

Wall and floor tiling —

Part 4: Code of practice for tiling and mosaics in specific conditions

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Committees responsible for this British Standard

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- British Adhesives and Sealants Association
- British Ceramic Research Ltd.
- British Ceramic Tile Council
- Building Employers' Confederation
- Chartered Institute of Building
- Concrete Society
- Consumer Policy Committee of BSI
- Contract Flooring Association
- Department of the Environment (Building Research Establishment)
- Mortar Producers' Association Limited
- National Federation of Terazzo, Marble and Mosaic Specialists
- National Master Tile Fixers' Association
- National Tile, Faience and Mosaic Fixers' Society
- Royal Institute of British Architects
- Stone Federation

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Foreword

This part of BS 5385 has been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Policy Committee. It supersedes BS 5385-4:1986 which is withdrawn.

BS 5385-4:1986 included appendices describing methods of bedding tiles. These appendices have been withdrawn as the recommendations now given in BS 5385-1, BS 5385-2 and BS 5385-3 are more comprehensive.

Since BS 5385-4:1986 was published, BS 5385-1 and BS 5385-2 have been completely revised and CP 202 has been withdrawn and replaced by BS 5385-3 and BS 5385-5. Accordingly, cross references in this part now refer to the latest editions of BS 5385-1, BS 5385-2 or BS 5385-3.

The recommendations in BS 5385-1, BS 5385-2 and BS 5385-3 are substantially relevant, but this part of BS 5385 provides greater assistance in understanding the effect specific conditions may have on ceramic tiling and gives more detailed guidance on the selection of the most suitable materials and methods.

The subject of movement is no longer treated as a special condition but is considered in Section 1. Recommendations about movement joints are given in Section 2.

Throughout this part, references to tiles and tiling are intended to apply also to mosaics. However, mosaics may be unsuitable in certain situations and attention is drawn to these where appropriate.

Other parts of BS 5385 are as follows.

- *Part 1: Code of practice for the design and installation of internal ceramic wall tiling and mosaics in normal conditions;*
- *Part 2: Code of practice for the design and installation of external ceramic wall tiling and mosaics;*
- *Part 3: Code of practice for the design and installation of ceramic floor tiles and mosaics;*
- *Part 5: Code of practice for the design and installation of terrazzo tile and slab, natural stone and composition block floorings.*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 31 and a back cover.

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Section 1. General

1 Scope

This part of BS 5385 gives recommendations for the installation of ceramic wall and floor tiling and mosaics in situations where there are specific functional or environmental requirements and/or conditions that are potentially detrimental to the installation or the background or both. Recommendations are given for the choice of materials, application practices and, where appropriate, for the design of backgrounds and structural bases.

This part of BS 5385 augments the recommendations given in BS 5385-1, BS 5385-2 and BS 5385-3 and unless the specific condition requires different materials, design or methods of fixing the recommendations given in the appropriate part of BS 5385 should be followed.

NOTE 1 BS 5385-1, BS 5385-2 and BS 5385-3 give recommendations for: exchanging information, time schedules, suitable materials, tile backgrounds and bases and their preparation, cement:sand rendering, movement joints, bedding methods for tiles and mosaics, grouting, protection, cleaning and maintenance.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this part of BS 5385 the definitions given in BS 6100 and BS 6431-1 apply.

3 General

The conditions covered in this part, imposing restrictions on tiling that warrant precautions additional to those normally taken, fall into two groups:

a) conditions to be resisted:

- movement,
- traffic,
- loads,
- wet and damp conditions,
- chemical attack,
- thermal effects,
- contamination from radioactivity;

b) conditions to be achieved:

- sterile conditions,
- thermal insulation,
- sound insulation,
- anti-static conditions.

For situations where several conditions are associated, the specification should be directed towards achieving the most important function required of the system. In some cases a compromise solution may be found for meeting conflicting needs, but this should not be considered if its adoption is likely to place the durability of the installation at risk.

Specifications should meet the most exacting conditions that may be imposed on the installation, even though these may not be sustained and may occur only infrequently.

Should an installation be subjected to a later change of use introducing conditions different from those foreseen originally, a careful check of the installation should be made to assess its degree of suitability.

Classes of tiles suitable for use in specific conditions, are given in Table 1 for wall tiling and Table 2 for floor tiling.

Suitability of bedding methods in specific conditions, are given in Table 3 for walls and in Table 4 for floors.

NOTE Some adhesives and jointing materials give off odours during curing that may adversely affect foodstuffs and other materials and/or cause discomfort to occupants. It is important that the manufacturer's instructions are closely followed.

Table 1 — Suitability of tiles for wall tiling in specific conditions

Specific conditions	Product group as classified in Table 2 of BS 6431-1:1983 ^a				Clause reference in this part of BS 5385
	AI	AIIa	BI	BIII	
Impact	S	C	S	C	5.3
Damp and wet conditions					
Installations subject to infrequent contact with water	S	S	S	S	6
Installations continuously immersed or subject to frequent contact with water	S	C	S	C	7
Chemical attack					8
Mildly corrosive conditions	C	C	C	C	
Highly corrosive conditions	C	C	C	C	
Sterile conditions	S	C	S	S	9
Thermal effects (climatic and environmental)	S	C	S	C	10
Thermal insulation	S	S	S	S	11
Sound insulation	S	S	S	S	12
Radioactivity	C	U	C	U	14
Key S Suitable U Unsuitable C Confirm tile's suitability by reference to manufacturer ^a For product groups not shown in the table, determine their suitability by reference to the tile manufacturer.					

Table 2 — Suitability of tiles for floor tiling in specific conditions

Specific conditions	Product group as classified in Table 2 of BS 6431-1:1983 ^a				Clause reference in this part of BS 5385
	AI	AIa	BI	BII	
Traffic and load conditions					5
Light to moderate loads and impact	S	S	S	C	
Heavy loads and impact	S	S	S	U	
Damp and wet conditions					
Installations subject to infrequent contact with water	S	S	S	S	6
Installations continuously immersed or subject to frequent contact with water	S	C	S	C	7
Chemical attack					8
Mildly corrosive conditions	C	C	C	C	
Highly corrosive conditions	C	C	C	C	
Sterile conditions	S	C	S	S	9
Thermal effects (climatic and environmental)	S	C	S	C	10
Thermal insulation	S	S	S	S	11
Sound insulation	S	S	S	S	12
Anti-static conditions	C	U	C	U	13
Radioactivity	C	U	C	U	14
Key S Suitable U Unsuitable C Confirm tile's suitability by reference to manufacturer ^a For product groups not shown in the table, determine their suitability by reference to the tile manufacturer.					

Table 3 — Suitability of bedding methods for wall tiling in specific conditions

Specific conditions	Bedding methods			Clause reference in this part of BS 5385
	Cementitious adhesives	Organic adhesives	Cement:sand mortar	
Impact	S	C	S	5.3
Damp and wet conditions				
Installations subject to infrequent contact with water	S	S	S	6
Installations continuously immersed or subject to frequent contact with water	S	C	S	7
Chemical attack				8
Mildly corrosive conditions	S	S	S	
Highly corrosive conditions	U	C	U	
Sterile conditions	S	S	S	9
Thermal effects (climatic and environmental)	S	S	S	10
Thermal insulation	S	S	S	11
Sound insulation	U	S	U	12
Radioactivity	S	S	S	14
Key S Suitable U Unsuitable C Confirm adhesive's suitability by reference to manufacturer				

Table 4 — Suitability of bedding methods for floor tiling in specific conditions

Specific conditions	Bedding methods						Clause reference in this part of BS 5385
	Cement: sand mortar	Cement: sand semi-dry mix	Cement: sand mortar over separating layer	Cementitious adhesives	Organic adhesives	Chemically-resistant adhesive	
Traffic and load conditions							5
Light to moderate loads and impact	S	S	S	S	S	S	
Heavy loads and impact	S	S ^a	U	S	C	S	6
Damp and wet conditions							
Installations subject to infrequent contact with water	S	S	S	S	S	S	7
Installations continuously immersed or subject to frequent contact with water	S	S ^a	U	S	C	S	
Chemical attack							8
Mildly corrosive conditions	S	S	S	S	S	S	
Highly corrosive conditions	U	U	U	U	U	S	9
Sterile conditions	S	S	S	S	S	S	
Thermal effects (climatic and environmental)	S	S	S	S	S	S	10
Thermal insulation	S	S	S	S	S	S	
Sound insulation							11
By methods a) and b) of 12.2	U	U	U	S	S	U	
On thick screed over a sound-absorbent layer	S	S	S	S	S	S	12
Electrostatic conditions	S	S	S	S	C	S	
Radioactivity	S	S	S	S	S	S	13
Key							14
S Suitable							
U Unsuitable							
C Confirm adhesive's suitability by reference to manufacturer							
^a Bonded to the base.							

4 Movement

4.1 General

Experience indicates that stresses may be set up in the tiling system as a result of movements due to such factors as drying shrinkage and moisture movements in the background and thermal and moisture changes in the tiling. These stresses, if not properly controlled, can sometimes be sufficient to promote loss of adhesion and bulging or cracking of the tiling. There are also sources of movement external to the tiling system which may affect the tiles themselves, e.g. settlement and subsidence of buildings, and vibration in boiler houses and around lift shafts and machinery.

Settlement, subsidence and vibration are uncommon sources of trouble, but where the stresses they promote are considerable, wall and floor tiling, in common with other components of the building, are likely to be affected. No precautions can be taken at the time of tiling to eliminate the effects of settlement and subsidence but the use of a flexible adhesive can be beneficial in reducing the effects of vibration and specialist advice should be sought. With other sources of movement, there are positive steps which can be taken to reduce the risk of tiles being damaged during their service life.

4.2 Drying shrinkage movement

Drying shrinkage movement of backgrounds is the most common source of movement in tile installations and it is important that new constructions should be allowed to dry out before tiles are fixed. Minimum drying times are given in BS 5385-1, BS 5385-2 and BS 5385-3. The times given may require considerable extension depending on the site conditions, thickness and mass of the structure. Longer drying times are recommended for concrete pools and tanks (see 7.2.1).

4.3 Moisture movement (wetting and drying)

4.3.1 General

Porous materials can absorb moisture from the atmosphere and may expand as a result. Conversely, when porous materials dry out they may contract. When these changes are small they do not create problems; but if the size changes are appreciable and ceramic tiles are fixed to such backgrounds, the tiling will be subjected to stress and some loss of adhesion or cracking may result.

4.3.2 Walls

Backgrounds of porous materials having medium or large moisture movements should be thoroughly dry before fixing commences and the installation should be designed to prevent further moisture sorption as far as practicable. If porous backgrounds are rendered or plastered, at least a further 2 weeks and 4 weeks respectively should be allowed for further drying.

Special attention should be paid to the provision of movement joints (see 4.7) and, if necessary, a flexible adhesive should be used for fixing the tiles.

The walls of premises that are shut down for appreciable periods in winter and have no space heating may become damp and expand. In extreme conditions such premises are liable to frost damage and should have provision for automatic heating during very cold weather.

4.3.3 Floors

Moisture movement is unlikely to be a factor in floors of concrete or screeded concrete construction. It may assume greater importance where the base is of timber construction, particularly chipboard, which is prone to distortion as a consequence of moisture sorption and is not suitable as a base for tiling (see 14.4 of BS 5385-3:1989).