

Building setting out and measurement —

Part 1: Methods of measuring, planning and organization and acceptance criteria

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Basic Data and Performance Criteria for Civil Engineering and Building Structures Standards Policy Committee (BDB/-) to Technical Committee BDB/4, upon which the following bodies were represented:

- Association of County Councils
- British Standards Society
- Building Employers' Confederation
- Chartered Institution of Building Services Engineers
- Concrete Society
- Department of Education and Science
- Department of the Environment (Building Research Establishment)
- Department of the Environment (Property Services Agency)
- Incorporated Association of Architects and Surveyors
- Institute of Building Control
- Institute of Clerks of Works of Great Britain Inc
- Institution of Civil Engineers
- Institution of Structural Engineers
- Institution of Water and Environmental Management
- Royal Institute of British Architects
- Royal Institution of Chartered Surveyors

The following body was also represented in the drafting of the standard, through sub-committees and panels:

- Chartered Institute of Building

This British Standard, having been prepared under the direction of the Basic Data and Performance Criteria for Civil Engineering and Building Structures Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 30 September 1990

© BSI 07-1999
First published August 1980
Second edition September 1990

The following BSI references relate to the work on this standard:
Committee reference BDB/4
Draft for comment 87/10913 DC

ISBN 0 580 18698 9

Amendments issued since publication

Amd. No.	Date	Comments
9314	December 1996	Indicated by a sideline in the margin

Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
0 Introduction	1
1 Scope	1
2 Field of application	1
3 References	1
4 Definitions	1
Section 1. General introduction	
5 general introduction	2
Section 2. Planning and organization of setting-out	
6 Acquisition of information	4
7 Planning the setting-out	4
8 Setting-out drawings	7
9 Functional responsibilities	7
10 Qualifications	7
11 Survey and site documentation	7
12 Calculation	7
Section 3. Setting-out and measuring procedures — Accuracy specifications	
13 Introduction	8
14 Primary system	8
15 Secondary system	11
16 Position points	14
17 Vertical transfer of points (plumbing)	16
18 Levelling	17
Annex Example of a working/inspection schedule of setting-out showing tasks and responsibilities	21
Bibliography	20
Figure 1 — Example of the three stages of setting-out as adopted in this International Standard	3
Figure 2 — Example of location grid	5
Figure 3 — Relationship between the different grids used during the building process	6
Figure 4 — Example of the general principle of a primary system, with some elevated points shown	9
Figure 5 — Example of how profile boards might be placed outside a proposed building	10
Figure 6 — Some examples of the setting-out of secondary points within the building using the primary system	12
Figure 7 — Previously set-out points should be checked according to 15.5 prior to further setting-out	13
Figure 8 — General examples of marking position points or lines	15
Figure 9 — Verticality deviation	17
Figure 10 — Examples of marking levels on shuttering	18
Figure 11 — Use of a tension device when transferring levels with the aid of a tape	19
Table 1 — Example of application on site	16
Table 2 — Measurement	19
Table 3 — Example of application on site	19
Publications referred to	Inside back cover

National foreword

This Part of BS 5964 has been prepared under the direction of the Basic Data and Performance Criteria for Civil Engineering and Building Structures Standards Policy Committee. It is identical with ISO 4463-1:1989 “*Measurement methods for building — Setting-out and measurement — Part 1: Planning and organization, measuring procedures, acceptance criteria*”¹⁾, published by the International Organization for Standardization (ISO); and is a revision of BS 5964:1980 (and of its equivalent ISO Standard 4463:1979) to take into account developments in setting-out and surveying practice. BS 5964:1980 is withdrawn.

The series of Parts comprising BS 5964 will assist those involved in specifying the surveying and setting out services that may be required during the development and construction of buildings and ancillary works, as follows:

- *Part 1: Methods of measuring, planning and organization and acceptance criteria;*
- *Part 2: Measuring stations and targets;*
- *Part 3: Check-lists for the procurement of surveys and measurement services.*

Part 1: is referred to in BS 5606:1990 “*Guide to accuracy in building*”.

Cross-references

International standard	Corresponding British Standard
ISO 7078:1985	BS 6953:1988 <i>Glossary of terms for procedures for setting out, measurement and surveying in building construction (including guidance notes)</i> (Identical)
	BS 7307 <i>Building tolerances: Measurement of building and building products</i>
ISO 7976-1:1989	^a Part 1:1990 <i>Methods and instruments</i> (Identical)
ISO 7976-2:1989	^a Part 2:1990 <i>Position of measuring points</i> (Identical)
	^b BS 7334: <i>Measuring instruments for building construction</i>
ISO 8322-1:1989	Part 1:1990 <i>Methods for determining accuracy in use: Theory</i> (Identical)
ISO 8322-2:1989	Part 2:1990 <i>Methods for determining accuracy in use: Measuring tapes</i> (Identical)
ISO 8322-3:1989	Part 3:1990 <i>Methods for determining accuracy in use: optical levelling instruments</i> (Identical)
ISO 8322-4:1991	Part 4:1992 <i>Methods for determining accuracy in use of theodolites</i> (Identical)
ISO 8322-5:1991	Part 5:1992 <i>Methods for determining accuracy in use of optical plumbing instruments</i> (Identical)

^a In preparation.

^b It is envisaged that ISO 8322-4 to ISO 8322-9 will be published as identical Parts of BS 7334.

¹⁾ In preparation.

International standard	Corresponding British Standard
ISO 8322-6:1991	Part 6:1992 <i>Methods for determining accuracy in use of laser instruments</i> (Identical)
ISO 8322-7:1991	Part 7:1992 <i>Methods for determining accuracy in use of instruments when used for setting out</i> (Identical)
ISO 8322-8:1991	Part 8:1992 <i>Methods for determining accuracy in use of electronic distance-measuring instruments up to 150 m</i> (Identical)

The Technical Committee has reviewed the provisions of ISO 1803-1 and ISO 1803-2, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard. A related standard to ISO 1803 is BS 6100 “*Glossary of building and civil engineering terms*”, Subsection 1.5.1:1984 “*Coordination of dimensions; tolerances and accuracy*”.

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 to iv, pages 1 to 22, 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.

0 Introduction

This part of ISO 4463 forms one of a series concerning the accuracy of measurement methods on building sites.

Part 2 will deal with measuring stations and targets and part 3 will deal with setting-out drawings.

1 Scope

This part of ISO 4463 deals with the progressive stages of setting-out work in building construction, i.e. acquisition of information, establishing the primary system, setting-out the secondary system, vertical transfer of points in the secondary system to other levels, and setting-out the position points and the establishment and transfer of levels (bench marks).

In addition it gives values of permitted deviations and guidance on independent check measurements (quality control) using instruments and methods currently in common use at each stage of the setting-out process.

2 Field of application

This part of ISO 4463 applies to common types of building construction. Special operations such as setting-out of precision machinery or the legal location of the building, as specified for example in planning laws or local regulations, are not covered by this part of ISO 4463 since all recommendations are subject to statutory legislation in a particular country.

3 References

ISO 1803-1, *Building construction — Tolerances — Vocabulary — Part 1: General terms*.

ISO 1803-2, *Building construction — Tolerances — Vocabulary — Part 2: Derived terms*.

ISO 7078, *Building construction — Procedures for setting-out, measurement and surveying — Vocabulary and guidance notes*.

ISO 7976-1, *Tolerances for building — Guidelines indicating methods of measurement of buildings and building products — Part 1: Instruments and accuracy*.

ISO 7976-2, *Tolerances for building — Guidelines indicating methods of measurement of buildings and building products — Part 2: Position of measuring points*.

ISO 8322 (all parts), *Building construction — Measuring instruments — Procedures for determining accuracy-in-use*²⁾.

²⁾ To be published.

4 Definitions

For the purposes of this part of ISO 4463, the definitions of ISO 1803 and ISO 7078, together with the following, apply.

4.1

site surveyor

person entrusted with the carrying-out of one or more of the different measuring operations in the building process

as practice can differ from country to country, the term site surveyor is intended to refer to a competent operator in this field irrespective of his formal qualifications

4.2

compliance measurement

measurement carried out to verify compliance with the specified permitted deviation of a completed stage of the construction process (for example, building components, setting-out and constructed work)

4.3

check measurement

independent informal measurement to check the correctness and accuracy of a previous measurement

4.4

secondary line

any line used for the purpose of setting-out the proposed building and for checking and compliance of the building or building parts

4.5

acceptance criteria

conditions to be fulfilled prior to acceptance of a completed task or process

Section 1. General introduction

5 General introduction

5.1 The process of setting-out on any building site may be described as the determination and establishment of a well-defined system of lines, distances and planes to provide a suitable network for the determination of the accurate position and level of buildings and building elements.

This International Standard is concerned with the complete range of setting-out on building sites and thus adopts a three-stage order of reference systems which are commonly required for large and complex building projects.

As shown in Figure 1, the order of establishment and connection of reference systems is as follows:

- a) Primary system, which is connected to the official control system³⁾ and normally covers the whole site and to which subsequent measurements on that site are related (see clause 14);
- b) Secondary system, which serves as the main reference system or grid for the erection of a particular building or group of buildings and associated works (see clause 15);
- c) Position points, which mark the location of individual elements, for instance columns and walls (see clause 16).

5.2 The choice of the number and type of reference systems required for a particular building project will be dependent on the size, complexity, and configuration of the site, the shape, size and position of each building, the amount of space available, the proposed methods of construction and the erection sequence. In practice, therefore, the previously established reference system from which the secondary setting-out system can be established may be either

- an existing co-ordinate system which covers the particular site, that is an official control system; or
- a network of measuring points specially established for the building project, that is a primary system; or
- corner points or other important points relating to a particular building established for example by the local authority (see Figure 7); or
- in the case of an extension of a building or infilling between existing buildings, reference lines established by extending one or more secondary lines, for example lines parallel to the column centre-lines.

³⁾ An official control system can be the national, municipal or other agreed higher order coordinate system.

