

---

---

**Safety of machinery — Permanent means  
of access to machinery —**

Part 1:  
**Choice of fixed means of access between  
two levels**

*Sécurité des machines — Moyens d'accès permanents aux machines —  
Partie 1: Choix d'un moyen d'accès fixe entre deux niveaux*



Reference number  
ISO 14122-1:2001(E)

© ISO 2001

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2001

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

Printed in Switzerland

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 14122 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 14122-1 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 199, *Safety of machinery*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this standard, read "...this European Standard..." to mean "...this International Standard...".

ISO 14122 consists of the following parts, under the general title *Safety of machinery — Permanent means of access to machinery*:

- *Part 1: Choice of fixed means of access between two levels*
- *Part 2: Working platforms and walkways*
- *Part 3: Stairs, stepladders and guard-rails*
- *Part 4: Fixed ladders*

Annex A of this part of ISO 14122 is for information only.

For the purposes of this part of ISO 14122, the CEN annex regarding fulfilment of European Council Directives has been removed.

# Contents

Page

Foreword.....	v
Introduction .....	vi
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions.....	1
4 Significant hazards .....	3
5 Requirements for the selection of the fixed means of access.....	3
5.1 General.....	3
5.2 Preferred means of access .....	4
5.3 Selection of the means of access .....	4
5.3.1 Basic solutions .....	4
5.3.2 Conditions for the selection of stepladder or ladder .....	4
5.4 Choice among lift, ramp or stair.....	5
5.5 Selection between stepladder and ladder .....	6
6 Assembly instructions .....	7
Annex A (informative) Examples of the changes in the machine or system to make better access possible.....	8
Bibliography .....	9

## Foreword

The text of EN ISO 14122-1:2001 has been prepared by Technical Committee CEN/TC 114 "Safety of machinery", the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 199 "Safety of machinery".

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 October 2001, and conflicting national standards shall be withdrawn at the latest by October 2001.

This European Standard 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).

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## Introduction

EN ISO 14122 consists of the following parts, under the general title "Safety of machinery - Permanent means of access to machinery" :

Part 1 : Choice of a fixed means of access between two levels

Part 2 : Working platforms and walkways

Part 3 : Stairs, stepladders and guard-rails

Part 4 : Fixed ladders.

This part of EN ISO 14122 is a type B standard as stated in EN 1070.

This document is to be read in conjunction with clause 1.6.2 "Access to operating position and servicing points" and 1.5.15 "Risk of slipping, tripping or falling" of the essential safety requirements expressed in annex A of EN 292-2:1991/A1:1995. See also 6.2.4 "Provision for safe access to machinery" of EN 292-2:1991.

For the significant hazards covered by this part of EN ISO 14122, see clause 4.

The provisions of this document may be supplemented or modified by a type C standard.

NOTE 1 For machines which are covered by the scope of a type C standard and which have been designed and built according to the provisions of that standard, the provisions of that type C standard take precedence over the provisions of this type B standard. "

NOTE 2 The use of materials other than metals (wood composite materials, so-called "advanced" materials, etc.) does not alter the application of this part of EN ISO 14122.

Annex A is for information only.

This part of EN ISO 14122 contains a Bibliography.

## 1 Scope

This part of EN ISO 14122 defines the general requirements for safe access to machines mentioned in EN 292-2. It gives advice about the correct choice of access means when the necessary access to the machine is not possible directly from the ground level or from a floor.

This part of EN ISO 14122 applies to all machinery (stationary and mobile) where fixed means of access are necessary.

This part of EN ISO 14122 applies to means of access which are a part of a machine.

This part of EN ISO 14122 may also apply to means of access to that part of the building (e.g. working platforms, walkways, ladders) where the machine is installed, providing the main function of that part of the building is to provide a means of access to the machine.

**NOTE** This part of EN ISO 14122 may be used also for means of access which are outside the scope of this part of EN ISO 14122. In those cases the possible relevant national or other regulations should be taken into account.

This part of EN ISO 14122 applies also to access means specific to the machine which are not permanently fixed to the machine and which may be removed or moved to the side for some operations of the machine (e.g. changing tools in a large press).

This part of EN ISO 14122 does not apply to lifts, to moveable elevating platforms or other devices specially designed to lift persons between two levels

## 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 292—1:1991 (ISO/TR 12100-1), *Safety of machinery — Basic concepts, general principles for design — Part 1 : Basic terminology, methodology*

EN 292-2/A1 (ISO/TR 12100-2), *Safety of machinery — Basic concepts, general principles for design — Part 2 : Technical principles and specifications*

EN 1050 (ISO 14121), *Safety of machinery — Principles for risk assessment*

EN 1070, *Safety of machinery — Terminology*

EN ISO 14122-2, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways*

EN ISO 14122-3, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails*

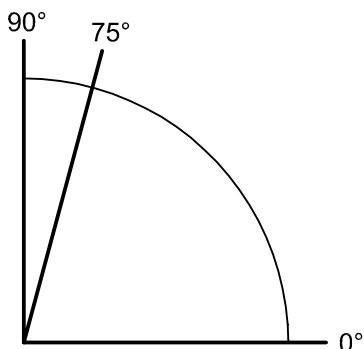
prEN ISO 14122-4:1996, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders*

## 3 Terms and definitions

For the purposes of this part of EN ISO 14122, the terms and definitions stated in EN 1070 "Safety of machinery - Terminology" and the following terms and definitions apply (see also Figure 5).

**3.1  
ladder**

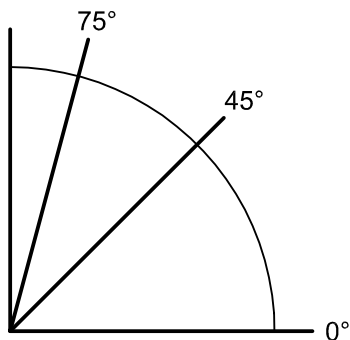
fixed means of access with an angle of pitch from more than 75 ° to 90 °, whose horizontal elements are rungs (see Figure 1)



**Figure 1 — 75° < angle of pitch ≤ 90°**

**3.2  
stepladder**

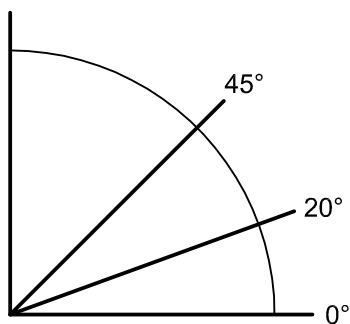
fixed means of access with an angle of pitch from more than 45 ° up to 75 °, whose horizontal elements are steps (see Figure 2)



**Figure 2 — 45° < slope angle ≤ 75°**

**3.3  
stair**

fixed means of access with an angle of pitch from more than 20 ° up to 45 °, whose horizontal elements are steps (see Figure 3)



**Figure 3 — 20° < angle of pitch ≤ 45°**



**3.4****ramp**

fixed means of access, comprising a continuous inclined plane having an angle of pitch from more than 0° up to 20° (see Figure 4)

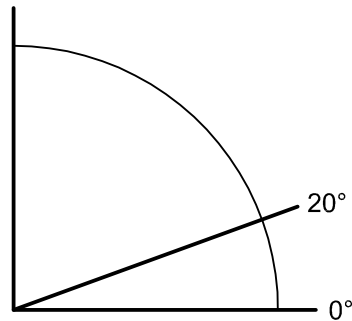


Figure 4 — 0° < angle of pitch ≤ 20°

## 4 Significant hazards

The significant hazards to be considered when determining the type and location of the means of access are the following:

- a) Falling.
- b) Slipping.
- c) Tripping.
- d) caused by excessive physical effort, e.g. from climbing a series of ladders.
- e) from falling of materials or objects when they may cause a risk to persons.

Other hazards **generated by the machinery**, e.g. **caused by the functioning of the machinery** (moving parts of the machine, movement of the machine itself (mobile machines), radiation, hot surface, noise, steam, hot liquids) or caused by its environment (harmful airborne substances) are not covered by this part of EN ISO 14122 but the designer of the machine should consider them, e.g. by preventing the access.

NOTE EN 1050 gives principles for risk assessment.

This part of EN ISO 14122 is primarily aimed at the prevention of persons falling and of excessive physical efforts.

## 5 Requirements for the selection of the fixed means of access

### 5.1 General

There shall be a safe and convenient means of access to all the zones and points of the machine where the need for access can be foreseen during the phases of the "life" of the machinery (see 3.11 of EN 292-1:1991).

## 5.2 Preferred means of access

The preferred means of access to the machinery shall be in the following order :

- a) access directly from the ground level or from a floor, (for more details see 5.3.1.1 and EN ISO 14122-2) ;
- b) lifts, ramps or stairs, (for more details see 5.4) ;
- c) stepladders or ladders, (for more details see 5.5).

## 5.3 Selection of the means of access

### 5.3.1 Basic solutions

**5.3.1.1** Whenever possible, access to control devices and other parts of the machine is preferred from either a ground level or a floor. This is particularly important where frequent access is required.

**5.3.1.2** If level access according to 5.3.1.1 is not possible or practicable,

- a lift
- or
- suitable ramp with an angle of pitch less than 10 ° (see 5.4.b))
- or
- stairs with an angle of pitch from a minimum of 30 ° to maximum of 38 ° (see 5.4.c))

shall normally be selected as a safe and suitable basic solution for the necessary access.

### 5.3.2 Conditions for the selection of stepladder or ladder

**5.3.2.1** In the design of access to machinery, stepladders and ladders shall be avoided as far as practicable due to the higher risk of falling and because of the higher physical efforts when using these access means.

**5.3.2.2** If access means according to 5.3.1 are not possible, selection of a stepladder or ladder may be considered. The final decision shall be made on the basis of the risk assessment, including ergonomic aspects.

If the level of risk (see EN 1050) is considered to be too high, the basic construction of the means of access to the machine shall be changed to allow accessways with a reduced risk to be used (see 5.3.1 and annex A).

**5.3.2.3** The following list presents some examples of the cases when a stepladder or ladder may be selected. These are only examples - the final selection shall always be done case by case on the basis of risk assessment. In most cases more than one of the conditions in the following list shall be fulfilled to make the selection of a stepladder or ladder possible.

- a) Short vertical distance.
- b) The means of access is foreseen to be used infrequently.

**NOTE** When estimating the frequency of the use, the whole life of the machinery is considered. If the means of access is to be used frequently, e.g. during the assembly or installation of the machine or during periodical major maintenance tasks, a stepladder or ladder is not an adequate solution.

- c) The user will not be carrying any large tools or any other equipment when using the means of access.

- d) Only one user will be foreseen to use the means of access at the same time.
- e) The means of access is not foreseen to be used for evacuation purposes by injured persons.
- f) The structure of the machine does not make stairs or other basic means (see 5.3.1) possible.

NOTE Examples are a tower crane and mobile machines.

**5.3.2.4** For the choice between stepladder and ladder see 5.5.

#### **5.4 Choice among lift, ramp or stair**

The installation of a stair or ramp as means of access between two levels is always preferable to that of a stepladder or ladder.

When selecting either a lift, ramp or stair, the following points shall be considered.

a) A lift may be the best solution in the following cases;

- need for frequent access of several persons;
- long vertical distances;
- heavy loads to transport;

An alternative escape route is always needed in addition to a lift.

b) A ramp may be the best solution in the following cases;

- for a short vertical distance ;
- where it is necessary to transport wheeled vehicles (forklift trucks, manually moved carts etc.).

Different angles of the ramp are depending on the use :

- for hand carts or other manually transported wheeled vehicles, maximum angle 3 ° (particularly when likely to be used by handicapped persons);
- for motor vehicles (e.g. forklift truck), maximum angle 7 °;
- for walking, up to 20 ° (generally and preferably not more than 10 °).

NOTE 1 Ramps are often preferable to stairs with only one or two steps.

NOTE 2 The properties of the surface have very strong influence on the safety of the ramp. The surface should have very good resistance against slipping in particular for ramps between 10 ° and 20 °.

c) Stairs (for detailed requirements see EN ISO 14122-3).

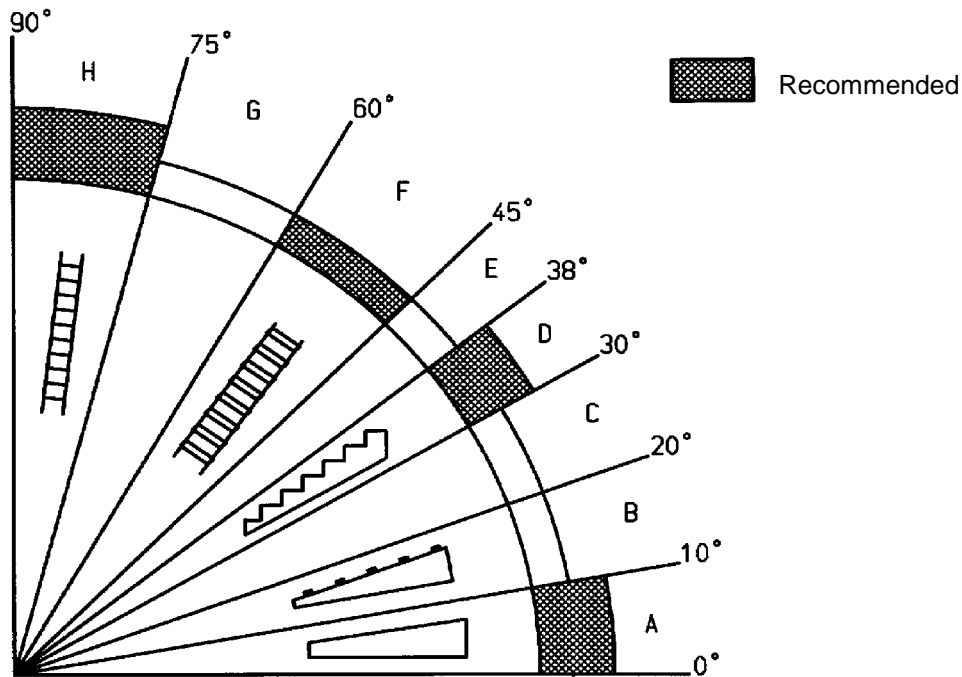
Preferred angle of pitch is between 30 ° and 38 °.

## 5.5 Selection between stepladder and ladder

When making the selection between stepladder and ladder at least the following points a) and b) shall be considered. For the detailed requirements of these means of access, see prEN ISO 14122-4:1996 (fixed ladders) and EN ISO 14122-3 (stepladders).

- a) Consequences on the level of safety affected by the choice of stepladders;
- if a person is coming down the stepladder and not facing it, there could be an increased risk of falling;
  - if a person is using the stepladder whilst carrying small objects, there could be an increased risk of falling;
  - according to EN ISO 14122-3, the maximum flight of a stepladder without a rest platform is limited;
  - stepladders with an angle of pitch between 60 ° and 75 ° should only be selected due to space limits or process requirements.
- b) Consequences on the level of safety affected by the choice of ladders;
- the person needs to face the ladder and also to use his hands for holding. Therefore, it is considered highly unlikely that the user will descend facing away from the ladder;
  - ladders are physically harder to use;
  - according to prEN ISO 14122-4:1996 the maximum flight of ladders without a rest platform is limited;
  - Two main alternatives for protection of the users of fixed ladders against falls from a height are safety cages or fall arresters:
    - The cage shall be the required choice, as it is a means which is always present and the actual level of safety is independent of the operator's actions,
    - Where it is not possible to use a cage, individual protective equipment shall be provided. The fall arrester is only effective if the user chooses to use it. If a harness with an incompatible sliding system is used with a guided type fall arrester, there will be a risk.
- A fall arrester shall be designed only for low frequency and specialised access (e. g. maintenance).

NOTE An appropriate individual fall protection device is able to arrest a fall better than a cage.



**Key**

- A Ramp, A recommended
- B Ramp with enhanced slip resistance
- C Stair
- D Stair, D recommended
- E Stair
- F Stepladder
- G Stepladder
- H Ladder, H recommended

**Figure 5 — Range of the various means of access**

**6 Assembly instructions**

All information on the proper assembly shall be contained in the assembly instructions. In particular, information shall be included on the:

- method of fixing ;
- assembly of guided fall arrester on anchorage point, where applicable.

## Annex A (informative)

### Examples of the changes in the machine or system to make better access possible

**A.1** Make changes in the position of pillars, beams, pipelines, cable trays, platforms, storage tanks etc., to make the use of stairs designed in accordance with this part of EN ISO 14122 or other preferable access means possible.

**A.2** Make changes in the design of the means of access (e.g. location) to make stairs designed in accordance with this part of EN ISO 14122 or other preferable means of access possible.

EXAMPLE 1 Make the access from another side so that there is enough room for stairs designed in accordance with this part of EN ISO 14122. Add horizontal platforms if necessary.

EXAMPLE 2 Make changes in the design of the means of access so that stairs are possible (e.g. change in the direction).

**A.3** Make changes in the machine to remove the need for access or to make the access possible from the ground level or from a floor.

EXAMPLE 1 Position lubrication points near the ground level with the help of pipes.

EXAMPLE 2 Use a different method of lubrication, e.g.

- permanent lubrication;
- lubrication circuit with a pump.

EXAMPLE 3 Motor and power transmission means positioned so that access to the maintenance and servicing points is possible from the ground level.

EXAMPLE 4 The machine is installed to another place so that access is possible e.g. from an already existing platform.

EXAMPLE 5 Change the position of pipelines and/or valves so that operation of the valve is possible from the ground level or the floor.

## Bibliography

In compiling this part of EN ISO 14122, the following have been taken into account :

EN 131-2:1993<sup>1</sup>, *Ladders — Requirements, Tests, Markings*

EN 294 (ISO 12852), *Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs*

EN 349 (ISO 13854), *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 353-1, *Personal protective equipment against falls from a height — Guided type fall arresters on a rigid anchorage line*

EN 364, *Personal protective equipment against falls from a height — Test methods*

EN 547-1, *Safety of machinery — Human body dimensions — Part 1 : Principles for determining the dimensions required for openings for whole body access into machinery*

EN 547-2, *Safety of machinery — Human body dimensions — Part 2 : Principles for determining the dimensions required for access openings*

EN 547-3, *Safety of machinery — Human body dimensions — Part 3 : Anthropometric data*

EN 795, *Protection against falls from a height — Anchorage devices — Requirements and testing*

EN 811 (ISO 13853), *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

---

<sup>1</sup> Under revision.

1

---

---

**ICS 13.110**

Price based on 9 pages

© ISO 2001 – All rights reserved