BRITISH STANDARD

BS 8000-9:2003

Workmanship on building sites —

Part 9: Cementitious levelling screeds and wearing screeds — Code of practice

ICS 91.060.30; 91.200

Confirmed February 2012

BSI British Standards

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee B/507, Paving units, kerbs, screeds and in situ flooring, to Subcommittee B/507/6, Screeds and in situ flooring, upon which the following bodies were represented:

Association of Concrete Industrial Flooring Contractors

Association of Lightweight Aggregate Manufacturers

British Cement Association

Concrete Society

Contract Flooring Association

Federation of Plastering and Drywalling Contractors

Federation of Resin Flooring Formulators and Applicators (FeRFA)

Mastic Asphalt Council Ltd

Mortar Producers Association Ltd

National Federation of Terazzo-Marble and Mosaic Specialists

National Specialist Contractors Council

Quarry Products Association

Society of Chemical Industry

Co-opted members

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 7 November 2003

First edition October 1989
Second edition December 1999

Amendments issued since publication

Amd. No.	Date	Comments

The following BSI references relate to the work on this British Standard

Committee reference B/507/6
Draft for comment 03/303970

ISBN 0 580 42811 7

Contents

Foreword

This British Standard has been prepared by Subcommittee B/507/6. It supersedes BS 8000-9:1999 which is withdrawn.

The main changes in this revision take account of the following.

a) The terms used for the types of screeds take account of developments in European standardization. Screeds are designated "levelling screeds" where they are to receive a final flooring and "wearing screeds" where they serve to provide the finished surface.

b) Bases to carry rigid insulation boards beneath floating screeds are to be levelled by filling depressions so that the boards do not rock on high spots.

c) The specifications for materials have been updated. In particular European Standard specifications for cements now include a number of cement types and standard strength classes.

d) The use of higher slag content cements (> 35 %) and the equivalent combinations have been excluded from levelling screeds due to limited experience of their use.

e) The bags of cement now supplied by the manufacturers have been halved in weight to 25 kg so mix calculations have been modified.

f) Slurry bonding of the edges of day work joints is recommended before laying fresh screed material to help reduce curling at butt joints.

g) Items of work to be checked during progress, as well as on the finished screed, are listed.

h) The recommendations given in BS 8204-1 and BS 8204-2 are referred to for curing when using cement lower than strength class 42.5 N.

This British Standard makes recommendations and gives guidance on basic workmanship for conventional types of building work. The recommendations given are not necessarily comprehensive; particular project documents, e.g. project specifications, may need to cover recommendations not dealt with by this code of practice.

This code of practice is unique in that unlike other British Standards, it draws together recommendations given in other codes of practice.

The purpose of this code of practice is to encourage good workmanship by providing the following:

1) the most frequently required recommendations on workmanship for building work in a readily available and convenient form to those working on site;

2) assistance in the efficient preparation and administration of contracts;

3) recommendations on how designers' requirements for workmanship can be satisfactorily realized;

4) definitions of good practice on building sites for supervision and for training purposes – this guidance is not intended to supplant the normal training in craft skills;

5) a reference for quality of workmanship on building sites.

It is recognized that design, procurement and project information is conducive to good workmanship on site.

This code of practice has generally been arranged in accordance with the *Common arrangement of work sections (CAWS) for building work* [1].

BS 8000 comprises the following parts:

— *Part 1: Code of practice for excavation and filling;*
— *Part 2: Code of practice for concrete work;*
— *Part 3: Code of practice for masonry;*
— *Part 4: Code of practice for waterproofing;*
— *Part 5: Code of practice for carpentry, joinery and general fixings;*
— *Part 6: Code of practice for slating and tiling of roofs and claddings;*
— *Part 7: Code of practice for glazing;*
— *Part 8: Code of practice for plasterboard partitions and dry linings;*
— *Part 9: Cementitious levelling screeds and wearing screeds — Code of practice;*
— *Part 10: Code of practice for plastering and rendering;*
— *Part 11: Code of practice for wall and floor tiling;*
— *Part 12: Code of practice for decorative wallcoverings and painting;*
— *Part 13: Code of practice for above ground drainage and sanitary appliances;*
— *Part 14: Code of practice for below ground drainage;*
— *Part 15: Code of practice for hot and cold water services (domestic scale);*
— *Part 16: Code of practice for sealing joints in buildings using sealants.*

This part is based upon and consistent with the guidance contained in BS 8204 which covers the design aspects of the subject matter, (including design, materials and other related aspects) in addition to workmanship on site.

BS 8204-1 gives recommendations for concrete bases to receive in situ wearing screeds of concrete, polymer modified cement, terrazzo, mastic asphalt, synthetic resin and magnesium oxychloride. It also covers both bases and levelling screeds to receive flexible floor coverings, such as textiles, linoleum, polyvinyl chloride, rubber and cork and rigid floorings, such as wood block and strip, ceramic tiles and natural stone.

The text of this part of BS 8000 includes commentaries. These commentaries are printed in italics and are intended to be for guidance only and do not form part of the recommendations. They refer, unless otherwise stated, to the clause which immediately precedes each commentary.

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.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 15 and a back cover.

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1 Scope

This part of BS 8000 gives recommendations on laying cementitious levelling screeds and wearing screeds.

This British Standard does not cover laying concrete bases or direct finished concrete wearing surfaces, recommendations for which are given in BS 8204-1 and BS 8204-2 respectively.

Recommendations on design aspects of levelling screeds and wearing screeds are given in BS 8204-1 and BS 8204-2 respectively.

NOTE This code of practice includes supplementary elements in the form of commentaries to assist in its use and understanding. Compliance with the commentaries is not necessary in order to be able to claim conformity with the standard.

2 Normative references

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

BS EN 13318, Screed material and floor screeds — Definitions.

3 Terms and definitions

For the purposes of this part of BS 8000 the terms and definitions given in BS EN 13318 and the following apply.

3.1
base
flooring element that provides the support for a screed and floor finishes

3.2
flooring
uppermost fixed layer of a floor that is designed to provide a wearing surface

NOTE Layers in a ground-supported concrete floor and a suspended concrete floor are illustrated in Figure 1 and Figure 2 respectively.

3.3
direct finished base slab
concrete flooring element that is suitably finished to provide a wearing surface or to receive directly the flooring to be applied without the need for a levelling screed

3.4
screed material
mixture comprising cement, aggregates, water and, in some cases, admixtures and/or additives

3.5
screed
layer of material laid in situ, directly onto a base, bonded or unbonded, or onto an intermediate layer or insulation layer, for one or more of the following purposes:

— to obtain a defined level;
— to carry the final flooring;
— to provide a wearing surface

3.6
levelling screed
screed suitably finished to obtain a defined level and to receive the final flooring

3.7
wearing screed
screed that serves as a flooring

NOTE This term was formerly known as high strength concrete topping or granolithic topping.

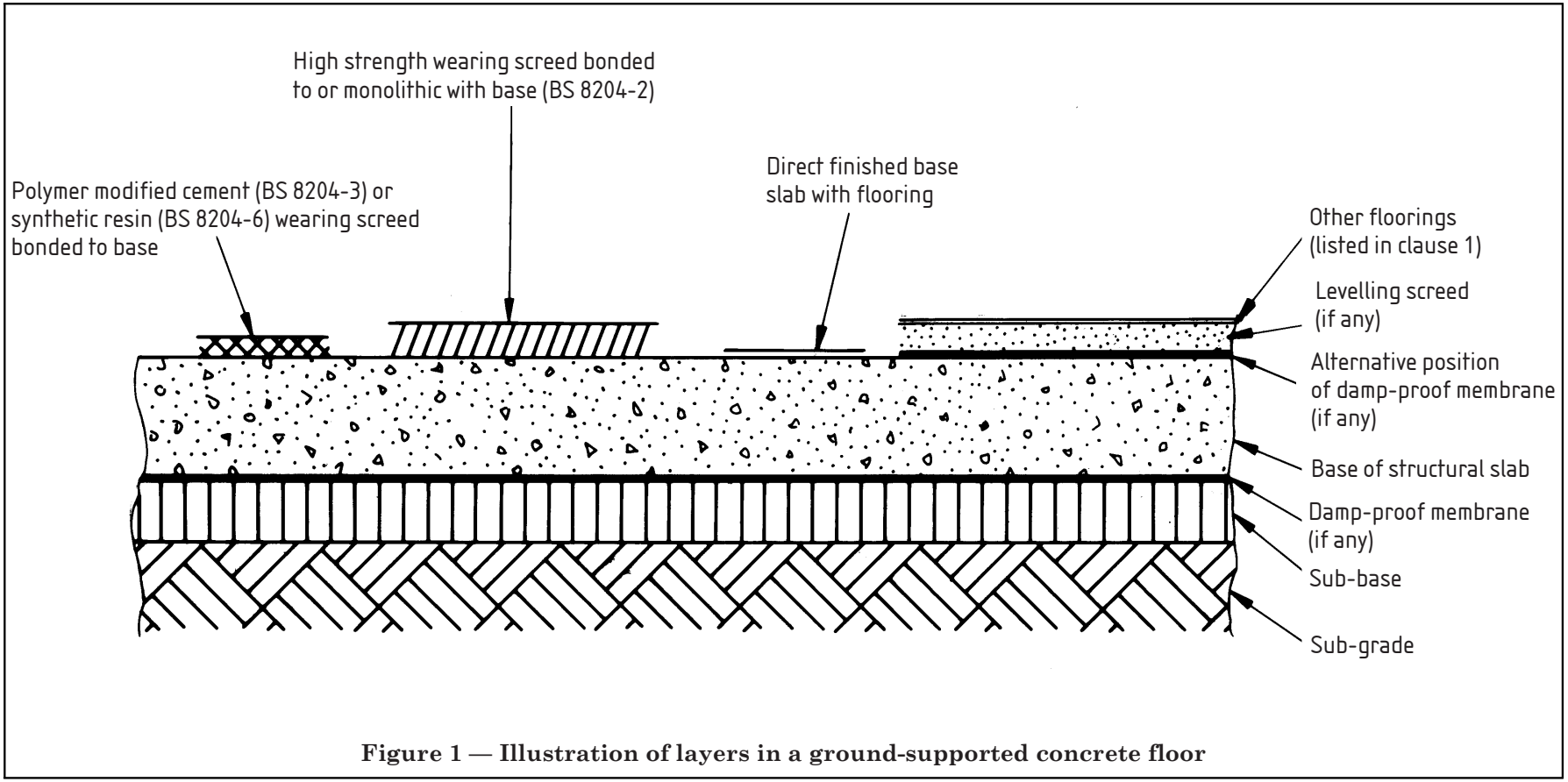

Figure 1 — Illustration of layers in a ground-supported concrete floor

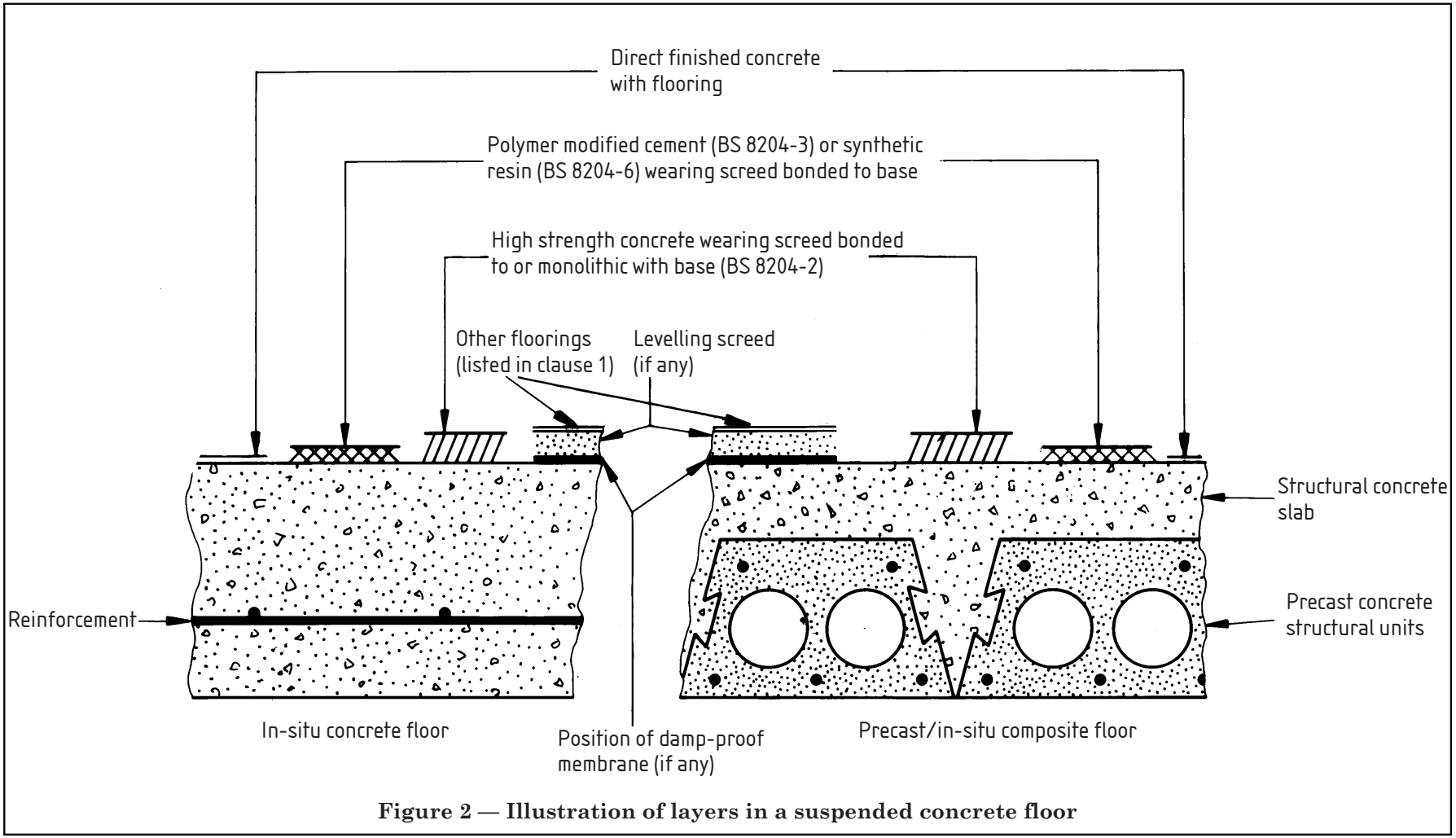

Figure 2 — Illustration of layers in a suspended concrete floor

3.8
surface regularity
deviation in height of the surface of a flooring layer over short distances in a local area

NOTE Surface regularity is also known as flatness.

3.9
departure from datum
deviation in height of the surface of a flooring layer from a fixed datum plane

3.10
in situ crushing resistance (ISCR)
resistance of levelling screeds to the crushing effect of imposed loads and traffic in service

NOTE ISCR was formerly known as soundness.

4 Materials handling and preparation

4.1 General

Cements and combinations, of strength class 42.5 N, have a compressive strength equivalent to that of ordinary Portland cement conforming to BS 12:1996 (BS EN 197-1). Lower strength classes of cement and combinations used either in concrete bases or in cementitious levelling screeds might need an increase in cement or combination content to obtain similar properties and performance. For example, a cement of strength class 32.5 N would probably require an increase in cement content of approximately 10 %. An additional period of curing might also be necessary (see BS 8204-1).

CAUTION Calcium aluminate (high alumina) cement should be used with care. Guidance on the correct use of calcium aluminate cement should be sought from manufacturers and current specialized publications.

WARNING 1 When Portland cement is mixed with water, or even becomes damp, alkalis are released that can be harmful to the skin. The effect depends on the length of contact, any abrasion, the individual and the part of the body involved. Suitable protective clothing should be worn. If eyes are affected, they should be washed out without delay and medical advice sought.

WARNING 2 Screed material and concrete might until set cause both irritant and allergic contact dermatitis.

— Irritant contact dermatitis is due to a combination of the wetness, alkalinity and abrasiveness of the constituent material.

— Allergic contact dermatitis is caused mainly by the sensitivity of an individual's skin to hexavalent chromium salts.

4.2 Checking, handling and site storage of materials and components

4.2.1 *Checking*

Check delivery tickets for the materials against what was ordered and, if necessary, refer discrepancies to the supplier immediately.

Check visually that the materials as ordered are as stated on the delivery tickets. In particular observe that:

a) cement is of the type and class specified;

b) sand is clean and well graded;

c) coarse aggregates are of the correct single or graded sizes and are clean.

4.2.2 *Handling and site storage*

4.2.2.1 *Ready-to-use retarded screed material*

Unload the screed material into clean containers or onto a clean impervious platform. If the screed material is not used immediately on delivery, protect it from the weather and cover it to prevent water loss.

4.2.2.2 *Cement in bags*

Where the cement is to be stored for later use (unless there are small quantities only), store as follows.

a) Store in a dry, weatherproof, enclosed shed or building with a dry floor. Where there is a solid floor, store off the floor, e.g. on pallets.

b) Stack bags away from walls, closely packed together but not more than eight bags high. Cover stacks with a tarpaulin or polyethylene sheet.

c) Stack bags so that consignments can be used in the order of delivery.

Check cement for deterioration when taken out of storage and discard if lumpy.

In the case of small quantities for immediate use, if not stored in a shed or building, stand the bags well clear of the ground, e.g. on a pallet, and cover with a tarpaulin or polyethylene sheet so that all the bags are wholly protected from wind and rain.

COMMENTARY. *Even if cement is protected from rain, moisture in the air will gradually cause its deterioration. Even in good conditions cement will eventually go lumpy and give lower strength.*

4.2.2.3 *Sand and aggregates*

The following should be observed when storing sand or aggregates.

a) Keep different sizes and types of sand and aggregates strictly separate.

b) Store on a hard, clean base which permits free drainage.

c) Keep free from leaves, rubbish, dirt or other deleterious material.

d) In frosty weather cover the stockpiles to prevent freezing.

e) Store sand and aggregates that are delivered in bags in the bags until required for use.

COMMENTARY. *In very cold weather it might be necessary to use some form of insulating covering to protect the sand and aggregates. Polyethylene sheets will keep out rain and dirt but do not offer much protection from frost. In very hot sunny weather it is advisable to cover or to shade stocks to prevent them from becoming excessively hot.*

4.2.2.4 *Reinforcement*

Avoid deformation of the reinforcement during handling. Store off the ground on supports close enough together to prevent the reinforcement from sagging unduly. Cover to keep dry and clean.

4.3 Preparation of work, materials and components

NOTE Levelling screeds provide surfaces that are intended to receive a flooring. Wearing screeds are intended to provide the finished surface. Screeds are liable to crack or curl mainly from the influence of drying shrinkage. Screeds can be crushed under load due to insufficient cement, inadequate mixing and/or compaction. Careful design and skilled workmanship can minimize the risk of these defects. When a failure does occur, it is often inconvenient and costly to remedy as it can occur during practical completion of construction or when the building is occupied. Disregarding the guidance and requirements given in this part of BS 8000 is likely to increase the risk of failure.

4.3.1 *Effect of standards of workmanship on screed performance*

The effects of standards of workmanship on the various tasks carried out in constructing screeds and the consequent screed performance are summarized in Table 1.

Table 1 — Effects of standards of workmanship on screed performance

Activity	Consequences of activity	Tendency or effect
Inadequate preparation of base to receive bonded screeds	Loss of bond and unrestrained shrinkage	Cracking, lack of bond and curling, particularly at joints
Inaccuracy in proportioning of materials:		
a) too much cement[a]	Mix too dry needing more water for workability	The addition of too much water increases liability to crack and curl
b) too little cement[a]	Lowers strength	Disintegration under load Lower abrasion resistance of wearing screed
c) too much water	Lowers strength Liability to shrink more	Increased liability to crack and curl Surfaces weakened More difficult to achieve good level surfaces
d) too little water	Liability to under-compact producing variable strength	Disintegration under load
Inadequate mixing	Variable and low strength	Disintegration under load
Inadequate compaction	Reduced strength and crushing resistance	Cracking and disintegration under load
Trowelling of wearing screeds too soon	Attracts water, cement and finest particles to surface producing lower strength of surface layer	Surface cracking and disintegration Lower abrasion resistance
Over-trowelling of levelling or wearing screeds at later stages	Produces dense, polished, low absorption surface	Slippery wearing surfaces Poor adhesion of applied flooring to levelling screeds
Inadequate curing	Reduces strength, increases total and differential shrinkage	Weaker surface strength Lower abrasion resistance of wearing screeds Curling at joints and cracking

NOTE A relatively early check and control on the strength of levelling screeds can be carried out by a screed tester as described in BS 8204-1. Suitability is determined after 14 days.

[a] For example, for levelling screeds outside the range of proportions by mass of cement to dry sand 1:3 to 1:4.5 recommended in BS 8204-1. For lightweight aggregates see BS 8204-1.

4.3.2 *Inspection and preparation of bases*

4.3.2.1 *Level*

Check the base for level before preparing it to receive the screed (and insulation if specified), to ensure that the specified minimum thickness of screed can be laid over the whole area. If the base is too high, seek further instructions.

4.3.2.2 *General*

The wearing screed material should not be placed on the base concrete until any bleed water on the surface has disappeared.

4.3.2.3 *Monolithic wearing screeds*

No special preparation of the surface of the base concrete is necessary when the wearing screed is laid monolithically.

COMMENTARY. *It is important for the complete bond of a monolithic wearing screed to a base that it should be applied and compacted on to the fresh concrete base while its surface is still plastic, i.e. within three hours of placing the base concrete (or a shorter time in hot weather).*

4.3.2.4 *Surface roughening and cleaning of hardened in situ concrete bases for bonded screeds*

Surfaces of hardened in situ concrete bases for bonded screeds should be roughened and cleaned as follows.

a) Mechanically roughen the entire surface to remove laitance and to expose cleanly, but not loosen, the coarse aggregate particles.

COMMENTARY. *Brushing to remove laitance from a fresh concrete base is inadequate preparation before laying a bonded screed and is not recommended.*

b) Use equipment that avoids heavy impacts on thin bases if there is a risk that cracking or damage could occur.

c) Remove all loose debris, dirt and dust by appropriate means, preferably with vacuum equipment.

d) Carry out the preparation of the surface with as little delay as is practicable before the screed is laid so as to reduce the risk of contamination.

COMMENTARY. *Where the base is a thin layer of concrete (under 100 mm) laid on precast concrete, mechanical scabbling can cause damage. Contained shot blasting is equally effective and is recommended.*

4.3.2.5 *Surface cleaning of roughened precast concrete bases for bonded screeds*

Surfaces of roughened precast concrete bases for bonded screeds should be cleaned as follows.

a) Thoroughly wash and clean surfaces left rough from casting and remove all adhering dirt. Take precautions to ensure that water does not remain in the cores of hollow units.

b) To reduce the risk of contamination, carry out the preparation of the surface with as little delay as is practicable before the screed is laid.

COMMENTARY. *Preparation depends on design requirements and further information should be sought. If wearing screeds are intended to act structurally with precast concrete, it is possible that the surface of the base will need to be contained shot blasted as described in the commentary after* ***4.3.2.4****d).*

4.3.2.6 *Bonding treatment for screeds on hardened in situ concrete bases for bonded screeds*

The bonding treatment may be carried out in either of the following ways.

a) After the base has been prepared and cleaned as described in **4.3.2.4** and before laying the screed material, thoroughly wet the base with water and leave it for several hours (preferably overnight) while keeping it wet. Remove surplus water. Not more than 30 minutes (or less in hot weather) before laying the screed, brush a thin layer of cement grout of creamy consistency well into the surface. Ensure that the grouting is applied at such a time that it will still be wet when the screed is laid on it.

b) As an alternative to applying a thin layer of cement grout, use approved proprietary bonding agents strictly in accordance with manufacturer's sitework instructions relating to covering rate and the condition of the base when the screed is laid.

COMMENTARY. *The use of bonding agents does not eliminate the need for the preparation of bases.*

4.3.2.7 *Surface cleaning and making good of bases for unbonded levelling screeds*

Surfaces should be cleaned and prepared as follows.

a) Sweep the surface clean and remove loose debris and dirt before laying the screed material or placing the separating layer if specified.

b) Check the surface for defects. Seek and obtain instructions if the making good of any cracks, hollowness or surface roughness is considered necessary.

c) Ensure that any damp-proof membrane (DPM) is not damaged before or during the laying of the screed.

4.3.2.8 *Services*

Firmly anchor any service required to be embedded and ensure that there is a minimum of 25 mm of screed cover.

4.3.2.9 *Insulation layer under floating screeds*

Ensure that the base is sufficiently smooth and level to carry rigid or semi-rigid insulation boards without boards resting on high spots and creating wide voids. Fill any depressions with cement grout or mortar before laying the boards.

Ensure that the board or quilt layer is butt jointed so that gaps are not created during the laying of the screed.

COMMENTARY. *The butt jointing is to ensure that the performance of the floating floor in reducing sound or heat transmission is not impaired.*

4.3.2.10 *Preparing levels to achieve required thickness*

For screeds, use either narrow strips of compacted screed material or screed battens, of steel or timber, bedded firmly for the whole length. Keep the edges of strips of bedding reasonably square so that screed laid to adjoin it does not run to a feather-edge.

For wearing screeds, use steel or timber forms or built-in precast concrete rails well supported and secured in places so that they are not disturbed when compacting the screed.

4.3.3 ***Preparation of screed material***

4.3.3.1 *Gauging*

Gauge materials, other than lightweight aggregates, by mass unless the specification requires gauging by volume.

Gauge lightweight aggregates by volume unless the specification requires gauging by mass.

When gauging bagged cement by volume, use the whole bag content for any one batch. Gauge the aggregate in containers of such a size that complete fillings are necessary to proportion batches accurately.

COMMENTARY. *Sand "bulks", i.e. increases in volume, when damp. An allowance should be made for this in gauging. Table 2 gives guidance on suitable allowances. When gauging by mass, compensation for measured moisture content can be made by calculation.*

For lightweight aggregates, gauging by volume is preferable because water absorption significantly affects the mass of the aggregate and it is difficult to control the allowances.

Table 2 — Guidance on changes in mix proportions of cement/sand screeds when damp sand is used

Mix ratio by mass	Proportion by volume			Proportion by mass		
	Cement	Sand		Cement	Sand	
		Dry	Damp		Dry	Damp
cement:dry sand	kg	m^3	m^3	kg	kg	kg
1:3	25 (one bag)	0.050	0.060	25	75	80
1:4	25 (one bag)	0.067	0.080	25	100	106
NOTE 1 Sand density is assumed to be 1 500 kg/m^3.						
NOTE 2 Bulking of uncompacted damp sand is assumed to be 20 %.						
NOTE 3 Moisture content of damp sand is assumed to be 6 % by mass.						

4.3.3.2 *Water content*

For cementitious screeds use the minimum quantity of water necessary to give sufficient workability for laying and thorough compaction.

When using calcium aluminate cement, follow strictly the manufacturer's instructions on water content.

For mixes using lightweight aggregates follow the manufacturer's sitework instructions.

COMMENTARY. *If the screed material is too dry it is unlikely to be sufficiently compactible unless considerable pressure is applied, i.e. by ramming, rolling or applying some other mechanical compaction. If the screed material is too wet, it will be difficult to control the surface profile accurately and the risk of cracking and curling is increased. The water content can be judged by pressing a ball of wet mixed screed material in the gloved hand. There should be virtually no water squeezed out and the ball should retain its shape and not crumble.*

In concrete wearing screeds too much water leads to greater shrinkage cracking, a weaker concrete and a surface more liable to dusting. Too little water gives poor workability and leads to poor compaction.

4.3.3.3 *Mixing of materials*

According to the type of screed desired, mix the materials as follows.

a) **Cementitious levelling screeds**

Mix the cement, sand and aggregate thoroughly and efficiently in a forced action mechanical mixer, e.g. trough or pan paddle mixers, or paddle mixers attached to screed pumps. Admixtures, if used, should be dispersed in the mixing water. Add the minimum amount of water necessary to give sufficient workability for laying and thorough compaction. Mix for sufficient time to provide a screed material of uniform texture.

For hand mixing small quantities, first thoroughly mix the cement and sand on a clean platform, then add water and mix to an even consistency throughout.

COMMENTARY. *Free fall drum mixers (tilting drum machines) have been found to produce inconsistent mixing of material with low moisture content and their use is not recommended for cementitious screeds. A common problem is the use of too dry, badly mixed cementitious mixes, which cannot be properly compacted, with the result that the screed has a dense upper crust with the underlying screed very weak and friable. This can result in breakdown of the screed under point loads.*

b) **Concrete wearing screeds**

Mix mechanically. When a free fall mixer is used first put coarse aggregate and a part of the mixing water in the mixer, then add sand, cement and the remainder of the water required. Admixtures, if used, should be dispersed in the mixing water. Mix for sufficient time to provide a consistent texture of material. Avoid over-mixing when admixtures or additives are used as this could cause excessive air entrainment.

c) **Lightweight aggregate screeds**

Mix mechanically in accordance with the appropriate manufacturer's sitework instructions.

d) **Proprietary systems**

Mix according to the manufacturer's or supplier's sitework instructions.

Discharge each batch completely before reloading the mixer.

4.3.3.4 *Pumped screeds*

Do not modify the specified mix or water content to suit pumping without approval.

4.3.3.5 *Care of mixing plant*

Clean out mixing drums at the end of each day's work and when there is a change of material. Carry out regular checks of the weighing mechanism in accordance with the manufacturer's instructions to ensure constant accuracy.

5 Laying of levelling and wearing screeds

5.1 General

5.1.1 *Weather conditions at the time of mixing and laying*

Weather conditions should be observed and the following points considered when mixing and laying wearing screeds.

a) Do not lay screeds on frozen surfaces.

b) Do not use sand or aggregates which are frozen.

c) Do not lay screeds unless they can be maintained at a temperature above 5 °C during construction and for four to five days afterwards.

COMMENTARY. *To enable work to continue during periods of cold weather, sand, aggregates and cement should be maintained above freezing point. Mixing water can be heated but cement should not come into contact with water hotter than 60 °C. Freshly placed and finished bases and screeds exposed to the weather should be covered with insulating mats, tarpaulins or other sheeting, carefully lapped and supported clear of the surface on a temporary framework in such a manner that the wind cannot blow underneath. Unless heated enclosures and/or heated materials are used it is preferable to delay mixing and laying until the weather is warmer.*

d) In hot weather, delay as little as possible between mixing, laying and protecting. Do not allow the screed to dry out to the extent that thorough compaction is prevented.

e) Protect freshly placed screeds from rain.

5.1.2 *Timing between mixing and laying*

The following points of timing should be observed when laying screeds.

a) Lay screeds before the screed material starts to stiffen or dry out.

b) Protect ready-to-use screed material from losing water by evaporation before use.

c) Lay screeds within the period quoted for retardation.

d) Do not retemper screeds after they have begun to stiffen.

COMMENTARY. *It is preferable that, except in the case of screed materials containing retarding admixtures, laying should be completed within two hours of mixing.*

5.1.3 *Monolithic construction*

Lay screeds within three hours of laying the base or sooner in hot weather (see **4.3.2.3**).

5.1.4 *Separate bonded construction*

Lay screeds on a suitably prepared base.

5.1.5 *Unbonded construction*

Lay screeds on a clean surface of hardened concrete or membrane (see **4.3.2.7**).

5.1.6 *Lightweight or proprietary screeds*

Lay screeds according to the sitework instructions of the aggregate manufacturer or of the manufacturers or suppliers of proprietary screed systems.

5.1.7 *General reinforcement*

Lay reinforcement, if specified, in the screed as in the following sequence.

a) Lay reinforcement in the middle third of the thickness unless otherwise specified.

b) Leave gaps where stress relief joints are to be cut.

c) Place screed in two layers.

d) Lay the bottom half of the screed, compact it, lightly roughen the surface and place the reinforcement.

e) Lay the top half of the screed, compact it, level it and finish it.

All these operations should follow one another without undue delay so that the second layer is placed while the first layer is still fresh and workable.

5.1.8 *Joints*

5.1.8.1 *General*

Form joints where instructed.

5.1.8.2 *Levelling screeds*

Form stress relief joints either by cutting through the screed with a trowel during laying or by saw cutting after the screed has hardened. Cut the joints straight and vertical at least to mid depth of the screed. Carry out saw cutting within four weeks of laying. Form any day joints within the screed as plain, vertical butt joints.

5.1.8.3 *Wearing screeds*

Form joints between bays of bonded or unbonded screeds as untreated vertical butt joints or by sawing grooves through the wearing screed as soon as it has hardened sufficiently. This is usually three to seven days after laying, but sooner in hot weather, particularly if there is no roof cover.

Where wearing screeds are laid monolithically with the base, the joint positions will be determined by those required in the base. Where specified, carefully locate and firmly fix any crack inducers at the bottom of the base. Either before or immediately after the screed has been laid, either insert strip joint formers in the required positions or, alternatively, form grooves at joint positions by cutting through the hardened concrete.

5.2 Bay sizes

5.2.1 *Cement sand levelling screeds*

In order to minimize the number of joints, lay screeds in as large an area as possible in one operation while maintaining the required levels.

COMMENTARY. *Screeds in large areas can crack at random locations as they dry and shrink. These shrinkage cracks, and any resulting minor curling where they occur, are more easily dealt with than the more pronounced curling which can occur at vertical butt joints if screeds are laid in small bays.*

5.2.2 *Concrete wearing screeds*

Form bay sizes as specified.

5.2.3 *Lightweight and proprietary screeds*

Form bay sizes in accordance with the manufacturer's or supplier's sitework instructions.

5.3 Placing and compacting

5.3.1 *Cement sand and fine concrete levelling screeds*

Cement sand and fine concrete levelling screeds should be placed and compacted according to the following.

a) Check that the base has been suitably prepared (see **4.3.2**) to receive the screed.

b) Use narrow strips of screed material, laid and compacted to the finished level, to establish the level of the screed. Alternatively, fix carefully levelled and trued screed battens.

c) Place screed material in bays separated by levelling strips. At the surface allow a surcharge of approximately 10 mm above the levelling strips (the drier the material the greater the surcharge) to allow for compaction to level. Ensure that the edges of day work joints are cut vertically before the next bay is laid. Slurry bonding, using slurry incorporating a bonding admixture, of these joints of the set or hardened levelling screed can be used to achieve a bond to the fresh screed material being laid in an adjacent bay.

COMMENTARY. *Slurry bonding the day work joints will help to reduce curling that could occur at an unrestrained vertical butt joint. A proprietary bonding agent may be used or a proprietary bonding admixture may be added to the slurry in accordance with the manufacturer's instructions.*

d) Tamp down the screed heavily and ensure that the screed is thoroughly compacted throughout its depth, particularly at corners and edges.

e) Fill any low areas, recompact and rule out.

COMMENTARY. *If the main body of the screed is poorly compacted, its strength will be lower than intended and it could fail in service. Poor compaction at the bottom of the screed layer will reduce its bond strength with the base. Particular care is needed to ensure thorough compaction when the screed is laid over a compressible layer. A mix slightly wetter than normal will assist compaction.*

5.3.2 *Thick cement sand levelling screeds*

Where thick screeds, i.e. over 50 mm, are laid in two layers, ensure that each layer is approximately the same thickness and has the same mix and water content. Immediately after compacting the first layer, rake its surface to provide a bond for the second layer, then lay the second layer and compact it.

COMMENTARY. *It is important that however the screed is laid, full compaction is achieved. A mix of good compactibility can be laid up to approximately 75 mm thick in one layer. The thicker the screed, the more difficult it is to ensure thorough compaction.*

5.3.3 *Concrete wearing screeds*

Concrete wearing screeds should be placed and compacted according to the following.

a) Check preparation of base (see **4.3.2**).

b) Fix levelling rails.

c) Place concrete in bays between levelling rails. Allow a surcharge of material of approximately 2 mm per 10 mm depth to allow for compaction to level.

d) Ensure that the concrete is thoroughly compacted throughout its depth, in particular at corners and edges.

e) Allow concrete to harden sufficiently to prevent damage when laying subsequent bays.

5.3.4 *Lightweight and proprietary screeds*

Refer to the manufacturer's or supplier's sitework instructions.

5.3.5 *Removing temporary levelling*

Remove temporary levelling so as to leave a firm square undamaged edge to the bay which will provide a neat construction joint with the succeeding bay or bays.

5.4 Finishing

5.4.1 *Cement sand and fine concrete levelling screeds*

Finish the surface as required by the specification or as needed for the type of flooring to be applied.

COMMENTARY. *The surface will normally either be slightly open textured as left from a screed board or wood float, or smooth and closed as left from a steel trowel.*

5.4.2 *Concrete wearing screeds*

Finish to a flat surface with a hand or powered float. Either hand float the surface at the end of the compacting operation or power float at a suitable time interval after laying.

Do not power float until the surface moisture has disappeared and the concrete has sufficient stiffness to bear the weight of the operator without causing significant disturbance to the surface. Do not sprinkle neat cement on the screed to absorb bleed water.

As soon as the surface is sufficiently hard, steel trowel by hand or machine. Re-trowel at least twice at intervals until a suitable hard closed finish is obtained and there is little or no effect from further trowelling. Do not apply water between trowelling operations.

COMMENTARY. *Floating operations are carried out to flatten the surface. Trowelling operations are intended to close, smooth and consolidate the surface. The build up of laitance, which would form a weak surface, should be minimized and so the finishing operations should be carried out at the right time and to the right degree in relation to the progressive hardening of the concrete. Trowelling should be carried out at least twice within the period of three hours to six hours after laying. The final trowelling should be carried out when considerable pressure is required to make any impression on the surface.*

5.4.3 *Lightweight and proprietary screeds*

Finish in accordance with the manufacturer's or supplier's sitework instructions.

5.4.4 *Dry shake finishes*

Apply in accordance with the manufacturer's or supplier's sitework instructions.

COMMENTARY. *A spreader machine should be used to ensure a uniform distribution of the dry shake material. Spreading by hand is not recommended except for small areas or where the machine cannot be used.*

5.5 Surface treatments after laying

Apply any surface treatments required strictly in accordance with the manufacturer's sitework instructions.

COMMENTARY. *It is desirable that concrete wearing screeds have surfaces of low absorption. Excess use of hardeners on such surfaces can give rise to uneven deposit of salts and uneven colour if the hardeners are not removed by washing but left to evaporate on the surface.*

5.6 Inspection and testing

5.6.1 *During work in progress*

Check work in progress, paying attention to:

a) materials;

b) preparation of the base;

c) batching and mixing;

d) compaction;

e) finishing;

f) curing.

5.6.2 *After completion of the screed*

Inspect the finished screed for:

a) level and surface regularity;

b) adhesion of bonded screeds to the base;

c) curling and lipping of unbonded and floating screeds;

d) in situ crushing resistance (see note to Table 1);

e) cracking;

f) accuracy in terms of the following:

1) level of surface of floors: unless otherwise specified, lay finished surfaces of all screeds within the maximum permissible departure from datum;

2) surface regularity: finish the screed to within the specified tolerance for flatness;

3) across joints: ensure that the difference in height across joints does not exceed that specified.

COMMENTARY. *Guidance on levels, surface regularity and steps at joints is given in BS 8204-1 and BS 8204-2.*

6 Curing screeds

COMMENTARY. *The following text is relevant when traditional cementitious levelling and wearing screeds are produced from what was known as ordinary Portland cement of single strength class, and what is now called CEM I 42.5 N, 42.5 R or 52.5 N.*

If screeds have been made using cements and combinations that develop strength at a reduced rate, an extended period of curing is required. See BS 8204-1 and/or BS 8204-2.

Cover screeds with waterproof sheeting for at least seven days to prevent drying out. Place the waterproof sheeting as soon as practicable after completion of laying in such a manner that the surface texture and profile of the screed will not be damaged. Lap the joints of the sheeting by at least 150 mm and hold down the joints and edges securely along their entire lengths to prevent wind blowing underneath.

Alternatively, apply a resin curing membrane to a concrete wearing screed as soon as possible after finishing and when the surface has no moisture sheen.

COMMENTARY. *Proprietary resin curing compounds should not be used on cement sand levelling screeds. They can be used on wearing screeds except where they could affect the bond of subsequent surface treatments.*

7 Protection

Protect levelling screeds against surface damage, wear and contamination during subsequent building operations.

Protect wearing screeds adequately in their early life until they have gained sufficient strength and abrasion resistance to withstand normal traffic.

COMMENTARY. *Protection can be achieved by using hardboard or similar sheet materials.*

Bibliography

Standards publications[1)]

BS 12:1996, *Specification for Portland cements.*

BS 8204-1:2002, *Screeds, bases and in situ floorings — Part 1: Concrete bases and cement sand levelling screeds to receive floorings — Code of practice.*

BS 8204-2:2002, *Screeds, bases and in situ floorings — Part 2: Code of practice for concrete wearing surfaces.*

BS 8204-3:1993, *Screeds, bases and in-situ floorings — Part 3: Code of practice for polymer modified cementitious wearing surfaces.*

BS 8204-6:2001, *Screeds, bases and in-situ floorings — Part 6: Synthetic resin floorings — Code of practice.*

BS EN 197-1:2000, *Cement — Part 1: Composition, specifications and conformity criteria for common cements.*

Other publications

[1] CONSTRUCTION PROJECT INFORMATION COMMITTEE (CPIC). *Common arrangement of work sections (CAWS) for building work.* Code: 13647. BPIC: 1998[2)].

Further reading

BS 8203:1996, *Code of practice for installation of sheet and tile flooring.*

[1)] The dates given are those of the current edition of the standards referred to. However, any subsequent edition applies as soon as it is published.

[2)] For further information see http://www.productioninformation.org/CAWS.html.
Available from www.ribabookshops.com//Search/IdxCat/1425.asp (RIBA Bookshops, Construction House, 56-64 Leonard Street, London EC2A 4LT).

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