

# Monuments within burial grounds and memorial sites – Specification

ICS 91.100.15

## Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee B/545, Natural stone, upon which the following bodies were represented:

Association of Consulting Engineers

English Heritage

Institution of Civil Engineers

Institute of Clerks of Works of Great Britain Incorporated

National Association of Memorial Masons

National Paving and Kerb Association

ODPM — represented by BRE

Stone Federation

Co-opted member

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| 15639    | 18 May 2005   | Correction to Annex reference in Clause 8 and amendment to notes in <b>B.10</b> . |
| Amd. 1   | 30 June 2009  | See foreword                                                                      |
| A2       | 30 April 2012 | See foreword                                                                      |

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## Foreword

This British Standard is published by BSI Standards Limited (2012) and has been prepared by Technical Committee B/545.

The start and finish of text introduced or altered by Amendment No. 1 is indicated in the text by tags **A1** and **A1**.

The start and finish of text introduced or altered by Amendment No. 2 is indicated in the text by tags **A2** and **A2**.

BS 8415:2005+A2:2012 supersedes BS 8415:2005+A1:2009, which is withdrawn.

It has been assumed in the drafting of this specification that the selection of components together with the design and construction of the monuments is entrusted to appropriately qualified and experienced persons, and the execution of the work is carried out under the direction of appropriately qualified supervisors.

Reference is made in this standard to the *Code of Working Practice* [1] published by the National Association of Memorial Masons. Clause 5.3 and the tensile pull test in Annex F derive from this Code.

This British Standard calls for the use of procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage. In particular attention is drawn to risks involving the lifting of components and equipment and those involved should be aware of this. In this respect the following publications are available from the HSE (Health and Safety Executive):

- *Manual Handling — Guidance on Regulations* [2];
- *Getting to grips with manual handling* [3];
- A1** — *Stone dust and you — Guidance for stonemasons INDG 315* [4];
- COSHH essentials for stonemasons: Silica (available in five parts) [5], [6], [7], [8], [9];
- *Controlling exposure to stonemasonry dust* [10];
- *Hand-arm vibration in the cast stone industry (MISC 493)* [11]. **A1**

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.**

**A1** **Attention is drawn to the the following statutory regulations:**

- Manual Handling Operations Regulations 1992 (as amended) [12];
- Control of Substances Hazardous to Health Regulations 2002 (as amended) [13];
- and
- The Provision and Use of Work Equipment Regulations 1998 [14]. **A1**

### Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 23, and a back cover.

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## 1 Scope

This British Standard specifies the minimum structural design criteria and performance requirements for new and reinstated monolithic and multi-component monuments in burial grounds and memorial sites in which monuments are:

- a) fabricated from natural stone and/or concrete; and
- b) installed above and below the natural ground surface; and
- c) whose total mass does not exceed 4 t.

It also specifies requirements for checking the condition of existing monuments.

This British Standard is intended for use by burial authorities and monumental masons concerned with the installation and reinstatement of monuments and the checking of existing monuments within burial grounds or memorial sites. It does not set out to constrain artistic endeavour.

NOTE Annex A of this standard contains recommended inscription information on monuments. Annex B contains requirements for the checking of existing monuments.

## 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 4449, *Specification for carbon steel bars for the reinforcement of concrete*.

BS 6100, *Glossary of building and civil engineering terms*.

BS 6744, *Stainless steel bars for the reinforcement of and use in concrete — Requirements and test methods*.

BS 8004, *Code of practice for foundations*.

BS 8110-1, *Structural use of concrete — Part 1: Code of practice for design and construction*.

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

BS EN 206-1, *Concrete — Part 1: Specification, performance, production and conformity*.

BS EN 447, *Grout for prestressing tendons — Specification for common grout*.

BS EN 10088-2, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate, plate and strip for general purposes*.

BS EN 10088-3, *Stainless steels — Part 3: Technical delivery conditions for semi-finished products, bars, rods, and sections for general purposes*.

BS EN 12370, *Natural stone test methods — Determination of resistance to salt crystallization*.

BS EN 12371, *Natural stone test methods — Determination of frost resistance*.

BS EN 12407, *Natural stone test methods — Petrographic examination*.

BS EN 13919, *Natural stone test methods — Determination of resistance to ageing by SO<sub>2</sub> action in the presence of humidity*.

BS EN ISO 11600, *Building construction — Jointing products — Classification and requirements for sealants*.

### 3 Terms and definitions

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

NOTE Other terms and definitions (not used in this standard) are given for information only in Annex C.

#### 3.1

##### **base**

support structure for a monument

#### 3.2

##### **canopy**

roof-like covering on a monument

#### 3.3

##### **burial ground**

area set aside for interment

NOTE A memorial garden,  churchyard  and cemetery are types of burial ground.

#### 3.4

##### **memorial site**

area set aside in the memory of the deceased upon which a monument is erected

#### 3.5

##### **monument**

freestanding object installed in a burial ground or memorial site in memory of the deceased

#### 3.6

##### **characteristic compressive strength**

compressive strength of a material, as assessed by standard test, which is exceeded by 95 % of the material

#### 3.7

##### **cramp**

shaped piece of metal, suitably bedded into sinkings cut in stone units, to tie them to one another or to their backing

#### 3.8

##### **dowel**

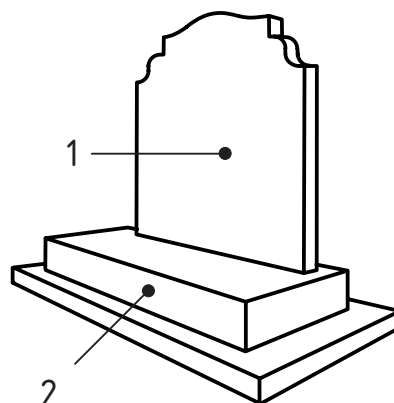
short piece of material sunk or cast into adjacent hidden faces to align or prevent movement, or both (see Figure 1)

#### 3.9

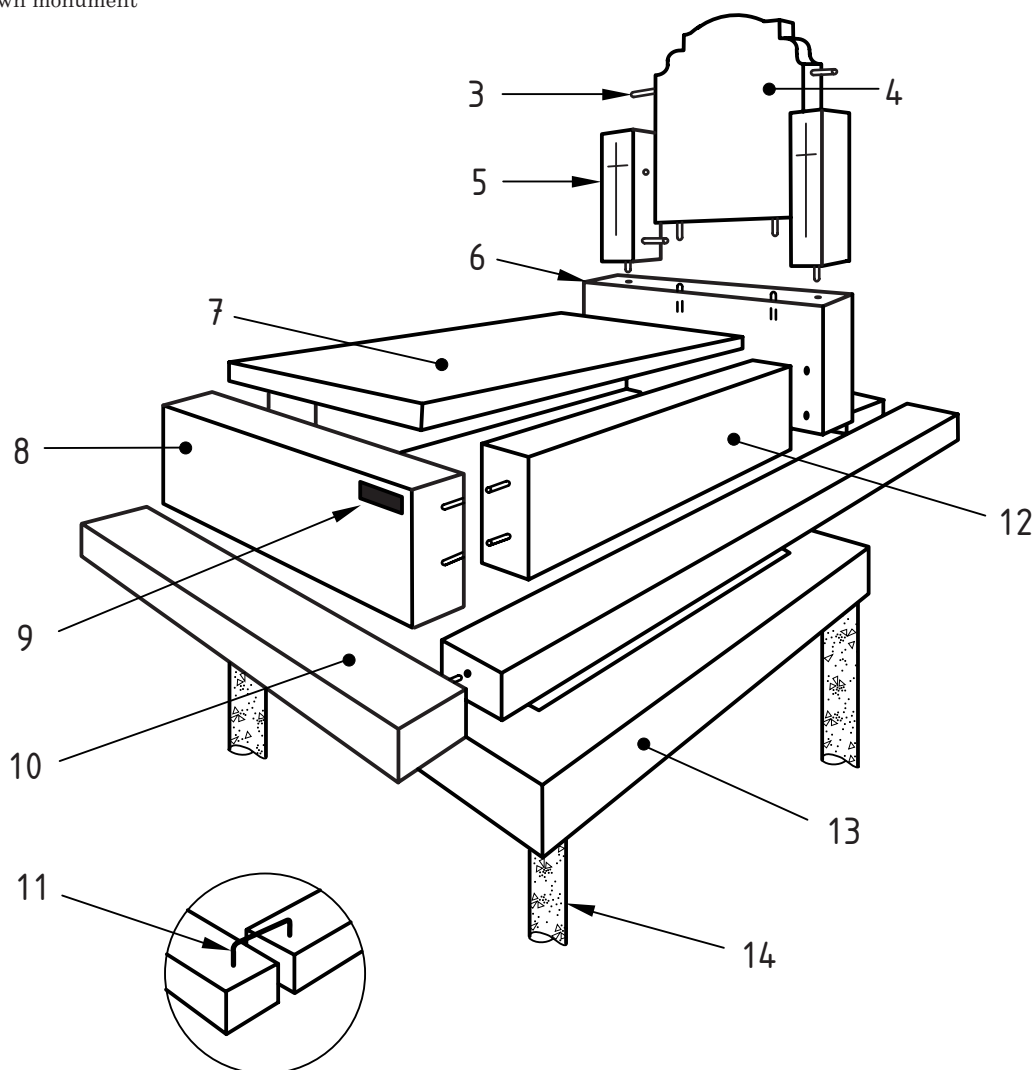
##### **foundation**

construction to transmit forces to the supporting ground (see Figure 1)

A1



a) Lawn monument



b) Full grave monument

**Key**

|   |                   |    |                                                     |
|---|-------------------|----|-----------------------------------------------------|
| 1 | Inscription plate | 8  | Front kerb                                          |
| 2 | Base              | 9  | Plot identification to burial ground specifications |
| 3 | Dowel             | 10 | Plinth                                              |
| 4 | Inscription plate | 11 | Cramp                                               |
| 5 | Pillar            | 12 | Side kerb                                           |
| 6 | Back kerb         | 13 | Foundation                                          |
| 7 | Cover slab        | 14 | Pier                                                |

**Figure 1 – Typical components of a monument**

A1

**3.10**

**ground**

soil, rock and fill existing in place prior to the execution of construction works

**3.11**

**grave**

place of burial below ground level which may or may not be lined

**3.12**

**inscription**

dedication recorded on a monument

NOTE For inscription information see Annex A.

**3.13**

**inscription  plate **

inscribed stone on a monument (see Figure 1)

 NOTE Commonly known as "headstone", see Figure 1. 

**3.14**

**kerb**

kerbing

edging stone used in connection with a monument (see Figure 1)

**3.15**

**ledger**

horizontal slab used in connection with a monument (see Figure 1)

**3.16**

**monumental work**

construction and reinstatement of monuments by monumental masons

**3.17**

**natural stone**

naturally occurring, consolidated aggregation of one or more minerals constituting the crust of the earth

**3.18**

**ornament**

decoration on a monument

**3.19**

**pier**

vertical element supporting a structure which is subjected primarily to both compressive axial loads and seismic forces

**3.20**

**plinth**

projecting base, either part of the monument or part of the foundation (see Figure 1)

**3.21**

**plot**

land upon which a monument is to be erected

**3.22**

**reinstated monument**

monument which has been reinstated following removal from a burial ground or memorial site for refurbishment

 **3.23**

**burial authority**

body appointed to administer the affairs of a burial ground or memorial site on behalf of its constituent owners 

## 4 Materials

NOTE The structural materials used to construct monuments should exhibit high atmospheric-corrosion-resistant properties.

### 4.1 Cement

Cement used in monuments within burial grounds and memorial sites shall be in accordance with BS EN 197-1 type CEM I, strength class 42.5.

### 4.2 Natural stone

#### 4.2.1 General

Natural stone used in the construction of monuments within burial grounds and memorial sites shall be sound, durable and free from defects likely to affect durability and structural stability (see 4.2.2). Limestone and cast stone made with limestone shall not be used in conjunction with sandstone, if water can drain from the former onto the latter.

#### 4.2.2 Assessment of durability

An assessment of the predicted service life of any particular type of natural stone shall be undertaken in accordance with at least one of the following methods:

- past performance in monumental work in the United Kingdom;
- mineralogical and physical characteristics of the material in accordance with the tests in BS EN 12407;
- accelerated weathering testing in accordance with BS EN 13919 and comparison with materials of known performance in accordance with BS EN 12370 and BS EN 12371.

### 4.3 Concrete

Concrete used in monuments within burial grounds and memorial sites shall conform to BS EN 206-1. The characteristic compressive strength of the concrete at 28 days shall be not less than 30 N/mm<sup>2</sup>.

### 4.4 Materials for dowels and cramps

#### 4.4.1 Metal fixings

Materials for **A1** *Text deleted* **A1** fixings shall conform to Table 1.

**Table 1 – Materials for metal dowels and cramps**

| Material        | Standard                          | Grade   |
|-----------------|-----------------------------------|---------|
| Stainless steel | BS EN 10088-2 or<br>BS EN 10088-3 | BS 6744 |

#### **A1** 4.4.2 Fixings not made from metal

It shall be permissible for other materials, having similar or greater strength than stainless steel, to be used if their viability is shown by design and calculation of testing. **A1**

### 4.5 Reinforcing steel

Reinforcing steel used in monuments within burial grounds and memorial sites shall conform to the requirements of BS 4449.

### 4.6 Jointing and pointing

Jointing and pointing materials used in monuments within burial grounds and memorial sites shall conform to BS EN 447.

### 4.7 Flexible compound bonding and sealing agents for joints

Flexible bonding and sealing agents selected shall meet a performance class specified in BS EN ISO 11600 and appropriate to the expected joint movements.

NOTE Usually the class compliance is stated in the product data sheet. BS EN ISO 11600 does not specify chemical type and this may be selected in consultation with the sealant manufacturer.

For non staining applications, the sealant manufacturer shall provide, as requested, evidence of non staining characteristics using test data to **A1** BS ISO 16938-1 or BS ISO 16938-2 **A1** for the selected sealant with recommended priming, if any, on a relevant substrate.

#### **A1** 4.8 Text deleted **A1**