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**Stopnice v podzemne jaške - Zahteve, oznake, preskušanje in ocena skladnosti**

Steps for underground man entry chambers - Requirements, marking, testing and evaluation of conformity

Steigeisen für Steigeisengänge in Schächten - Anforderungen, Kennzeichnung, Prüfung und Beurteilung der Konformität

Echelons pour regards de visite - Exigences, marquage, essais et évaluation de la conformité

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English version

## Steps for underground man entry chambers - Requirements, marking, testing and evaluation of conformity

Echelons de trou d'homme - Prescriptions, marquage,  
essai, et évaluation de la conformité

Steigeisen für Steigeisengänge in Schächten -  
Anforderungen, Kennzeichnung, Prüfung und Beurteilung  
der Konformität

This European Standard was approved by CEN on 1 August 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN 13101:2002) has been prepared by Technical Committee CEN/TC 165, "Waste water engineering" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2003, and conflicting national standards shall be withdrawn at the latest by July 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

In this European Standard the Annexes A to F and H are normative and the Annexes G and I are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## 1 Scope

This standard specifies general requirements and testing methods for steps manufactured from cast iron, steel or aluminium, for use in manholes and other underground man entry chambers as a means of access.

This standard specifies performance criteria for mechanical stability and resistance providing protection against falling. Corresponding test methods and evaluation of conformity are included.

The steps specified in this European Standard are suitable for use in sewage, surface water and, subject to the requirements of national regulations, potable water environments.

Where steps are to be used in particular corrosive environments, e.g. industrial effluents, additional protection may be required.

This standard does not apply for steps moulded in prefabricated manholes of the same material.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

EN 573-3:1994, *Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition*.

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EN 1561, *Founding – Grey cast irons*.

EN 1562, *Founding - Malleable cast irons*.

EN 1563, *Founding - Spheroidal graphite cast irons*.

EN 2101, *Aerospace series; Chromic acid anodizing of aluminium and wrought aluminium alloys*.

EN 2284, *Aerospace series; Sulphuric acid anodizing of aluminium and wrought aluminium alloys*.

EN 10025, *Hot rolled products of non-alloy structural steels; - Technical delivery condition*.

ENV 10080:1995, *Steel for the reinforcement of concrete weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric*.

EN 10088-1, *Stainless steels - Part 1: List of stainless steels*.

EN 10088-3, *Stainless steels - Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general and construction purposes*.

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications*. (ISO 1461:1999)

ISO 1183, *Plastics; Methods for determining the density and relative density of non-cellular plastics*

ISO 3599, *Vernier callipers reading to 0,1 and 0,05 mm*.

ISO 3893:1977, *Concrete; Classification by compressive strength*.

### 3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

#### 3.1

##### **step**

component which is capable of being fixed into or attached to the wall of an underground man entry chamber or manhole to facilitate safe entry and exit

#### 3.2

##### **single step**

step which is designed to support one foot or hand, and is intended to be installed in a staggered configuration with other such steps

#### 3.3

##### **double step**

step which is designed to support two feet or two hands next to each other, and is intended to be installed in a single vertical alignment with other such steps

#### 3.4

##### **replaceable step**

step designed to allow removal and replacement

#### 3.5

##### **tread**

top surface of a step to accommodate a foot or hand

#### 3.6

##### **plastic encapsulation**

polymeric material providing protection of a metal core

#### 3.7

##### **stand-off-distance**

horizontal distance from the vertical face of the manhole or other chamber to the front of the step after fixing (see Figure 1)

#### 3.8

##### **upstand**

raised part of a step designed to stop the foot slipping laterally off the edge of the step

### 4 Requirements

#### 4.1 General

Steps shall conform to the requirements of this clause. Where a fixing system is supplied as part of the step, the system shall conform to the requirements of this standard.

Steps shall be installed in accordance with the manufacturer's instructions. For the installation of the steps, national regulations shall be observed.

#### 4.2 Materials

##### 4.2.1 Metals

Steps shall be manufactured from the following metals:

- a) Aluminum alloys according to designation 6 060 or 6 106 of EN 573-3:1994.
- b) cast Iron:



- malleable cast iron conforming to EN 1562;
- spheroidal graphite (ductile) cast iron conforming to EN 1563;
- flake graphite (grey) cast iron conforming to EN 1561.

c) Steel:

- steel conforming to EN 10025 or ENV 10080:1995;
- austenitic stainless steel conforming to EN 10088-1 or EN 10088-3, minimum grade X6CrNiTi18-10.

NOTE Grade X6CrNiMoTi17-12-2 or better should be used for particularly corrosive environments. Advice should be sought from the step manufacturer.

## 4.2.2 Plastics encapsulation

The material for encapsulating steps in plastics shall be polyethylene of minimum density 0,935 g/cm<sup>3</sup> (as tested in accordance with ISO 1183) or equivalent qualities of polypropylene copolymer.

NOTE If encapsulated steps are to be installed or stored where they will be subjected to prolonged exposure to direct sunlight, they should be protected from the degradation effects of ultraviolet light. This can be achieved by the use of suitable pigments and/or stabilizers. Advice should be sought from the step manufacturer.

## 4.3 Design requirements

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### 4.3.1 Types

Steps shall be one of the following types:

- Type A : Circular tread without patterned surface, without upstand;
- Type B: Circular tread without patterned surface, with upstand;
- Type C: Any shape tread with patterned surface, without upstand;
- Type D: Any shape tread with patterned surface, with upstand.

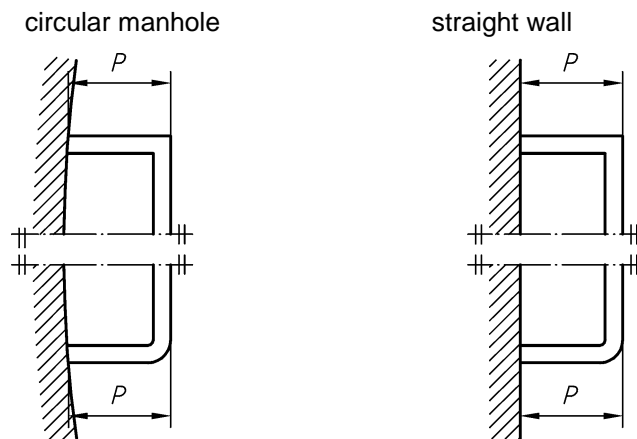
It is permissible for steps to incorporate a facility for attaching handrails or safety devices.

NOTE The purpose of the patterned surface is to provide some additional resistance to the foot slipping on the tread. Any design of the patterned surface, e.g. ribbing or chequering is at the step manufacturer's discretion.

### 4.3.2 Dimensions

#### 4.3.2.1 General

Steps shall conform to the relevant dimensions given in 4.3.2 (see Figure 1, Figure 2 and Figure 3) and to dimensions and tolerances declared by the producer and shall be measured to the nearest 0,1mm.



**Key**

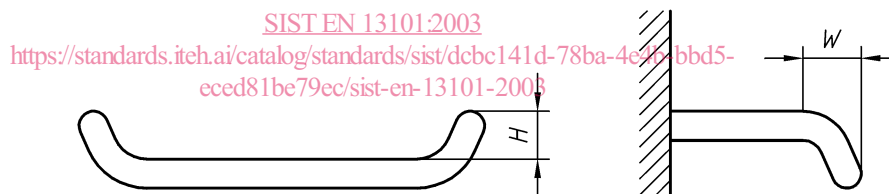
P Stand-off-distance (see 4.2.2.2 e)

**Figure 1 — Stand-off-distance**

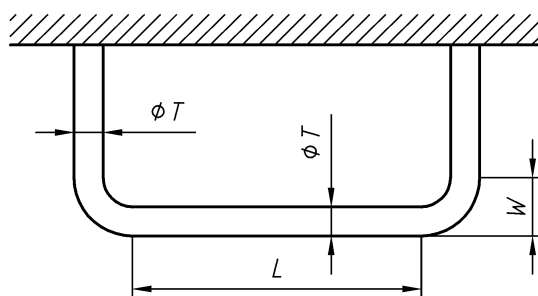
Side elevation  
no upstand



Side elevation  
upstand



Plan view



**Key**

T Width of tread

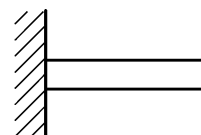
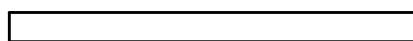
H Height of upstand

W Length of upstand

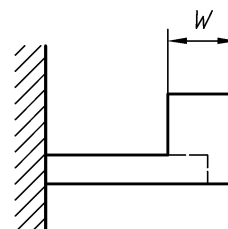
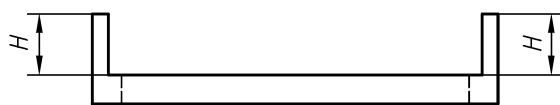
L Length of tread

**Figure 2 — Dimensions for double and single steps; Example for Circular tread**

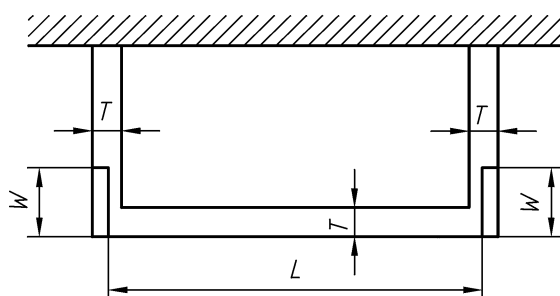
Side elevation  
no upstand



Side elevation  
Upstand



Plan view



#### Key

- T Width of tread  
H Height of upstand  
W Length of upstand  
L Length of tread

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**Figure 3 — Dimensions for double and single steps; Example for Flat tread**

#### 4.3.2.2 Requirements

- Cast iron steps shall have a minimum cross-sectional thickness of 5 mm, at any point;
- Plastics encapsulation shall have a minimum thickness of plastics of 2,5 mm at any point;
- The minimum width of tread (dimension T on Figure 2 and Figure 3) shall be 20 mm;
- The minimum length of tread (dimension L on Figure 2 and Figure 3) shall be 145 mm for single steps and 250 mm for double steps;
- The minimum stand-off-distance (dimension P on Figure 1) shall be 120 mm;
- For single and double steps of type B and type D, the following shall apply:
  - Single steps shall have an upstand of between 5 mm to 20 mm high (dimension H on Figure 2 and Figure 3) and at least 25 mm long (dimension W on Figure 2 and Figure 3) on each end of the tread to act as a boot stop;
  - Double steps shall have an upstand of at least 20 mm high (dimension H on Figure 2 and Figure 3) when measured within 70 mm from the front of the step and between 25 mm to 100 mm long (dimension W on Figure 2 and Figure 3) on each end of the tread to act as a boot stop.

#### 4.3.3 Limit of insertion of step

The limit to which the step should be inserted into the wall of a chamber shall be clearly indicated by a single change of section or additional information on the step, except when it is to be factory fixed into a precast concrete unit. When the limit of insertion is not indicated on the step, its manufacturer shall state in his technical literature the insertion length used in test method D.2.1 of this European Standard.

#### 4.3.4 Surface condition

Steps shall be free from visible defects, protrusions or sharp edges.

#### 4.3.5 Corrosion resistance

Steps shall be resistant to corrosion, which shall be achieved by the properties of the metal used in manufacture or by a surface treatment or by plastics encapsulation.

##### a) Steel steps;

- Mild steel and non-austenitic stainless steel steps shall be protected from corrosion by hot dip galvanizing conforming to EN ISO 1461, or by plastics encapsulation;
- No surface protection is necessary for austenitic stainless steels;

##### b) Aluminium steps;

- Aluminium steps shall be supplied either with no additional protection (i.e. bare metal), or plastics encapsulated or anodised in accordance with EN 2101 (chromic acid anodizing) or EN 2284 (sulphuric acid anodizing);
- Aluminium steps shall be provided with plastics fixing tails which totally encapsulate each end of the step and which protrude into the chamber a minimum of 20 mm (dimension F on Figure 4) from the vertical installation face;

##### c) Cast iron steps;

- Malleable cast iron and ductile (spheroidal graphite) cast iron steps shall be protected from corrosion by hot dip galvanizing conforming to EN ISO 1461, or by plastics encapsulation;
- No surface protection is required for grey cast (flake graphite) iron steps.

#### Key

- 1 Aluminium core  
F Protrusion

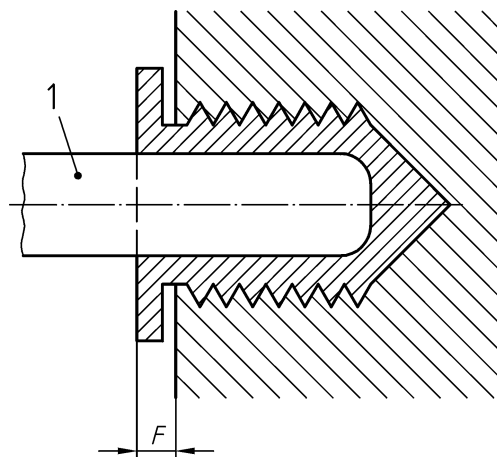


Figure 4 — Plastics fixing tails