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**Fibre-reinforced plastics — Telescopic ladder — Requirements and test methods**

*Plastiques renforcés de fibres de verre — Échelle télescopique — Exigences et méthodes d'essai*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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## Introduction

This ~~standard document~~ relates only to telescopic ladders made of ~~fiber~~~~fibre~~-reinforced plastic materials. Therefore, the test methods and technical requirements for the aging performance of the ladders ~~are~~ increased.

This ~~standard document~~ is a ~~technical standard~~ applicable to different countries and regions in the world, considering the weight difference between people in different countries and regions, and also in order to reduce the weight of the ladder and more convenient to carry, so the maximum total weight of the ladder is divided into two grades: ~~100 kg~~ 100 kg and ~~150 kg~~.

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# Fibre-reinforced plastics — Telescopic ladder — Requirements and test methods

## 1 Scope

This document specifies the terms and definitions, technical requirements, test methods and inspection rules for telescopic ladders made of fibre-reinforced plastics.

~~This document~~ applies to the manufacture, selection, inspection and use of telescopic ladders made of fibre-reinforced plastics.

~~This~~NOTE 1 — Annex A provides guidance for inspection rules of the telescopic ladders.

NOTE 2 — Annex B classifies all the tests covered in this document into 8 test blocks and specifies the sequence of tests within the same test block.

It does not apply to ladders with a length over 5 m.

Note: NOTE 2 Ladders with a length over 5 m, ~~could~~can use this document as a reference.

The scope of this document does not relate to the “live working” and “explosive atmospheres”.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 179-1, Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test

ISO 4892-2:2013, Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps

ISO 7599, Anodizing of aluminium and its alloys — ~~Method~~General specifications for specifying decorative and protective anodic oxidation coatings on aluminium

ISO 14125, Fibre-reinforced plastic composites — Determination of flexural properties

ISO 14644-1, ~~Clean rooms~~Cleanrooms and associated controlled environments — Part 1: Air Cleanliness Classification of particulate matter concentrationsair cleanliness by particle concentration

ISO 14713-2, Zinc coatings — Guidelines and recommendations for the protection against corrosion of iron and steel in structures — Part 2: Hot dip galvanizing

ISO 16293-2, Glass in building — Basic soda lime silicate glass products — Part 2: Float glass

IEC 62321, ~~Electrotechnical products-3-1~~, Determination of levels of six regulatedcertain substances (in electrotechnical products — Part 3-1: Screening test methods — Screening of electrotechnical products for lead, mercury, cadmium, hexavalenttotal chromium, polybrominated biphenyls, polybrominated diphenyl ethers) andtotal bromine using X-ray fluorescence spectrometry

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*IEC 62321-4, Determination of certain substances in electrotechnical products — Part 4: Determination of mercury in polymers, metals and electronics by CV-AAS, CV-AFS, ICP- OES and ICP-MS*

EN 59, Glass reinforced plastics — Determination of indentation hardness by means of a Barcol hardness tester

EN 131-3, Ladders — Part 3: Marking and user instructions

EN 10088-2, Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes

### 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1 telescopic ladder

ladder consisting of three or more rung/step sections with telescopic stiles

Note 1 to entry: See [Figure 1](#).

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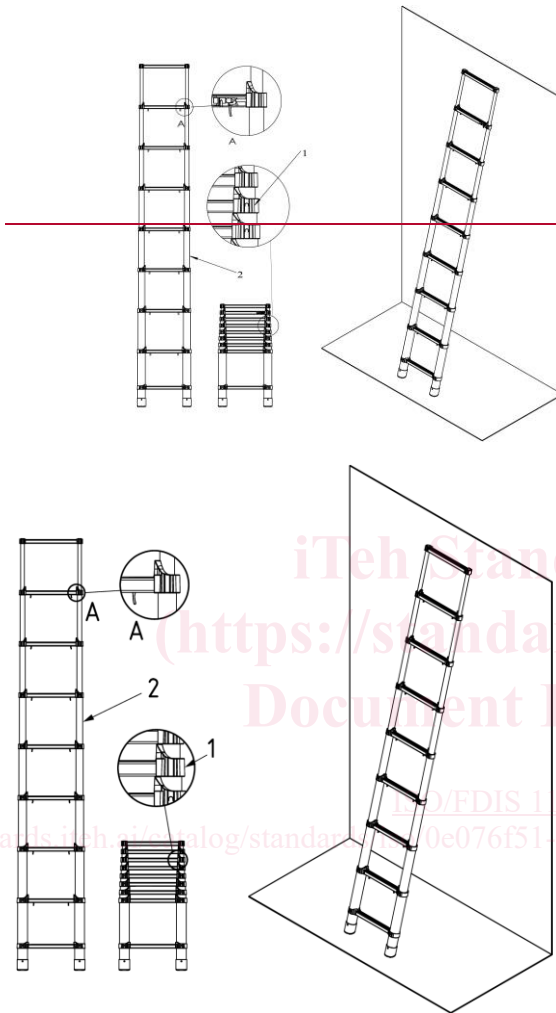
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**Key**

- 1 bracket
- 2 stile
- 3A rung/step section locking mechanism

**Figure 1** — Example of structure of a telescopic ladder

**3.2**

**free-standing telescopic ladder**

ladder (with rungs or steps) which has its own support with opening restraints.

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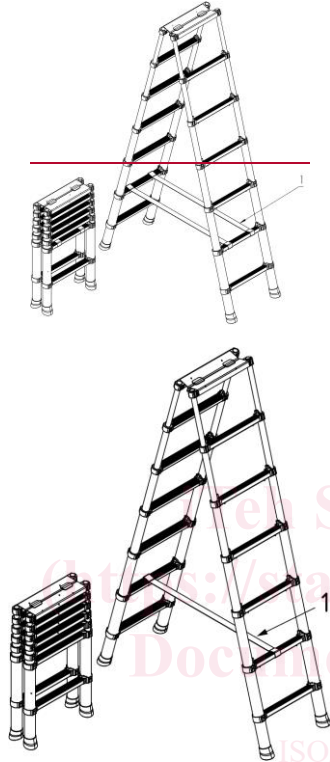
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Note -1 to entry: See Figure 2. Figure 2.



Key  
1 one of the opening restraints

Figure 2.— Example of structure of free-standing telescopic ladder

**3.3 rung/step section**  
section of ladder that consists of one rung/step connected to two telescopic stiles

**3.4 bracket**  
part that attaches the rung/step to the stile.

Note -1 to entry: See Figure 1. Figure 1.

**3.5 locking indicator**  
mechanism or part that indicates that one rung/step section or part of one rung/step section is locked/unlocked

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**3.6  
rung/step section locking mechanism**  
mechanism that locks a rung/step section

Note -1 to entry: See [Figure 1](#). [Figure 1](#).

**3.7  
locking pin**  
part that locks each rung/step section and that is engaged when the locking mechanism is locked

**3.8  
protection system against squeezing**  
mechanism or part that minimizes the risk of squeezing when the ladder is shortened

**3.9  
release function**  
function which releases the locking mechanism

**3.10  
ascendable partside**  
part of the ascending leg consisting only of fully extended rung/step sections

**3.11  
storage position**  
position where none of the rung/step sections are extended

~~**3.1.12  
working state**  
leaning ladder is fully extended and leaning on a supporting surface, or a standing ladder is fully extended on the ground.~~

~~**3.1.13  
acceptance test**  
contractual test to prove to the customer that the item meets certain conditions of its specification~~

**3.1.13  
type test**  
conformity test made on one or more items representative of the production

**4 Technical requirement**

**4.1 Functional dimension**

The size mark of the telescopic ladder is shown in [Figure 3](#), [Figure 3](#), and the numerical relationship between dimensions is shown in [Table 1](#), [Table 1](#). It shall meet the requirements in [Table 1](#), [Table 1](#).

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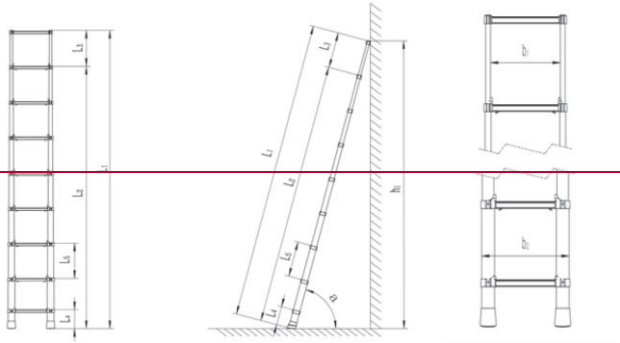


Figure 3.— Dimension of telescopic ladder

Table 1.— Functional sizes

Dimensions in millimetres

	$b_1$	$b_2$ where $L_1 < 3\ 000$	$b_2$ Where $L_1 > 3\ 000$	$L_3$ and $L_4$	$L_5$	$\alpha$
min.	280	340	$b_2 + 0,1 \times L_1$	$0,5 L_5$	250	$65^\circ$
max.	—	— <sup>a</sup>	— <sup>a</sup>	$L_5 + 15$	300	$75^\circ$

<sup>a</sup> The dimension  $b_2$  for leaning ladders may be limited to a maximum of 1 200 mm at the discretion of the manufacturer.

#### 4.2 Total load

The telescopic ladder is divided into two grades: I and II. The maximum total load that telescopic ladders can bear are shown in [Table 2, Table 2](#).

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