

Screeds, bases and in situ floorings —

Part 6: Synthetic resin floorings — Code of practice

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Committees responsible for this British Standard

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- Association of Industrial Concrete Flooring Contractors
- Association of Lightweight Aggregate Manufacturers
- Concrete Society
- Contract Flooring Association
- Department of the Environment, Transport and the Regions — Building Research Establishment
- Federation of Resin Flooring Formulators and Applicators
- Federation of Plastering and Drywall Contractors
- Mastic Asphalt Council
- Mortar Industry Association
- National Federation of Terrazzo-Marble and Mosaic Specialists
- National Specialist Contractors Council
- Quarry Products Association
- Society of Chemical Industry
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Foreword

This part of BS 8204 has been prepared by Subcommittee B/544/6. It gives recommendations for floorings based on liquid synthetic resin binders, in which curing takes place by chemical reaction of the resin components, applied to a direct finished concrete slab, fine concrete screed, polymer modified cementitious screed or existing concrete floor and finished to the required level.

The other parts of BS 8204 are the following:

- *Part 1: Concrete bases and cement sand levelling screeds to receive floorings — Code of practice;*
- *Part 2: Concrete wearing surfaces — Code of practice;*
- *Part 3: Code of practice for polymer modified cementitious wearing surfaces;*
- *Part 4: Code of practice for terrazzo wearing surfaces;*
- *Part 5: Code of practice for mastic asphalt underlays and wearing surfaces.*

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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 24, an inside back cover and a back cover.

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Introduction

The term “resin” is derived from “epoxy resin”, the compound on which the first resin floorings were based. Many different types of resins are now used to manufacture resin floorings but the one common feature is that a polymerization, or curing, reaction takes place in situ to produce the final synthetic resin finish. Synthetic resin flooring is available in a wide range of thicknesses from thin floor seals to heavy-duty industrial protective coatings. The resulting flooring can provide a seamless surface with greatly enhanced performance compared with the concrete base on which it is applied.

Concrete wearing surfaces give satisfactory service under many industrial conditions but become less effective where there are specific requirements for chemical resistance, hygiene, cleanliness, and resistance to high impact or abrasion. The main properties of synthetic resin floorings can be summarized as follows:

- a) a strong permanent bond to the concrete base;
- b) resistance to a wide spectrum of aggressive chemicals;
- c) impermeability to liquids;
- d) toughness, durability, resilience and resistance to impact or abrasion;
- e) hygienic and easily cleaned surfaces;
- f) resistance to cracking;
- g) low applied thickness;
- h) rapid installation and curing with minimum disruption to normal operations.

1 Scope

This part of BS 8204 gives recommendations for the design and installation of in situ synthetic resin flooring used internally in buildings, where they are bonded to direct finished concrete slabs, fine concrete screeds and to existing concrete floors. The installation of resilient sports surfacings based on synthetic resins is not covered by this code of practice.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 6100-1, *Glossary of building and civil engineering terms — Part 1: General and miscellaneous*.

BS 6100-6, *Glossary of building and civil engineering terms — Part 6: Concrete and plaster*.

BS 8102, *Code of practice for protection of structures against water from the ground*.

BS 8203, *Code of practice for installation of resilient floor coverings*.

BS 8204-1:1999, *Screeds, bases and in-situ floorings — Part 1: Concrete bases and cement sand levelling screeds to receive floorings — Code of practice*.

BS 8204-2:1999, *Screeds, bases and in-situ floorings — Part 2: Concrete wearing surfaces — Code of practice*.

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

CP 102, *Code of practice for protection of buildings against water from the ground*.

BS EN 12504-2:2001, *Testing concrete in structures — Part 2: Non-destructive testing — Determination of rebound number*.

THE CONCRETE SOCIETY. *Concrete industrial ground floors: a guide to their design and construction*. Technical Report No. 34. Second edition. Crowthorne (Berkshire): The Concrete Society, 1994¹⁾.

ROGERS, M.R. and G. BARNBROOK. *Concrete industrial ground floors: specification and control of surface regularity of free movement areas*. Supplement to The Concrete Society Technical Report No. 34, *Concrete industrial ground floors: a guide to their design and construction*. Crowthorne (Berkshire): The Concrete Society, 1997¹⁾.

¹⁾) Available from the Concrete Society, Century House, Telford Avenue, Crowthorne, Berks RG45 6YS.

3 Terms and definitions

For the purposes of this part of BS 8204, the terms and definitions given in BS 6100-1, BS 6100-6 and the following apply.

3.1

base

building element that provides the support for a screed or flooring

3.2

flooring

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

3.3

direct finished base slab

base that is finished to receive directly the flooring to be applied without the need for a levelling screed

3.4

levelling screed

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

3.5

synthetic resin

reactive organic polymeric binder for a flooring system comprising one or more components which react in situ at ambient temperature

3.6

departure from datum

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

3.7

surface regularity

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

NOTE This is sometimes referred to as flatness.

4 Exchange of information and time schedule

4.1 General

Consultation and exchange of information between all parties concerned with the building operations should be arranged, so that each party has full knowledge of the particulars of the flooring work and is able to cooperate in producing the necessary conditions to complete a satisfactory job.

Some of the items listed in 4.3, 4.4 and 4.5 may need special precautions or procedures and responsibility for these should be determined in advance of the work.

4.2 Selection of flooring to be applied

It is essential that, in the design and construction stages, there should be full consultation with the manufacturer of the synthetic resin flooring to ensure that the product to be selected is entirely suited for the conditions both during application and in subsequent service. This consultation should take account of the following items, however, it should be noted that some of these items may only apply where the client has specified particular performance requirements:

- a) the intended use of the synthetic resin flooring, including the type, extent and frequency of traffic;
- b) the type of loading (static or dynamic) and severity of impact;
- c) the details of all chemicals, including those used for cleaning or sterilizing, which could come into contact with the floor, and likely extent, frequency and temperature of any spillage;
- d) the temperatures that the flooring is required to withstand in normal service or as part of the cleaning operations and whether exposure is by radiant or conductive heat or by direct contact;
- e) the uniformity and retention of colour, appearance and decorative effects;
- f) the extent to which the flooring will be exposed to direct sunlight or ultraviolet light;
- g) the appearance and quality of finish;

- h) the need to reduce the risk of osmotic blistering (see 9.2);
- i) compliance with hygiene or food industry requirements;
- j) special requirements, such as slip resistance, fire resistance or anti-static characteristics;
- k) expected life of the flooring;
- l) thickness of flooring to be installed;
- m) time available for the application and curing of the flooring;
- n) age, specification where known and nature of the base, including information about any previous use of the floor that could affect adhesion, and any preparatory treatment required.

4.3 Information to be provided to the flooring contractor

All relevant information should be provided in good time to those responsible for installing the flooring and to others whose work could be affected. This should include the following:

- a) description, situation and address of site and means of access;
- b) those conditions of contract which could practically affect this particular work;
- c) location and area of flooring to be installed;
- d) finished floor level, falls and maximum permissible departure from datum in each location;
- e) class of surface regularity of the finished flooring;
- f) type of damp-proofing and insulation if present;
- g) type and thickness of any levelling screed proposed, and whether any curing compound is to be applied;
- h) type of finish of base or fine concrete screed;
- i) any work consequent upon services passing through the floor;
- j) treatment of joints;
- k) treatment of channels;
- l) treatment of skirtings and kerbs;
- m) treatment of junctions with adjacent floorings and doorway thresholds;
- n) any special requirements related to underfloor heating;
- o) the timing of the introduction of heating in the building;
- p) date for the completion of the base or fine concrete screed to receive the flooring;
- q) dates for the start and completion of the individual sections of the floor;
- r) details and frequency of any compliance testing required;
- s) any potential restrictions on working hours;
- t) any limitations on installation due to production or other activities.

It should be noted that some of items a) to t) may not apply in all cases and that this will depend on the individual client's requirements.

4.4 Information to be provided by the flooring contractor

The flooring contractor should provide in good time to those responsible for the building, details of the conditions needed for the installation of the flooring. These should include:

- a) the extent of weatherproof areas to be provided for storage of raw materials and mixing of the flooring product and whether any temperature control is necessary;
- b) the ambient temperature requirements in the area where the flooring is to be installed;
- c) the power and lighting requirements to facilitate the laying operation;
- d) the protective screening to isolate the working area from adjacent facilities;
- e) the minimum time intervals after the flooring is installed before allowing foot traffic, vehicular traffic and water or chemical exposure;
- f) the protection necessary for the flooring between installation and final handover

4.5 Time schedule

When planning the floor installation, allowances should be made for the following:

- a) curing and drying of the base concrete, fine concrete levelling screed, and/or polymer modified cementitious levelling screed;
- b) time between commencement and completion of work;
- c) period of curing and protection of the completed flooring from damage by other trades, including restriction of access.

5 Materials

5.1 General

For all synthetic resin flooring products the setting reaction, by which the initially liquid components are converted into a strong tough polymer, begins only when the base resin and the reactive hardener or catalyst are intimately mixed. To obtain the optimum results these components should be blended in the precise proportions needed for the chemical reaction to occur. Mixing should be thorough to ensure the final product is homogeneous and uniform in properties. Only pre-batched base resins, reactive hardeners and aggregates, if any, should be used to facilitate site operation and ensure optimum performance. Since, it is imperative that the chemical balance is not upset, no attempt should be made to use subdivided packs, or to blend in any other additional materials such as diluents or aggregates.

Any separate primers or surface seals should be applied strictly in accordance with the manufacturer's recommendations in order to achieve maximum bond between each application.

5.2 Synthetic resin types

A variety of synthetic resins can form the binder of a flooring system. These typically include epoxy, polyurethane and methacrylate resins.

The different resin types give different combinations of application characteristics and in-service performance. Careful consideration should be given to the factors that will affect the selection of a resin type (see clause 6).

6 Design

6.1 Selection parameters

Flooring systems should be selected on the basis of:

- a) type and degree of traffic;
- b) temperatures to which flooring will be exposed;
- c) nature and duration of any chemical contact with the floor;
- d) wet or dry service conditions;
- e) slip resistance requirements;
- f) ease and method of cleaning (including hygiene requirements);
- g) moisture condition of the substrate;
- h) time available for application and curing of the flooring;
- i) prevailing site conditions at time of installation.

The most appropriate flooring for any situation will depend upon the particular conditions to which it will be subjected, and the choice should be made in discussions between all the interested parties, including client, designer, contractor and supplier. It is not possible to provide a simple guide to the usage of different flooring types, since so many parameters can affect the decision for a particular situation.

6.2 Types of synthetic resin flooring

Synthetic resin floorings can be divided into different types varying in thickness and surface finish (see Table 1).

Some of these types of flooring may be produced with special decorative effects by the incorporation of coloured particles or flakes in the surface. Terrazzo-like finishes (ground exposed aggregate) may be produced from certain trowel-applied floorings of Types 6 and 8. Slip resistant or anti-static/conductive versions of all these categories may also be available.

Table 1 — Types of synthetic resin flooring

Type	Name	Description	Typical thickness
1	Floor seal	Applied in two or more coats. Generally solvent or water-borne.	up to 150 µm
2	Floor coating	Applied in two or more coats. Generally solvent-free.	150 µm to 300 µm
3	High build floor coating	Applied in two or more coats. Generally solvent-free.	300 µm to 1 000 µm
4	Multi-layer flooring	Aggregate-dressed systems based on multiple layers of floor coatings or flow-applied floorings, often described as “sandwich” systems.	> 2 mm
5	Flow-applied flooring	Often referred to as “self-smoothing” or “self-levelling” flooring and having a smooth surface.	2 mm to 3 mm
6	Resin screed flooring	Trowel-finished, heavily filled systems, generally incorporating a surface seal coat to minimize porosity.	> 4 mm
7	Heavy duty flowable flooring	Having a smooth surface.	4 mm to 6 mm
8	Heavy duty resin flooring	Trowel-finished, aggregate filled systems effectively impervious throughout their thickness.	> 6 mm

6.3 Durability

Generally, the service life will be proportional to the applied thickness of the synthetic resin flooring. However, many operational factors will directly affect the performance, including the severity of traffic (wheel type and loading), the frequency and efficiency of cleaning, mechanical handling abuse and impact. In most industrial facilities there will be a variety of situations for which a different type of synthetic resin flooring will be most appropriate. Conversely, there will be areas of a facility where some types of flooring are inappropriate.

Floorings of Types 1 to 3 should be installed only where there will be pedestrian or commercial use or in lighter industrial situations. Where there is regular or heavy fork-lift truck traffic, the thicker floorings of Types 4 to 8 should be installed. For the heaviest usage, particularly where there is the possibility of significant impact damage, then floorings of Types 7 and 8 should be installed.

Premature failure of the coatings of floorings of Types 1 to 3 could occur if grit or metal swarf were not cleaned away and were then ground into the surface under the action of traffic. A thicker type of flooring, which would be more durable, should be installed in such situations.

6.4 Timing

Synthetic resin floorings are frequently selected for use because they can permit rapid installation and hence minimum disruption to industrial or commercial operations. However, in planning the flooring installation other associated aspects of the work should be taken into account (see 4.4 and 4.5).

In new works, or in existing works where a new sub-floor is first to be installed, the curing of the concrete base should be taken into account. Where the synthetic resin flooring chosen is not susceptible to moisture in a concrete base, it may be applied over a new concrete base as soon as it is firm enough to withstand the physical loads imposed. Generally, the concrete should be allowed to dry for three to four weeks after the necessary curing, before the resin flooring is applied.