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**Protection of below ground structures
against water ingress — Code of practice**

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Contents

	Page
Foreword	iii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Design philosophy	4
4.1 General	4
4.2 Design team	5
4.3 Principal considerations	5
<i>Figure 1 — Design flowchart</i>	8
5 Site evaluation	9
5.1 General	9
5.2 Inspection and survey for existing structures	10
6 Water resisting design	12
6.1 Groundwater	12
6.2 Waterproofing protection	13
<i>Figure 2 — Schematic illustrations of Type A, Type B and Type C waterproofing protection – Type A (barrier) protection</i>	15
<i>Figure 3 — Schematic illustrations of Type A, Type B and Type C waterproofing protection – Type B (structurally integral) protection</i>	15
<i>Figure 4 — Schematic illustrations of Type A, Type B and Type C waterproofing protection – Type C (drained) protection</i>	16
<i>Table 1 — Use of different protection types based on water table classification</i>	17
<i>Table 2 — Waterproofing protection – Grades of performance for below ground spaces</i>	19
6.3 Exclusion of surface water	20
6.4 External sub-surface drainage	20
<i>Figure 5 — Sub-surface drainage positioning</i>	21
6.5 Buried decks below ground level	22
<i>Figure 6 — Typical details of a buried deck with drainage</i>	23
6.6 Ground gases	24
7 General construction issues	24
7.1 Site dewatering	24
7.2 Unexpected hazards	25
7.3 Structural elements	26
7.4 Continuity in construction	26
7.5 Protecting waterproofing	26
8 Type A (barrier) protection	27
8.1 Structural aspects	27
<i>Figure 7 — Effect of structure on applied waterproofing barrier</i>	28
<i>Figure 8 — Examples of pile to floor slab junction</i>	29
8.2 Waterproofing barrier materials	30
<i>Table 3 — Waterproofing barriers</i>	31
<i>Figure 9 — Effect of bonded or partially bonded barriers</i>	33
9 Type B (structurally integral) protection	36
9.1 General	36
9.2 Materials for structurally integral protection	36
9.3 Embedded retaining walls	39
10 Type C (drained) protection	41
10.1 Structural aspects	41

10.2	Cavity drain systems	41
	<i>Figure 10 — Example of a multi-level system</i>	44
	<i>Figure 11 — Example of a flood loop discharge</i>	46
10.3	Servicing and maintenance	47
11	Remedial measures	48
11.1	General	48
11.2	External grouting or injection	49
11.3	Repair with cementitious or polymeric systems	50
11.4	Replacement of locally defective material	51
11.5	Masonry structures	51
Bibliography		52

Summary of pages

This document comprises a front cover, an inside front cover, pages I to IV, pages 1 to 53, 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 2022. It was prepared by Technical Committee B/526, *Geotechnics*. A list of organizations represented on this committee can be obtained on request to its committee manager.

Supersession

This British Standard supersedes [BS 8102:2009](#), which is withdrawn.

Information about this document

This British Standard was originally published in 1990, superseding the earlier CP102 (1975). This is a full revision of the standard, and introduces the following principal changes:

- a) a number of recent developments are addressed, which are important when specifying, designing and constructing below ground structures, including:
 - 1) more deep construction in congested urban areas;
 - 2) an increase in the provision of residential basements;
 - 3) development and use of new materials for waterproofing.
- b) a more detailed assessment is provided of the risks inherent in below ground construction and how these might best be addressed.

It is noted that the figures used in this document are only representative of different installation methods, and are not to be translated directly into practice without first checking all the parameters specific to the installation.

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Users may substitute any of the recommendations in this British Standard with practices of equivalent or better outcome. Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements 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.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

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1 Scope

This British Standard gives recommendations and provides guidance on methods of dealing with and preventing the entry of water from external sources into structures that are partly or wholly below ground.

It covers the use of:

- a) waterproofing barrier materials applied to the structure;
- b) structurally integral watertight construction; and
- c) drained cavity construction.

It refers to the evaluation of groundwater conditions and consideration of harmful ground gases, risk assessment and how to manage these risks in below ground structures.

This British Standard includes guidance on the drainage outside the structure and recognition of the risk of water entering a structure through openings.

NOTE 1 Structures that are partly or wholly below ground can include occupied rooms, tunnels, plantrooms, car parks, residential or commercial spaces, and service ducts. These structures can consist of any combination of solid masonry, concrete and steel as the primary ground retaining structures. This British Standard is relevant to structures below buildings or that are fully underground and covered by buried roofs, podium decks, or tunnel roofs.

Structures are generally characterized as “deep” if they have more than one storey below ground level, or “shallow” if they have only a single storey below ground. This British Standard is applicable to both.

NOTE 2 The principles for achieving waterproof underground spaces in this standard are relevant to most forms of underground space. However, it is recognized that deep tunnels, rock caverns, mines, pipelines and some water containment structures might follow design principles that are different to the approach set out in this British Standard. In these types of structures, the acceptable levels of water ingress can be very different to those defined in this standard.

NOTE 3 Standards and guidance for the protection of buildings against flooding by means of property level flood resistance and resilience measures are given in [BS 85500](#).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document¹⁾. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[BS 5220](#), *Code of practice for ground investigations*

[BS 6100-3](#), *Building and civil engineering — Vocabulary — Part 3: Civil engineering — General*

[BS 6000-2](#) (all sections), *Workmanship on building sites — Part 2: Code of practice for concrete work*

[BS 8204-1](#), *Screeds, bases and in situ floorings — Part 1: Concrete bases and cement sand levelling screeds to receive floorings — Code of practice*

[BS EN 1504](#) (all parts), *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity*

[BS EN 1542](#), *Products and systems for the protection and repair of concrete structures — Test methods — Measurement of bond strength by pull-off*

¹⁾ Documents that are referred to solely in an informative manner are listed in the Bibliography.