

Structural design of low-rise buildings —

Part 2: Code of practice for masonry walls for housing

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee B/525, Building and civil engineering structures, upon which the following bodies were represented:

- Association of Consulting Engineers
- British Cement Association
- British Constructional Steelwork Association Ltd.
- British Masonry Society
- Building Employers' Confederation
- Department of the Environment (Building Research Establishment)
- Department of the Environment (Construction Directorate)
- Department of Transport
- Federation of Civil Engineering Contractors
- Institution of Civil Engineers
- Institution of Structural Engineers
- National Council of Building Material Producers
- Royal Institute of British Architects
- Timber Research and Development Association

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Association of Building Engineers
- Autoclaved Aerated Concrete Products Association
- Brick Development Association
- British Ceramic Research Ltd.
- British Precast Concrete Federation Ltd.
- Calcium Silicate Brick Association Limited
- Concrete Block Association
- Department of the Environment for Northern Ireland
- Institute of Building Control
- National House-building Council
- Scottish Office

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Foreword

This Part of BS 8103 has been prepared under the direction of the Technical Committee B/525, Building and civil engineering structures.

A large proportion of the national building programme is concerned with new housing and alterations in both the public and private sectors where traditional methods of construction are used for the majority of houses, and it is to these that this code is applicable.

BS 8103 is published in four Parts:

- *Part 1: Code of practice for stability, site investigation, foundations and ground floor slabs for housing;*
- *Part 2: Code of practice for masonry walls for housing;*
- *Part 3: Code of practice for timber floors and roofs for housing;*
- *Part 4: Code of practice for concrete suspended floors for housing.*

This code is written for those with expertise in building construction but not necessarily in structural engineering design. Low-rise buildings constructed within the limitations stated in the relevant clauses will not require additional specialist advice. For any conditions outside the limitations of this code, appropriate specialist advice should be obtained. It should not be expected that the recommendations made in this Part can be proved by calculation as they are based on traditional prescriptive guidance substantiated by long experience.

In formulating the guidance of this code, the worst combination of circumstances likely to arise was taken into account. It may be appropriate to consider a minor departure from the recommendations of this Part and show adequacy by calculation. However, in cases where the recommendations of clause 6 for conditions relating to a wall are not able to be met or are inappropriate then reference should be made to BS 5628-1.

When using this code it is important to assess that the overall stability of the building is achieved, and that the work of any specialist engaged is properly co-ordinated. BS 8103-1 covers the stability aspect of low-rise housing.

The recommendations in this code are intended to provide safe designs without the need for calculations of loading and strength criteria.

The figures in this code support the text. They do not show all constructional details and are not intended to illustrate compliance with any other requirements or recommendations. They are not necessarily to scale and should not be used as working details.

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 and ii, pages 1 to 26, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 8103 gives recommendations for walls above ground level damp-proof course (dpc) and walls between ground floor level and top of foundation level in the following range of buildings of traditional construction:

- a) low-rise housing comprising detached, semi-detached and terraced houses and flats (with not more than four self-contained dwelling units per floor accessible from one staircase) of not more than three storeys above ground, intended for domestic occupation;
- b) certain small single storey non-residential buildings, e.g. domestic garages and annexes to residential buildings not exceeding 36 m² in floor area (see annex A). For such buildings all clauses of the code are applicable except for 4.2, item a) of 4.3, 6.1, 6.7.3 and 6.8.

For the purposes of this code, additional habitable accommodation in the roof space constitutes a storey of the house. This code does not include the design of basements, but providing the basement is of one level only and is designed to provide a firm platform at ground level the provisions of this code may apply to the superstructure.

The structural design recommendations described in this code are not intended to cover other considerations such as fire resistance, thermal and sound insulation, resistance to damp penetration and durability for which reference should be made, for example to BS 5628-3.

Proprietary housing systems and houses of timber, steel or concrete framed constructions are not covered by this code.

NOTE Annex B gives guidance on design provisions for movement.

2 References

2.1 Normative references

This Part of BS 8103 incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this Part of BS 8103 only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This Part of BS 8103 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this British Standard the definitions in BS 6100 apply in general, together with the following.

3.1 annexe

single storey adjunct to a residential building with dimensions of the adjunct not exceeding those given in annex A

NOTE Examples are a porch, verandah, loggia, conservatory, greenhouse, garage, tool shed, fuel store, water closet, lavatory, wash-house.

3.2 traditional construction

buildings constructed as follows:

- a) roofs:
 - 1) timber rafter and purlin;
 - 2) timber truss and purlin;
 - 3) timber trussed rafter;
 - 4) timber flat roof.
- b) ground floors:
 - 1) timber suspended;
 - 2) concrete ground-supported;
 - 3) concrete precast suspended;
 - 4) concrete in situ reinforced suspended.
- c) intermediate floors:
 - 1) timber suspended;
 - 2) concrete precast suspended.
- d) walls of masonry construction.

where loads do not exceed those given in other Parts of BS 8103

3.3 thickness (of walls)

space allocated to masonry units taking into account their allowed dimensional deviations. In the case of non-loadbearing walls, this includes the thickness of any applied finish to the wall

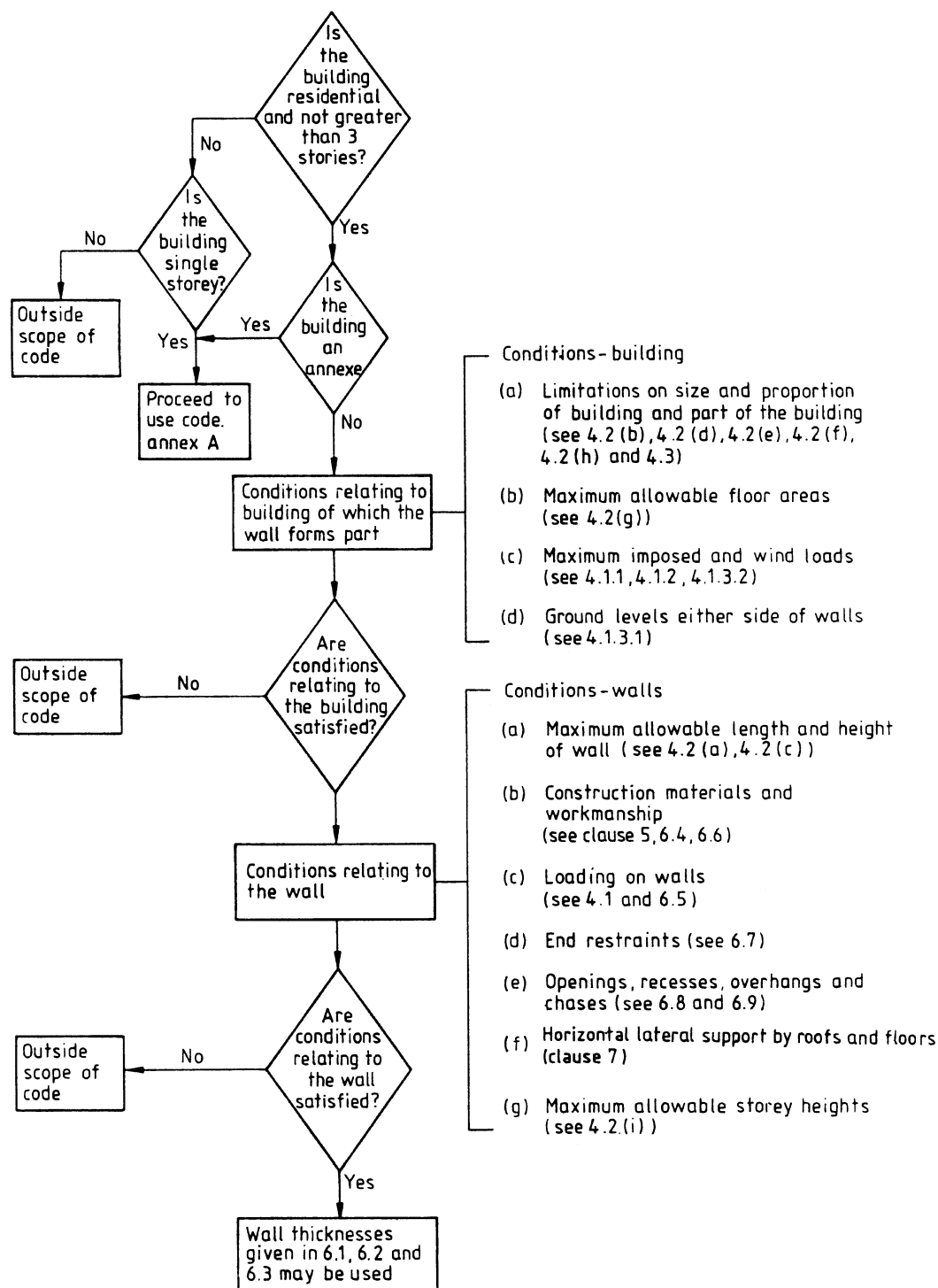


Figure 1 — Field of application

4 Field of application

NOTE When checking whether this code applies to a particular building, reference should be made to Figure 1.

4.1 Limiting loads and dimensions

4.1.1 Vertical dead loads

The recommendations given in this code are based on the assumption that all floors and roofs supported by the walls conform to BS 8103-3 for timber elements and BS 8103-4 for concrete floors.

4.1.2 Vertical imposed loads

The recommendations given in this code are based on the assumption that the imposed loads on the floors supported by the walls, given in type 1 of Table 5¹⁾ in BS 6399-1:1984 will not be exceeded.

4.1.3 Lateral imposed loads

4.1.3.1 Ground levels either side of walls

Where a wall is subjected to a lateral load from retained material due to a difference in ground levels on opposite sides, the difference in level above fully compacted backfill should not exceed the dimensions shown in Figure 2. The rules given in Figure 2 b) do not apply where there is an adjacent roadway on the upper level, used other than by private cars, and where the roadway for such vehicles is closer than a distance equivalent to 1.25 times the retained height. Such situations are outside the scope of this code.

NOTE Figure 2 does not apply to free-standing walls.

4.1.3.2 Wind loading

The maximum wind forces to which a building is liable to be exposed will vary with its geographical location in the country, the degree of exposure, and the height of the building. The scope of this code is based on a limited building shape (see 4.3), building height (see 4.2), and storey height (see 4.2).

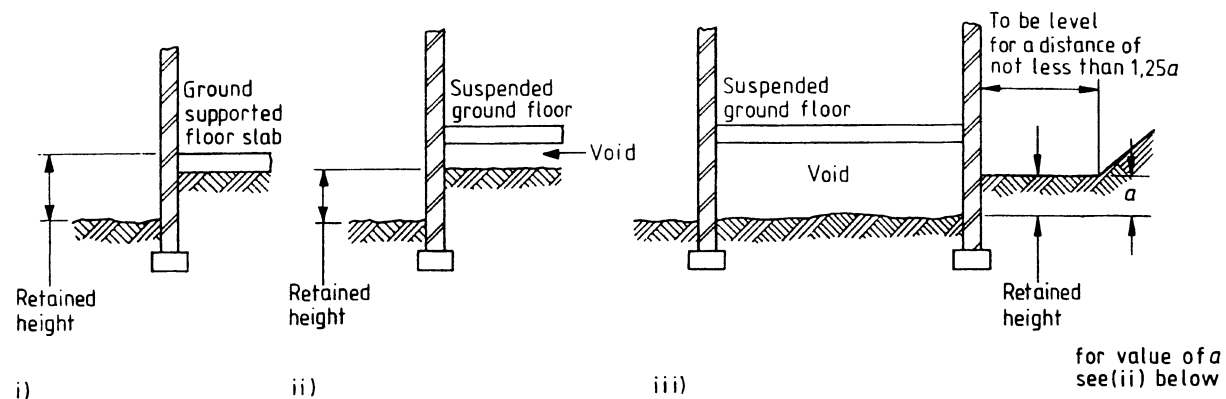
It will normally be possible to establish the applicability of this code by reference to the basic wind speeds shown in Figure 3 and listed in Table 1 and Table 2. If the proposed building falls outside the maximum building height in these tables or where doubt exists, a separate design check in accordance with CP 3:Chapter V-2 should be carried out. If the design wind speed exceeds 44 m/s this code does not apply and the design should be carried out in accordance with BS 5628-1.

4.2 Dimensions

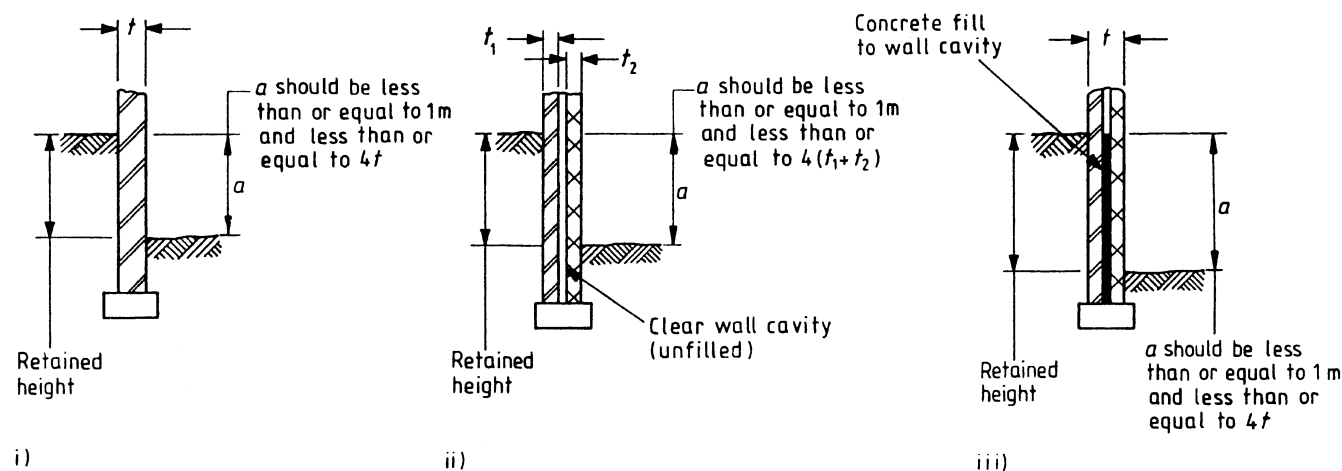
The recommendations given in this code are governed by the following limiting dimensions.

- a) The maximum length of loadbearing wall between vertical lateral supports, i.e. between centre-lines of buttressing walls, piers, return walls etc., should be 9 m (see 6.7).
- b) No part of a wall or roof should be higher than 15 m above the lowest adjacent ground level (see Figure 4).
- c) The maximum external wall height (H_1 , H_2 , or H_3 , measured in accordance with Figure 5) should be 12 m.
- d) The maximum clear span of any roof should be 12 m.
- e) The maximum clear span of any floor should be 6 m.
- f) No opening in a loadbearing wall should have a clear span greater than 3.0 m.
- g) The maximum floor area for stability should be as shown in Figure 6.
- h) The maximum height from top of foundation to top of ground floor (see Figure 5) should be:
 - 1) 2.7 m where the floor provides lateral restraint to the wall; and
 - 2) 1 m for all other cases.
- i) For maximum storey height see Figure 5.

¹⁾ Residential occupancy class, self-contained dwelling units.



a) Situations where differences in level may occur



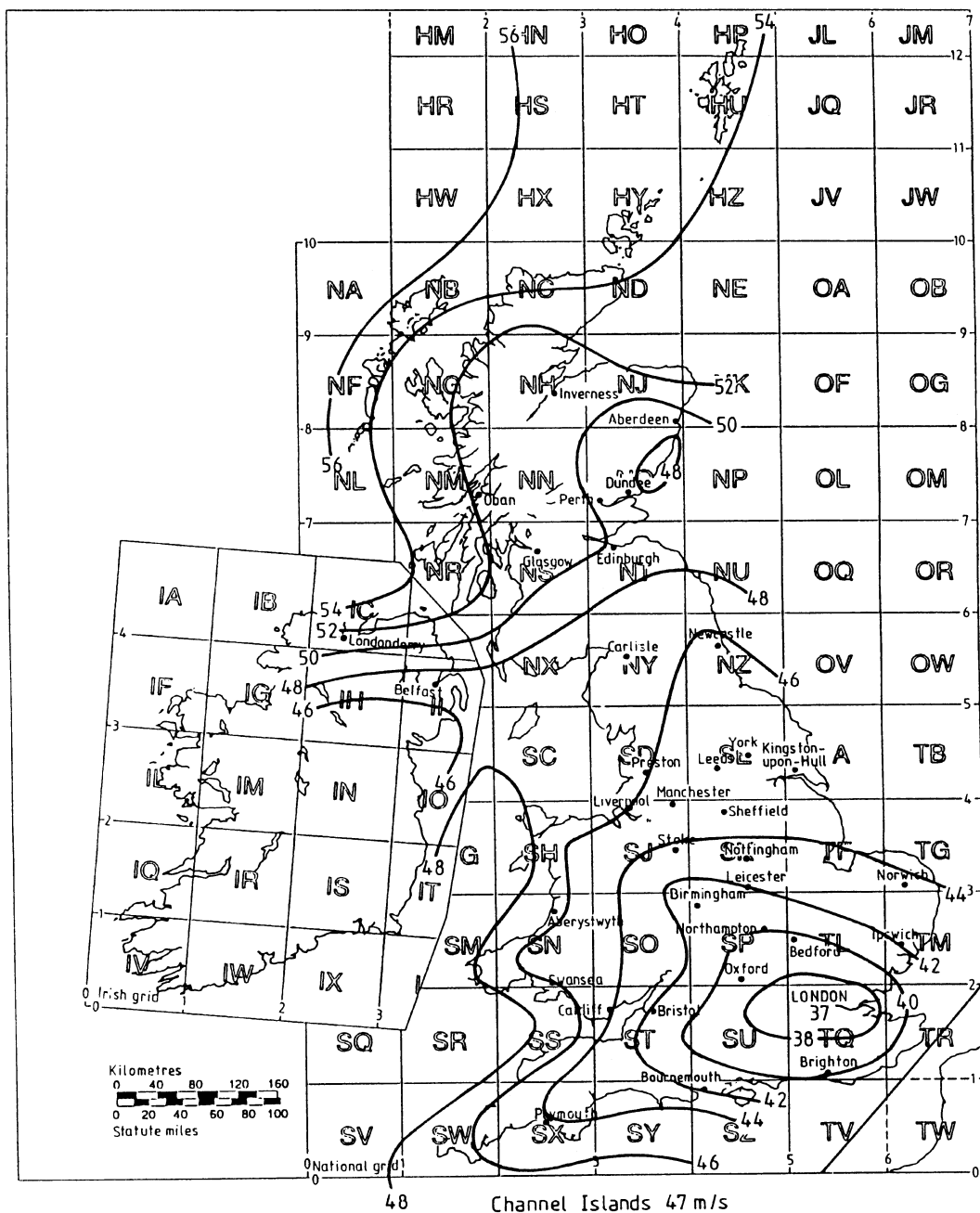
b) Maximum differences in permitted level

NOTE 1. Cross-sectional hatching conforming to BS 1192 : Part 3 varies in this figure and also in figures 8, 14, 15 and 19 to illustrate either brickwork or blockwork. In this respect the illustrations are only typical and are not meant to exclude one or the other.

NOTE 2. Floor slabs in figure 2b have been omitted for clarity and may be on either side of the walls shown.

NOTE 3. Cavity walls should be tied in accordance with 6.6.

Figure 2 — Walls with a difference in ground level on opposite sides



NOTE 1. Maximum gust speed likely to be exceeded on the average only once in 50 years at 10 m above the ground in open level country.

NOTE 2. Lines are drawn at 2 m/s intervals.

Figure 3 — Map of United Kingdom showing basic wind speed (in m/s)

Table 1 — Maximum heights of buildings on normal level sites within the scope of this code

Basic wind speed m/s	Maximum building height for ground roughness category (in m)			
	Open countryside with no obstructions	Open countryside with scattered windbreaks	Country with many windbreaks, small towns, outskirts of large cities	Surface with large and frequent obstructions, city centres
36	15	15	15	15
38	15	15	15	15
40	15	15	15	15
42	15	15	15	15
44	15	15	15	15
46	11	15	15	15
48	9	13	15	15
50	7	10	15	15
52	6	9	15	15
54	4.5	8	14	15
56	3	7	13	15

NOTE These data apply to normal level or slightly sloping sites and are based on $S_1 = 1.0$ as given in CP 3:Chapter V-2, which can be referred to for further guidance on applicability of data to particular sites.