smooth side up.

Hardboards should not be used as fabricated underlays for floor coverings of semi-flexible polyvinyl chloride tiles.

NOTE Historically, semi-flexible tiles have cracked and rucked when laid over very thin hardboards with bitumen adhesives.

6.8 In situ underlays

*COMMENTARY ON **6.8***

In situ underlays can be used over cementitious and similar bases. No single in situ underlay is the most suitable for all conditions and selection depends on site conditions and occupational use.

6.8.1 Mastic asphalt

Mastic asphalt should be laid in accordance with the recommendations of BS 8204-5. Where it is being used as a combined underlay and damp-proof membrane, continuity with the damp-proof course in the walls should be provided.

6.8.2 Cementitious

6.8.2.1 Natural rubber latex/cement (aggregate filled)

This type provides a general purpose underlay which should be used where only foot and light wheeled traffic is anticipated.

NOTE These materials contain protein protected with antimicrobial and/or fungicidal additives.

6.8.2.2 Synthetic polymer dispersion/cement (aggregate filled)

NOTE 1 The properties of these materials vary widely in respect of, e.g. water and solvent resistance and resistance to point loading.

The choice of material should be made after taking account of the manufacturer's recommendations.

NOTE 2 Some of these materials contain protein protected with antimicrobial and/or fungicidal additives.

6.9 Smoothing underlayments

6.9.1 Natural rubber latex/cement

This type is a general purpose smoothing underlayment and should be used where only foot and light wheeled traffic is anticipated.

NOTE The flexibility varies according to the formulation. The higher the flexibility, the greater the adhesion, but the lower the resistance to indentation. These materials contain protein protected with antimicrobial and/or fungicidal additives.

6.9.2 Synthetic polymer dispersion/cement

NOTE 1 The properties of these materials vary widely in respect of, e.g. water and solvent resistance and resistance to point loading.

The choice of material should be made after taking account of the manufacturer's recommendations.

NOTE 2 Some of these materials contain protein protected with fungicidal additives.

6.9.3 Powder/water mixes

NOTE 1 The properties of these materials vary very widely in respect of, e.g. rigidity and resistance to point loading.

The choice of material should be made after taking account of the manufacturer's recommendations.

NOTE 2 This type of smoothing underlayment is normally only used on rigid, uncontaminated sand/cement screeds or concrete bases.

6.9.4 Epoxy and other resin compounds

NOTE Underlayments based on epoxy and other resin compounds are available for specific applications.

These compounds should be used in accordance with the manufacturer's recommendations.

6.10 Protection against heat

NOTE 1 Underfloor heating systems have traditionally been run at temperatures up to 27 °C at the adhesive line and the floor coverings covered by this British Standard have given satisfactory service at these temperatures, provided an appropriate grade of adhesive is used.

NOTE 2 Floor coverings conforming to BS EN 650, BS EN 651, BS EN 1816 and BS EN 12104 might reduce the response of underfloor heating due to their thermal insulation properties.

Where hot water pipes are laid below the floor covering for purposes other than heating, they should be laid in accordance with this subclause in order to prevent possible failure of the adhesive or damage to the floor covering. The laying of conduits or pipes in a screed should be avoided, if possible, as cracks might occur over them. To minimize the effects of shrinkage cracking where it is essential that conduits and pipes are incorporated, a minimum of 25 mm thickness of screed containing reinforcement should be placed over the conduit or pipe. The reinforcement should be placed centrally in the depth of the screed over the conduit or pipe and extend for 250 mm on each side.

Where ducts or trunking more than 75 mm wide are to be incorporated in the screed they should be laid with their top surface flush with the screed surface.

Alternatively, where such ducts or trunking have to be buried in the screed below finished screed level, the surface should be brought to screed level with a material strong and resilient enough to carry the imposed loads.

NOTE 3 The significant increase in depth of a bonded screed required to accommodate pipes and trunking within its thickness might lead to increased risk of hollowness.

NOTE 4 Attention is drawn to the possibility of damage to, or softening of, floor coverings situated in close proximity to stoves, cookers or heating appliances.

NOTE 5 High surface temperatures could be caused by direct sunlight falling on the floor covering, when buildings have large windows with southerly aspects.

Adhesives capable of withstanding high surface temperatures should be used.

6.11 Fire hazard

*COMMENTARY ON **6.11***

The fire properties of floor surfaces are not controlled by any of the national building regulations but local regulations might restrict their use in primary escape routes and certain construction and transport regulations might restrict their use in vehicles.

A floor covering with good slip resistance in wet conditions for floors and stairs in escape routes should be used, see BS 9999 and the Building Regulations 2010, Approved Document B for England and Wales [4], [5], [6].

6.12 Skirtings and covings

NOTE 1 A variety of skirtings and covings can be used with the floor coverings covered by this British Standard.

Extruded sections are available in a number of different profiles and should be affixed to the wall using a suitable adhesive.

NOTE 2 Some types can additionally be seam welded to the floor covering to give continuity of surface.

NOTE 3 Site formed coving can be formed from materials such as flexible polyvinyl chloride floor coverings, linoleum and rubber using a suitable cove former.

Such covings should be constant in radius and care should be taken to ensure that they are straight and regular to minimize the formation of voids beneath the floor covering.

6.13 Transition strips

NOTE Transition strips are available in wood, metal and plastic.

Transition strips should be used between dissimilar types, thicknesses or colours of floor covering, at door openings or to act as a finish to a floor edge.

6.14 Stairs

NOTE 1 The floor covering materials covered by this British Standard are suitable for stair treads and risers, provided that they are used with a slip-resistant nosing which can be preformed.

Treads should be levelled and prepared to receive the floor covering in the same manner as the main body of the floor.

Nosings of internal stairs for public buildings should be of a contrasting colour for the benefit of people with impaired vision.

NOTE 2 See BS 8300 for further guidance on visual contrast.

7 Installation

7.1 Liaison and workmanship

7.1.1 Liaison

The liaison previously established with the main contractor and other parties (see **4.1**) should be maintained during the work. For example, work should be scheduled so that:

a) any concrete base and screed are allowed sufficient time to dry;

b) the building is watertight with appropriate heating, lighting and ventilation; and

c) operations which could damage the floor covering are completed before the floor covering is installed.

Other operations which require access to the same area should not be scheduled during the installation of the floor covering and the curing period for the adhesive. The floor covering should be protected before these operations take place, and until completion.

7.1.2 Workmanship

Care should be taken to ensure good workmanship and efficient supervision. Operatives with the necessary skill and knowledge should be employed.

7.2 Storage

Floor covering materials should be stored in a secure, clean, warm, dry, well-ventilated place (see **7.4** for treatment of materials before and during laying).

NOTE Attention is drawn to the various legal requirements for the storage of flammable and highly flammable liquids, including some adhesives.

7.3 Underlays

7.3.1 Fabricated underlays

Any hollows in the base should be levelled by sanding, planing or patch-filling with a suitable smoothing underlayment.

All wood-based panels used as fabricated underlays should be loosely stacked in the room where they are to be laid, in order to create as close to in-use conditions as possible, before laying for at least 48 h, and preferably one week. Hardboard should be either conditioned by sponging/brushing with water on the mesh side with approximately 1 L per panel (1220 mm × 2440 mm) or a pre-conditioned oil tempered hardboard should be used. Hardboards conditioned on site should be installed and fixed whilst slightly expanded, but allowed to fully dry after fixing, to avoid the risk of buckling after the floor covering is applied.

In order to obtain the best results, the underlay should be laid across the line of the boards of the subfloor, with no gaps between the joints of the sheets or any step between each sheet. A gap should be provided around the perimeter of a floor to upstands or abutting construction and at door thresholds to allow for possible expansion of the underlay. This should be a minimum of 10 mm at each stage or 2 mm per metre run of board, or as specified by the manufacturer. The gap should be left open and covered by a skirting board, or filled with a compressible strip such as cork. Joint lines should be staggered and joints in the sheet and the timber base should not coincide.

Fabricated underlays should be fixed using screw nails, ring shank nails or screws which should be finished flush with the surface. Each panel should be fixed at 100 mm centres around the perimeter of the panel and at 150 mm centres elsewhere. The length of the fixings should be at least 2.5 times the

thickness of the fabricated underlay, but no longer than would allow the fixing to protrude below the timber or wood-based panel base.

7.3.2 In situ underlays

Mastic asphalt (flooring grade only) should be laid in accordance with BS 8204-5 and should be the correct grade for its service conditions. Where it is used as a combined underlay and damp-proof membrane, continuity with the damp-proof course in the walls should be provided. To provide an absorbent base for the application of adhesives, the asphalt should be skimmed with a minimum 3 mm thickness (6 mm maximum) of a suitable proprietary smoothing underlayment.

In these cases, the asphalt surface should be prepared by sand rubbing, or by the application of proprietary adhesion primers.

Cementitious underlays should be applied in accordance with the manufacturer's instructions.

7.3.3 Smoothing underlayments

Smoothing underlayments should be mixed and laid in accordance with the manufacturer's instructions.

7.4 Laying

7.4.1 General

Before starting to lay any floor coverings, any conflicting overhead work should be completed. The presence of underfloor heating and security systems should be checked and all preliminary work, such as the fixing of floor sockets for service plugs, completed. The base should be sound, smooth, clean and dry before laying commences.

The laying area should be at a steady temperature between 18 °C and 27 °C for at least 48 h prior to, during and for at least 24 h after completion. The minimum subfloor temperature should be 10 °C.

Provision should also be made for ventilation throughout and after installation.

Existing floor coverings and sufficient residual adhesive should be removed (see **6.6**). Where it is difficult to establish whether or not these materials contain asbestos, specialist advice should be sought before attempting to remove.

NOTE Attention is drawn to Asbestos and man-made mineral fibres in buildings: practical guidance, published by DETR [7], which gives advice on the precautions to be taken when removing existing flooring containing asbestos.

Floor coverings should not be installed to cover movement joints. A proprietary movement joint should be inserted and the floor covering terminated either side of this joint.

The subfloor should be prepared to receive the floor covering by the use of a fabricated underlay on timber bases or a suitable underlayment on screeds, concrete or other solid subfloors.

Worn areas of concrete bases or cement-sand screeds should be made good with a smoothing underlayment, making sure that the base is capable of receiving all applied floor preparation products and floor covering.

Underfloor heating should be switched off 48 h prior to laying the floor coverings. As most adhesives which are used for floor laying do not achieve maximum bond strength immediately, the heating should not be turned on until at least 48 h after laying and peak temperature should be avoided for a further seven days.

If a priming coat is used, the manufacturer's instructions should be followed.

A number of floor covering manufacturers have extensive and detailed laying instructions which are relevant to their materials and these should be consulted.

7.4.2 Product conditioning

7.4.2.1 Cork tiles

Cork tiles should be in a dimensionally stable condition when laid. To achieve this, the tiles should be removed from the carton, and any other wrapping, at least 48 h before laying commences. If site conditions allow, the tiles should be distributed in the room in which they are to be laid to allow them to acclimatize to the conditions likely to prevail in occupation, otherwise they should be distributed in an area where the humidity and temperature conditions are similar to those likely to prevail in occupation.

Some proprietary cork tiles with special surface treatments are supplied preconditioned and with these the manufacturer's instructions should be followed.

7.4.2.2 Other resilient floor coverings and adhesives

Prior to installation, the flooring materials should be allowed to become acclimatized to the site conditions in the laying area. Rolls should be stored securely in an upright position for at least 24 h in the laying area. Boxes of tiles should be removed from the delivery pallet and stored not more than five boxes high in the laying area for at least 24 h.

The conditioning time should be extended to at least 48 h if the floor covering has been stored or transported at temperatures less than 10 °C immediately prior to delivery. Extremes of temperature should be protected against, especially day and night temperatures. Where the ambient room temperature exceeds 27 °C and the high temperatures are caused by sunlight, shading should be used to limit the temperature increase.

The material manufacturer should be contacted for guidance on specific instances of uncertainty.

7.4.3 Adhesives

7.4.3.1 General

The adhesive manufacturer's instructions for the use of the adhesive should be followed, including details of the trowel and the method of use of the adhesive, having regard to the type and thickness of floor covering being laid, the type of base and the adhesive to be used.

NOTE Most flooring adhesives are spread with a notched trowel to ensure even coverage of the base at the correct thickness.

In the absence of such instructions, the manufacturer should be contacted.

7.4.3.2 Application

Adhesives should be applied by one of the following methods:

a) notched trowel. The depth of spacing of the notches should be maintained throughout the installation; or

NOTE 1 Details of the trowel to be used is given in the instructions of either the adhesive or floor covering manufacturer.

b) roller. A pre-wetted short-pile synthetic roller should be used, either on its own or immediately following the notched trowel applications.

NOTE 2 Adhesives applied by roller produce a flat surface film as is required with pressure sensitive adhesives.

7.4.3.3 Methods of use

7.4.3.3.1 Laying into wet adhesive

This method should be used for gum/spirit adhesives and for chemically curing adhesives such as epoxy resins and polyurethanes.

NOTE 1 It is also commonly used for water-borne adhesives when applied over absorbent surfaces.

The floor covering should be laid whilst the adhesive is still wet.

The amount of adhesive applied, the type of adhesive, the porosity of the base and the ambient conditions, including ventilation, are all factors which might affect the rate of drying or curing and should be taken into account when determining the area to be spread with adhesive at any one time.

NOTE 2 A modification of this method, commonly termed the "double drop" method of laying, can be used especially on non-porous subfloors as it markedly reduces the danger of trapping water or solvent from the adhesive.

The floor covering should be laid into the wet adhesive to obtain good transfer to the back. It should then be lifted and peeled back to allow the water or solvent in the two films of adhesive to evaporate, leaving tacky films on both floor and floor covering. The floor covering should then be replaced, applying pressure overall.

NOTE 3 Adhesive manufacturers' instructions indicate which of their adhesives can be used in this manner.

7.4.3.3.2 Laying into dry adhesive

*COMMENTARY ON **7.4.3.3.2***

This method is normally used when fixing the various grades of polyvinyl chloride floor coverings with bitumen adhesives and pressure sensitive adhesives. It can also be used when laying floor coverings directly over non-absorbent bases, when it is necessary to allow any carrier in the adhesive, e.g. water or solvent, to evaporate before the floor covering is laid, to avoid entrapment.

The adhesive should be spread onto the base and allowed to dry before the floor covering is laid. As this method requires that the dried adhesive film be sufficiently tacky to form an adequate bond with the floor covering, the adhesive manufacturer's instructions should be followed.

7.4.3.3.3 Laying into contact adhesive

Contact adhesives should be applied to both the base and the underside of the floor covering and both films of adhesive allowed to dry before the floor covering is laid. The floor covering should be carefully positioned before it is actually laid in place as a strong bond is formed on contact. The area spread with adhesive at any time should be such that it can be covered with floor covering within the time that the adhesive remains receptive.

7.4.3.4 Safe use of adhesive

7.4.3.4.1 General

Safety data sheets provided by adhesive suppliers should be used when carrying out COSHH assessments to ensure that sufficient information is provided to enable their products to be used safely and without risk to health. Appropriate personal protective equipment (PPE) should be worn at all times.

NOTE 1 Attention is drawn to the Health and Safety at Work Act 1974 [8] which requires that adhesive suppliers provide sufficient information to enable their products to be used safely and without risk to health.

NOTE 2 It is the responsibility of users to ensure they are following current legislation.

7.4.3.4.2 Solvent borne adhesives

*COMMENTARY ON **7.4.3.4.2***

Adhesives which are labelled "Petroleum mixture giving off a heavy inflammable vapour", "highly flammable", "highly inflammable" or "flammable" present a potential fire hazard and UK law requires special use, transportation and storage conditions including, in some cases, a licence. See the various petroleum regulations and the Highly Flammable Liquid and Liquefied Petroleum Gases Regulations 1974 [9].

All sources of ignition should be eliminated in the surrounding neighbourhood as vapours from all flammable and highly flammable adhesives spread for considerable distances along the ground, down stairways, etc., thus extending the fire hazard beyond the immediate vicinity of the work.

NOTE 1 Potential sources of ignition include lighted cigarettes, pilot lights, gas torches or burners and electrical appliances including motors and switches.

The work area should be sufficiently ventilated when any solvent-borne adhesive is being used, to ensure that fresh air is constantly introduced, thereby minimizing inhalation of vapours and a build up of a vapour pocket. Smoking should be prohibited in the vicinity, even when non-flammable solvents are used, as some of the vapours decompose to toxic gases in the heat of a lighted cigarette.

NOTE 2 Respirators might be necessary when using this type of adhesive.

7.4.3.4.3 Reactive adhesives (e.g. epoxy resin and polyurethane)

NOTE 1 Most adhesives in this class can cause skin irritation, dermatitis or perhaps sensitization when in direct contact with the skin. These materials can also cause sensitization through the vapours and can cause allergic reaction through the vapours in sensitized persons. At all times reference is to be made to the Manufacturer's Safety Data Sheet and the COSHH Assessment for the relevant material.

Handling procedures should ensure that uncured materials do not come into contact with the skin, e.g. by wearing gloves. Hands should be washed thoroughly after using adhesives of this type.

NOTE 2 Some adhesives might contain materials which could cause irritation of the skin and/or give off irritant vapours which could cause breathing problems and allergic reaction in sensitized persons. At all times reference is to be made to the Manufacturer's Safety Data Sheet and the COSHH Assessment for the relevant material.

Good ventilation should always be provided and approved respirators might be necessary, especially if the adhesive is being spray applied.

7.4.3.4.4 Water borne adhesives

Water borne adhesives are generally far less hazardous than solvent borne or reactive types, however ventilation should be provided and skin contact avoided.

7.4.3.4.5 Waste disposal and emptied containers

NOTE 1 Waste material and the residue in emptied containers give rise to the same hazards as the adhesive itself.

Waste material and residue should not be left on sites but disposed of safely according to the information given in the material safety data sheet.

NOTE 2 Attention is drawn to the relevant legislation with regard to the disposal of waste and residue.

7.4.4 Cork floor tiles

Cork tiles should be fixed with an adhesive specifically designated as being suitable for the type, i.e. sanded, ready sealed, polyvinyl chloride faced etc., and thickness of cork being laid.

The adhesive should be spread evenly on the subfloor using a suitable notched trowel as recommended by the manufacturer and the notch size should be maintained throughout the application. The adhesive should be spread in sufficient quantity for laying only a few square metres at a time. Adhesive should not be spread on areas that take part tiles until after the part tile has been cut. Each tile should be carefully worked into position to exclude air beneath the tile and to ensure overall contact with the adhesive. No adhesive should collect between the tiles to ensure that good,

but not too tight, joints are attained. The floor should be rolled laterally and transversely with a floor roller weighing approximately 68 kg.

7.4.5 Linoleum floor coverings

Sheet material should be cut and fitted. The adhesive should be spread evenly on the subfloor using a suitable notched trowel as recommended by the manufacturer and the notch size should be maintained throughout the application. The floor covering should be laid into the adhesive within the recommended adhesive open time and be well rolled laterally and transversely with a floor roller weighing approximately 68 kg. The floor covering should be re-rolled within 30 min and as necessary, to maintain overall contact.

If the seams are to be welded, the adhesive should be allowed to dry, normally for 24 h after installation, before the floor covering is welded.

For tiles, the main field should be laid into the adhesive, working within an area that can be laid within the open time of the adhesive. The perimeter tiles should be cut to fit prior to the application of adhesive. The floor should be rolled in both directions with a floor roller weighing approximately 68 kg and re-rolled within 30 min and as necessary, to maintain overall contact.

7.4.6 Plastic floor coverings

Sheet material should be cut and fitted. The adhesive should be spread evenly on the subfloor using a suitable notched trowel as recommended by the manufacturer and the notch size should be maintained throughout the application. The material should then be laid into the adhesive within its recommended open time and, where recommended by the manufacturer, should then be rolled in both directions with a floor roller weighing approximately 68 kg. The floor should be re-rolled within 30 min and as necessary, to maintain overall contact. If a jointless floor is required, the seams should be welded. If heat welded, the adhesive should be allowed to dry, normally for 24 h after installation, before the floor covering is welded.

For tiles, the main field should be laid into the adhesive working within an area which can be laid within the open time of the adhesive. The perimeter tiles should be cut to fit prior to the application of adhesive. The floor should be rolled in both directions with a floor roller weighing approximately 68 kg and re-rolled within 30 min and as necessary, to maintain overall contact.

7.4.7 Rubber floor coverings

Rubber floor coverings should be installed as described in 7.4.1 and 7.4.6.

7.5 Initial treatment and maintenance

Prior to handover, an initial clean should be carried out in accordance with the manufacturer's recommendations. All traces of adhesive should be removed using the method recommended by the adhesive manufacturer. Care should be taken when a bituminous adhesive has been used with a light coloured floor covering to ensure that the surface is not stained.

Further treatment and maintenance should be in accordance with the manufacturer's instructions and BS 6263-2.

7.6 Protection

When installation of the floor covering is complete, the adhesive should be allowed to dry, normally for at least 24 h, then all scrap material and debris removed and the floor swept or vacuumed. Where the floor has to be put back into use before handover, all trafficked areas should be covered using a suitable protective layer. The type of protection chosen should take into account the level of potential trafficking, along with any risk of damage from impact, scratching or indentation. If a proprietary

protective layer is chosen that has any printed information, the printed side should be placed uppermost away from the decorative face of the floor covering.

7.7 Underfloor heating

7.7.1 Operating temperatures

*COMMENTARY ON **7.7.1***

When used with many flooring materials, underfloor heating can cause problems if the temperature at the interface between the subfloor and the flooring exceeds 27 °C or is subject to rapid fluctuations in temperature. In the majority of installations, this temperature does not need to be exceeded if the building insulation meets the requirements of the Building Regulations 2010, Approved Document L [10], [11].

NOTE BS EN 1264-2, which is used to design underfloor heating systems, allows for a maximum floor surface temperature of 29 °C in occupied areas.

In areas where the use of higher temperatures is unavoidable, agreement from both the adhesive and flooring manufacturers should be obtained.

7.7.2 Design

Heated screeds should include joints across doorways and between areas with separate heating control zones. If the underfloor heating manufacturer recommends further joints, this advice should be followed (see BS 8204-7).

In addition, maximum bay sizes should be in accordance with the recommendations of the screed manufacturer and also BS 8204-1 and BS 8204-7.

Where electrical element systems are installed, the individual system manufacturer should be consulted for installation advice. This should include the provision of an adequate coverage of smoothing underlayment above the heating elements. They should not be switched on for at least seven days after installation and slowly increased to ensure that the maximum temperature of 27 °C is not reached for at least seven days.

The screed manufacturer should be consulted on drying times for heated screeds (see **7.7.3**).

7.7.3 Commissioning

Before any floor covering is installed the heating system should be commissioned.

NOTE 1 This has two purposes:

a) *to ensure that the heating system is functioning and no leaks or cable breaks require the heat source to be uplifted or repaired; and*

b) *to ensure that the screed is dry and in a stable state to receive the flooring.*

NOTE 2 Preheating is prescribed in BS EN 1264-4, BS 8204-1 and BS 8204-7.

Heat up should not begin for 21 days after laying cement/sand screeds or less for proprietary cements, or seven days for calcium sulphate screeds. Initial heat up should be carried out in accordance with the recommendations of the screed manufacturer and continued until the screed is dry (see **6.1.2**).

NOTE 3 When time scales do not allow for adequate drying of the base to occur, liquid-applied surface damp-proof membranes can be used upon base substrates that include underfloor heated systems.

The recommendations of both the surface damp-proof membrane and the screed manufacturers should be sought prior to the commencement of work. The underfloor heating system should be fully commissioned prior to installation of the surface damp-proof membrane.

Annex A (normative)
Guidance on the selection and specification of suitable plywood for fabricated underlays

A.1 General

To minimize the risk of problems in service, the plywood should conform to **A.2**.

A.2 Plywood specification

NOTE 1 It is envisaged that the floor underlay application does not exceed BS EN 335:2013, Use class 2 in long-term service life. On this basis, plywood meeting the veneer biological durability requirements of class EN 636-2 would be sufficient once in service.

Given the high moisture contents that might occur during initial installation for the floor (from water-based adhesives used to fix overlays), plywood should be manufactured to the Glue Bond class 3 (exterior) as defined in BS EN 314-2.

NOTE 2 Plywood classified as EN 636-3 also meets the above requirements (the class EN 636-3 indicates that the glue bond has passed class 3 of BS EN 314-2).

Formaldehyde emission class should not exceed E1, as defined in BS EN 13986:2004+A1:2015, Annex B.

Boards should be made with species having a published average density of not less than 500 kg/m^3 and a heartwood natural durability class between classes 1 and 4 (i.e. excluding class 5 species) in accordance with BS EN 350.

A.3 Outer veneers

A.3.1 General

The outer veneers should be hardwood and a minimum of 0.75 mm thickness after sanding. Face grain direction should be parallel to one another. They should not be treated with any chemicals that might impair an adhesive bond.

A.3.2 Outer veneer quality

The outer veneer quality should be class I in accordance with BS EN 635-2:1995, Tables 1 and 2: Plywood – Classification by surface appearance – Part 2: Hardwood.

A.4 Internal veneers

A.4.1 General

The inner veneers should be laid up with the direction of grain in adjacent veneers at right angles to each other. The lay-up should be balanced, as defined in BS EN 313-2.

A.4.2 Internal veneer quality

NOTE Open joints, overlaps or other defects which might be telegraphed through to the surface veneers are not permitted.

Internal hardwood veneers of class 1 should conform to BS EN 635-2:1995, Tables 1 and 2: Plywood – Classification by surface appearance – Part 2: Hardwood.

NOTE 1 Repairs to core veneers to achieve this class are permitted, within the limits set for BS EN 635-2:1995, Table 2, class 1.

NOTE 2 Softwood veneers of species above the minimum density of 500 kg/m³ might also be suitable for inner veneers, but there is currently insufficient experience to justify minimum requirements for softwood veneers within this guidance.

A.5 Panel edges

Panel edges should not be filled.

NOTE Defects in the boards can be hidden by filling.

A.6 Nominal thickness

Minimum thickness should be (5.5 ±0.2) mm.

A.7 Common panel sizes

2440 mm × 1220 mm (8 ft × 4 ft)

2400 mm × 1200 mm

1220 mm × 610 mm (4 ft × 2 ft)

1200 mm × 600 mm

A.8 Product claims

Product claims represent a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the recommendations of this British Standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex B (normative) Hygrometer test for dampness of concrete, cementitious and calcium sulphate bases

B.1 Basis of test

To use a hygrometer or hygrometer probe to measure the relative humidity in a pocket of air entrapped in a sleeve or between an impervious thermally insulated housing and the screed/concrete base. Sufficient time is allowed for moisture equilibrium to become established between the pocket of air and the base.

NOTE Concrete under normal conditions is never completely dry. Those responsible for laying floor coverings need to know when the moisture level of the concrete has been reduced to a value where flooring can be safely laid. Water in the coarse pores of concrete is relatively mobile and can lead to damage to flooring, whereas water in the fine pores is relatively immobile and harmless.

When concrete is allowed to dry, the coarse pores first become empty because water in coarse pores exerts a higher vapour pressure, and hence evaporates more quickly than water in fine pores. Because the size of the pores controls the vapour pressure that arises in them, it also controls the vapour pressure of a small volume of air entrapped between the concrete surface and an impervious housing (or box). The vapour pressure determines the relative humidity of that entrapped air so a hygrometer or probe reading indicates the extent to which harmful moisture is still present.

Experimental evidence has shown that when the measured, relative humidity falls to 80% RH, the water has evaporated from the coarse pores and the screed is sufficiently dry to allow installation of resilient floor coverings. If some allowance is made for errors in determining the relative humidity, the concrete is considered dry when the relative humidity falls to 75% or less.

For these reasons, the hygrometer probe or sleeve methods for dampness measurement are recommended over and above other methods.

B.2 Apparatus

B.2.1 *Insulated impermeable box*, which can be sealed to the floor surface to create an enclosed pocket of air which is isolated from the humidity and fluctuations in temperature of the outside air. (See Figure B.1.) This is sealed to the floor using a preformed butyl sealant tape and readings are taken while the apparatus is in position on the floor without breaking the seal and releasing the trapped pocket of air.

NOTE Other forms of apparatus might be suitable but the width of the area is not to be less than 150 mm. It is essential that the principles of thermal insulation and vapour barrier are followed, so that an insulated vapour-proof space is created. Suitable vapour barrier materials are sheet metal, glass, 2 mm thick clear acrylic sheet, or 2 mm thick PVC-U (polyvinyl chloride, un-plasticized), and the apparatus has a maximum U-value of 1.0 W/(m²·K).

B.2.2 *Hygrometer or relative humidity (RH) probe*, for measuring relative humidity to an accuracy of ±3% RH.

NOTE This can be a hair, paper, synthetic fibre or electronic hygrometer of the clock type, or an electronic relative humidity probe.

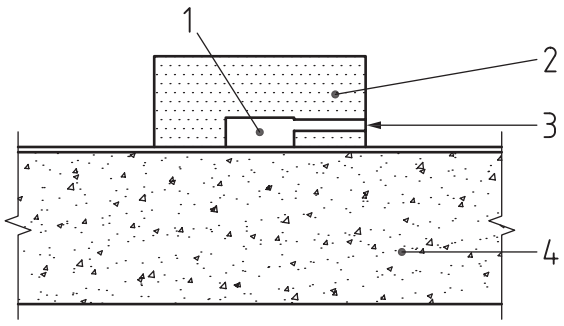
B.2.3 *Preformed butyl sealant tape.*

B.2.4 *Adhesive tape.*

B.2.5 *Protective mats (rubber or polyethylene).*

B.2.6 *Hygrometer sleeve* (if using procedure).

Figure B.1 — *Apparatus for hygrometer test*



Key

1 Space
2 Polystyrene box
3 Entry for hygrometer
4 Concrete and screed

B.3 Suitability

The method of test is appropriate for measurement of percentage relative humidity values above porous surfaces such as screeds and concretes. Low porosity surfaces such as power floated concrete require extended testing periods before true readings can be achieved, and any surface treatment such as concrete curing compounds or waxes should be removed.

NOTE The method might not be suitable for use on proprietary screeds and is not suitable for performance assessment of surface applied moisture barriers.

B.4 Hygrometer probe method

B.4.1 Turn off any artificial aids used for accelerating drying at least four days before final readings are attempted. Accelerated drying should not be used for screeds.

B.4.2 Seal the apparatus firmly to the floor and allow sufficient time for the entrapped air to reach moisture equilibrium with the screed or base.

B.4.3 For an unbonded screed, where the damp-proof membrane is placed between the base and screed as described in BS 8204-1 allow a period of not less than 4 h before taking the first reading.

NOTE Equilibrium can be assumed when two consecutive readings taken at 4 h intervals show no change.

B.4.4 For very thick constructions, i.e. direct finished base slabs or bonded screeds (where the damp-proof membrane is placed below the base slab as described in BS 8204-1) allow a period of at least 72 h to elapse before taking the first reading.

NOTE Equilibrium can be assumed when two consecutive readings taken at 24 h intervals show no change.

B.4.5 Constructions with thickness greater than 200 mm can take considerably longer than one week before moisture equilibrium is established. To prevent edge effects with these very thick constructions, the area of 1 m^2 surrounding the instrument should be covered with an impervious sheet material during the test.

B.4.6 To minimize the time required for the instrument to be in a position on the floor, the following technique can be applied. Cover the positions to be measured with impervious mats (see **B.2.5**) not less than 1 m × 1 m, taped to the floor at their edges. Leave in position for at least three days in the case of screeds and seven days in the case of thick constructions. After removing the mat (see **B.2.5**), immediately seal the instrument to the centre of the covered area. The instrument should be left overnight for equilibrium to be reached.

B.4.7 To avoid expensive equipment being left on site, the probe (see **B.2.2**) should be removed from the apparatus shown in Figure B.1 and the hole plugged before the box (see **B.2.1**) is sealed to the subfloor.

B.4.8 After allowing time to reach equilibrium, remove the plug, insert the RH probe (see **B.2.2**) promptly, and allow at least 30 m for this to reach equilibrium before readings are taken.

B.4.9 A number of simultaneous measurements might be necessary to give a representative survey. This should take into account the size and layout of the installation, as well as any variation in the subfloor construction.

B.4.10 If readings greater than 75% RH are obtained, remove the equipment and allow the floor to dry before further readings are attempted.

B.5 Hygrometer sleeve method

B.5.1 Before drilling into the concrete, check that there are no services within the base.

B.5.2 Drill the correct size diameter hole into the concrete to a depth of 40% of the concrete subfloor's overall thickness.

B.5.3 Using a small brush, clean the inside of the hole free from dust and vacuum away any loose debris from within the hole.

B.5.4 Place the proprietor sleeve into the hole ensuring it is a firm fix and finishes flush with the concrete surface and the cap is firmly in place.

B.5.5 After a minimum of 72 h, remove the cap and immediately insert a proprietary relative humidity reading probe into the sleeve.

B.5.6 After a minimum of 30 min, record the reading. Remove the probe and firmly replace the cap.

B.5.7 After a further minimum 24 h period, repeat the procedure (see **B.5.1** to **B.5.6**) at a minimum of 24 h intervals until two consecutive readings are identical to each other. At this point the trapped air is in equilibrium.

B.6 Verification of hygrometer or probe

As the accuracy of a hygrometer can drift with time or in transit, it should be recalibrated frequently. The accuracy of the hygrometer or RH probe at 75% RH can be checked by sealing it in a desiccator or humidity cabinet over a saturated solution of analytical or general purpose reagent grade sodium chloride, at a constant temperature of (20 ±2) °C for a minimum of 12 h.

Annex C (normative) Assessment of levels and surface regularity

Check surface levels against datum using normal surveying methods.

Check surface regularity by using a 2 m long straightedge laid in contact with the floor surface and resting under its own mass (see Table C.1). Measure the deviations of the surface from the underside of the straightedge by means of a slip gauge or other suitably accurate measuring device.

Table C.1 — *Classification of surface regularity of direct finished base slab or levelling screed*

Class	Maximum permissible departure from the underside of a 2 m straightedge resting in contact with the floor mm
SR1	3
SR2	5
SR3	10

The number of measurements required to checked levels and surface regularity should be agreed between the parties concerned, bearing in mind the accuracy required and the likely time and cost involved.

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Further reading

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