

INTERNATIONAL STANDARD

ISO
4463-2

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1995-12-15

Measurement methods for building — Setting-out and measurement —

Part 2:

Measuring stations and targets

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Méthodes de mesurage pour la construction — Piquetage et mesurage —

Partie 2: Stations et balises

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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International Standard ISO 4463-2 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 4, *Dimensional tolerances and measurement*.

This first edition of ISO 4463-2, together with ISO 4463-1 and ISO 4463-3, cancels and replaces ISO 4463:1979, which has been technically revised.
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ISO 4463 consists of the following parts, under the general title *Measurement methods for building — Setting-out and measurement*:

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

Annexes A and B of this part of ISO 4463 are for information only.

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Measurement methods for building — Setting-out and measurement —

Part 2:

Measuring stations and targets

1 Scope

This part of ISO 4463 deals with the progressive stages of establishing and marking measuring stations and targets on building sites. The aspects covered are planning, functional needs and maintenance.

This part of ISO 4463 applies to measuring stations and targets in all types of building construction.

Examples of different stations and targets and location plans are given in annex A.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4463. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 4463 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of the IEC and ISO maintain registers of currently valid International Standards.

ISO 1803:—¹⁾, *Building construction — Expression of dimensional accuracy — Vocabulary*.

ISO 4463-1:1989, *Measurement methods for building — Setting-out and measurement — Part 1: Planning and organization, measuring procedures, acceptance criteria*.

3 Definitions

For the purposes of this part of ISO 4463, the definitions given in ISO 1803 and ISO 4463-1 apply.

4 General

Stations and targets are the basis of all setting-out and measuring procedures. It is important that the locations of stations and targets are properly planned and constructed to meet their functional requirements throughout the building process. The requirements include the need for stability, accessibility and clear lines of sight throughout their useful life, wherever possible.

The type, quality and permanence of stations and targets depend on the particular project requirements in relation to the various categories of setting-out and measurement described in ISO 4463-1.

Planning and maintenance of stations and targets are essential to ensure reliable results.

5 Planning

5.1 Location

The locations of the stations and targets should be chosen to meet the requirements and conditions of the particular construction site. These may depend on:

1) To be published. (Revision of ISO 1803-1:1985, ISO 1803-2:1986 and ISO 4464:1980).

- a) the type of construction and complexity;
- b) the availability and suitability of the proposed locations for the stations and targets;
- c) the intended locations of the site offices, stores and site construction roads;
- d) the locations of underground utilities;
- e) the ground conditions;
- f) the period for which each station and target is required.

During the relevant stages of construction, it is important to keep essential lines of sight between stations and targets clear of all obstructions to enable the setting-out and subsequent check and compliance measurements to be made.

Stations should have easy access and sufficient working space to allow free movement around the point.

5.2 Approvals

Before establishing stations and targets outside the site, permission may be required from the adjacent property owner. Before establishing stations and targets on the construction site, it is recommended that the site manager is in agreement with the proposed locations. Each location should be indicated on both the site plan and the appropriate location plan.

5.3 Programme

A programme giving the time schedules for the establishment of the stations and targets should be prepared, which takes into account the construction schedule, the ground conditions, the accessibility to the building site and its location.

This programme should, wherever possible, include sufficient time to allow for relevant settlement and shrinkage to take place before the primary stations are used for measurement purposes.

6 Functional needs of stations and targets

6.1 Stability and durability

On the site there are many risks to the stability of measuring points, such as disturbance from site traffic

and works, settlement in the ground due to proximity of excavation, blasting, load from heavy foundations and vibrations from traffic.

When constructing stations and targets, their design and materials should fulfil the needs of stability and durability. Examples of stations and targets are given in annex A.

6.2 Protection

Appropriate actions should be taken to protect stations and targets in vulnerable locations from disturbance by providing physical barriers such as posts and guard rails. Visual warnings such as buntings or painted rails should be provided.

Wall targets outside the site should be placed out of reach from the ground level.

6.3 Marking

Stations and targets should have distinct and unambiguous marks. For a specific site, all stations and targets should have unique referencing. These should be indicated on the location plan.

6.4 Station and target description

All important stations and targets should be described so that they can be located easily.

For each of these stations or targets, a description should be given that provides the following information:

- a) location sketch indicating the position of the station or target in relation to an easily recognizable permanent feature or features (witness marks);
- b) identity reference;
- c) whether it concerns a station, target or benchmark;
- d) form of construction;
- e) coordinates or level value, as appropriate;
- f) date.

Examples of descriptions for a station and a benchmark are given in figure 1.

a) X: 1 852,260
Y: 376,458
Z:
 Date: 1988-05-12 POINT DESCRIPTION
 Project: ABC Motor Works, Oldtown, LC Constr. Co. Page: 1

Point reference: 3 Type: Primary
 ID-text: PP3 LC
 Recognition signs: See points 1-2 on sketch
 Witness marks: Do not exist
 Coordinates: See computer printout 1988-05-31, local coordinates
 Notes: Steel pipe with ID-collar in earth-bound stone
 Drawn up by: TR

Sketch

Primary point 3

1 Fence post 4,28 m
2 Corner of barn 5,13 m

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b) X:
Y:
Z: +18,258
 Date: 1988-05-30 POINT DESCRIPTION
 Project: Forsyth Brokers, Newtown, LC Constr. Co. Page: 2

Point reference: 12 Type: BM
 ID-text: BM12 LC
 Recognition signs: See points 1-2 on sketch
 Witness marks: Do not exist
(Master Benchmark on 54 Curzon Cr.)
 Coordinates: +18,258 m in Newtown local height system
 Notes: Steel stud with ID-collar in building foundation
 Drawn up by: TR

Sketch

Benchmark 12

+18,258

1 Lamp post 6,38 m
2 House corner 4,17 m

Curzon Cr.

Culver St.

Figure 1 — Examples of forms for point description

7 Maintenance

7.1 Visual

The first stage of inspection is to look for any visible indication of changed status; i.e. damage, movement or instability of a station or target.

7.2 By measurement

An inspection by measurement should be made when the integrity of the station or target appears to have

been disturbed, or at the time of handing over the responsibilities for the established setting-out system.

When the inspection reveals that the existing station or target is not valid or is unstable, wherever possible, correct location of the station or target should be re-instated or an alternative station or target established in a stable location.

An up-to-date record should be kept of any changed status, or re-instatements, or of new positions of stations and targets

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Annex A (informative)

Examples of stations and targets

A.1 This annex gives examples of measuring stations and targets (figures A.1 to A.18) and an example of measuring points and targets (figure A.19). It includes a Guide (table A.1) which is subdivided according to the main uses of the stations and targets.

This annex also includes two examples of a location plan of stations and targets (figures A.20 and A.21) and a list of symbols to be used on location plans (table A.2).

A.2 The duration of stations and targets varies greatly for particular stations and targets on specific sites, but is in general assumed to be the following:

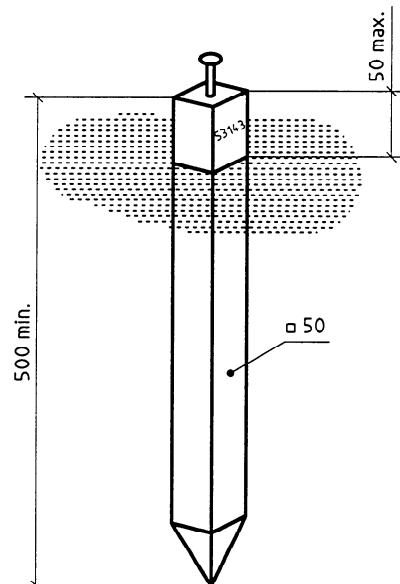
- a) short term: up to 1 month;
- b) medium term: up to 1 year;
- c) long term: at least for the duration of the building project.

Table A.1 — Guide to facilitate the use of annex A

Example No.		Detail points	Targets	Markers	Point protection	Location plan of stations and targets
Primary points	Secondary points					
2	2	1				
3 BM				ISO 4463-2:1995		
4	4 BM					
5 BM						
6	6	6				
	7			7		
	8 BM					
10			9			
	11			10		
13 BM		12	12			
14 BM	14 BM			13		
15 BM						
16 BM					17	
19			19		18	
						20
						21

BM = benchmark
The numbers refer to figures A.1 to A.21.

Dimensions in millimetres



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Type: Wooden peg.

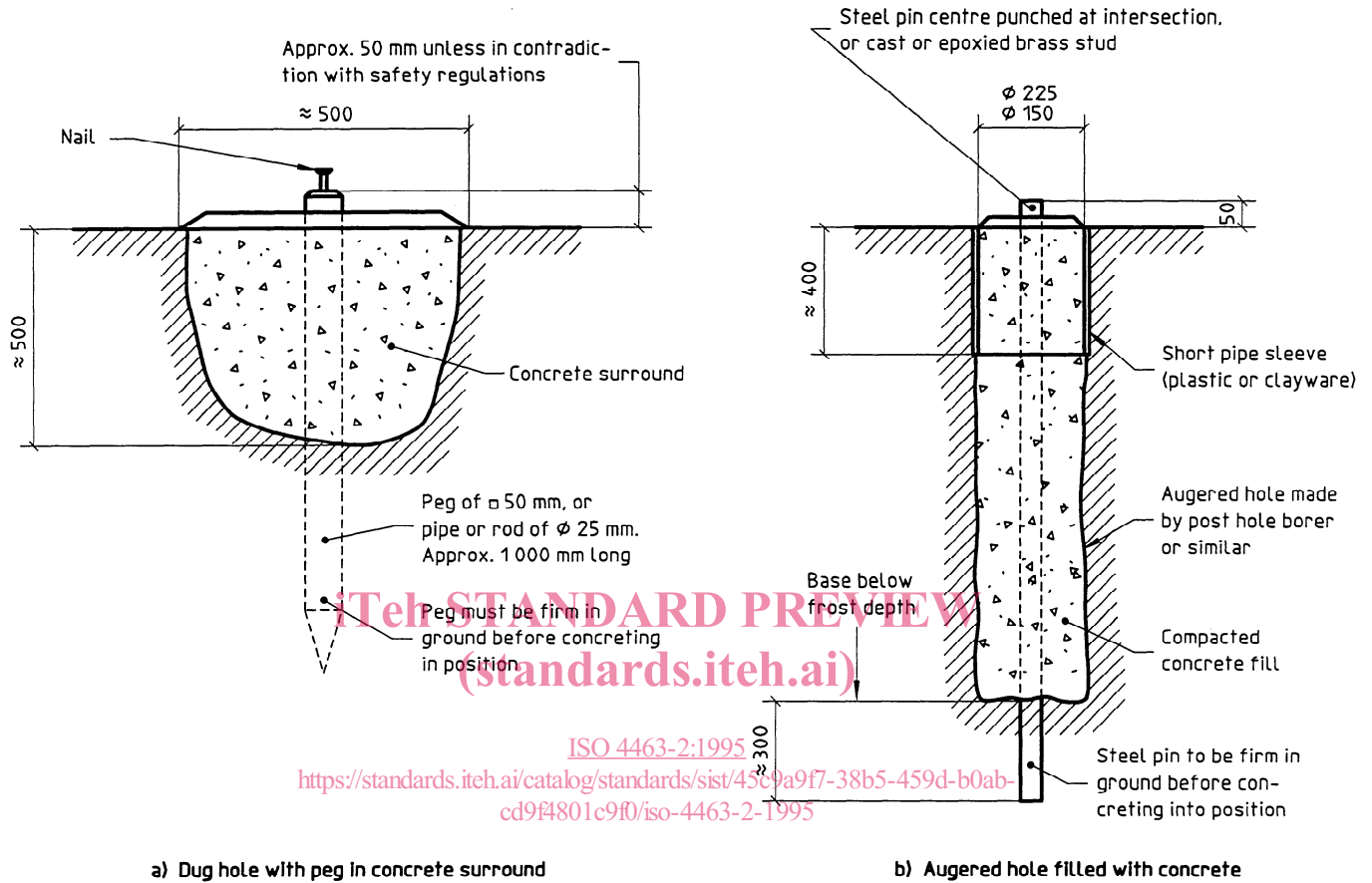
Main uses: Corner points, earthworks, street kerbs. [ISO 4463-2:1995](https://standards.iteh.ai/catalog/standards/sist/45c9a9f7-38b5-459d-b0ab-cd9f4801c9f0/iso-4463-2-1995)
<https://standards.iteh.ai/catalog/standards/sist/45c9a9f7-38b5-459d-b0ab-cd9f4801c9f0/iso-4463-2-1995>

Duration: Short term.

Precautions: May not be suitable where frost heave can occur.

Figure A.1 — Stations and targets: Example 1

Dimensions in millimetres



Type: *In-situ* cast concrete block in dug or augered hole.

Main uses: Primary and secondary points within boundary of site.

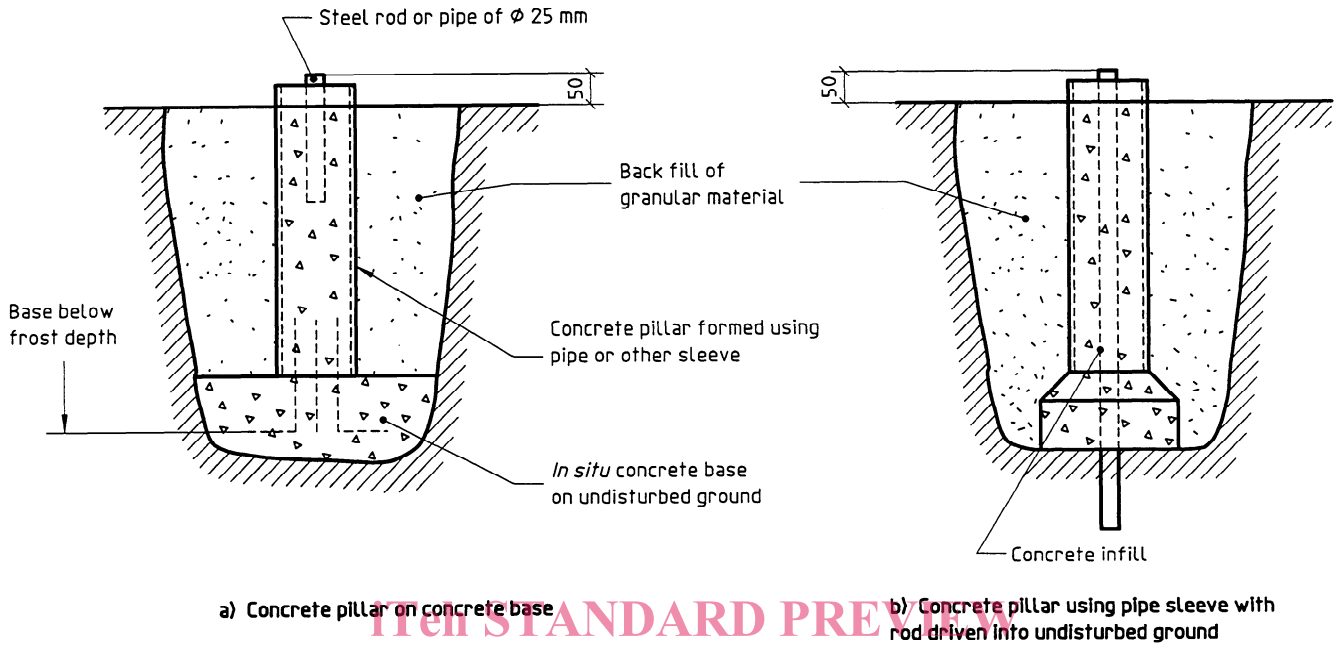
Duration: Type a): medium term;
 Type b): long term.

Precautions: To be positioned so as not to be affected by site traffic or operations.

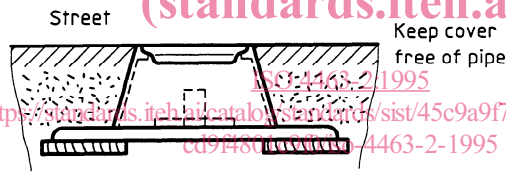
NOTE — Type a) is not suitable for areas with frost heave.

Figure A.2 — Stations and targets: Example 2

Dimensions in millimetres



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c) Example of protection for station below ground level [applies to both alternatives a) and b)]

Type: *In situ* pillar using pipe or other sleeve.

Main uses: Primary points and benchmarks. (The material can usually be obtained on site.)

Duration: Long term.

Precautions: Should be well marked and protected from vehicle/machinery damage.

NOTES

- 1 Suits most ground conditions even where frost heave can occur.
- 2 See figure A.13 for example of marker in upper end of steel.
- 3 See figures A.17 and A.18 for examples of station protection.

Figure A.3 — Stations and targets: Example 3