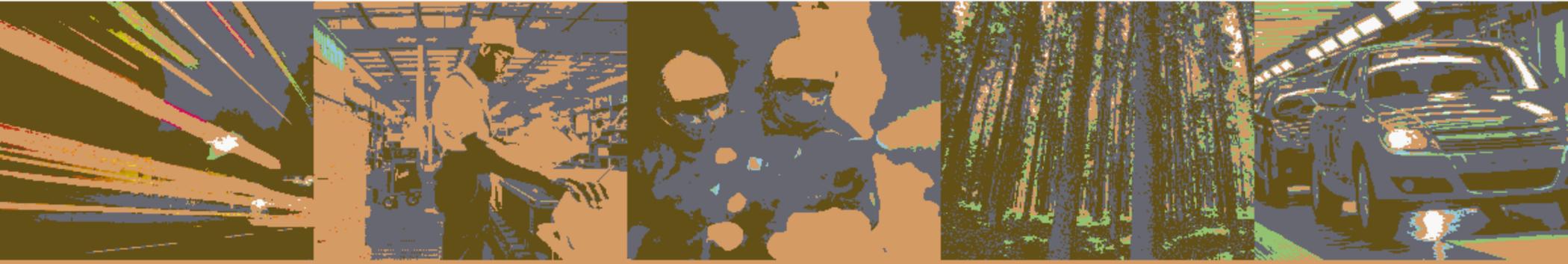


**BS 8634:2017**



BSI Standards Publication

## **Portable roof ladders - Specification**

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## Summary of pages

This document comprises a front cover, and inside front cover, pages i to ii, pages 1 to 27, an inside back cover and a back cover.

## Introduction

The Work at Height Regulations 2005 [1] gives specific requirements regarding the use of ladders which apply equally to roof ladders.

Roof ladders are suspended ladders retained at their top by a hook (ridge hook) which rests against the opposite side of a pitched roof. Bearers underneath the climbing face of the ladder serve both to support the ladder and to ensure there is sufficient distance between the ladder and the roof for the user's hands and feet enabling a firm hand and foot hold. This British Standard specifies the minimum distances required for that purpose.

The HSE has received reports that roof ladders might become unstable when subjected to forces which can be generated by the actions of the user working on roof ladders. Hence this standard specifies dimensions for the minimum width of the ridge hook and bearers to reduce the possibility of the ladder becoming unstable. Work is being carried out by the HSL (Health & Safety Laboratories) which might, in future revisions of this standard, enable a test for stability of roof ladders or provide further verification of the current dimensional requirements.

The scope of this British Standard encompasses roof ladders for use on certain angles of dual pitched roofs. A range of 25° to 65° encompasses the majority of pitched roofs that are likely to be encountered by users of this type of ladder. Other types of access equipment can be considered for roof pitches outside of this range.

This British Standard does not consider the use of personal protection equipment intended as a means of fall arrest, which is connected to a roof ladder and the potential loads that would be generated on the ladder in a fall arrest situation as a result of the attachment of such equipment. Designers of proprietary PPE systems connected to a roof ladder are advised to consider this fact and design the PPE, and its connections with the ladder, accordingly. [Annex A](#) is intended to assist with this.

## 1 Scope

This British Standard specifies requirements for portable roof ladders specifically designed solely to provide temporary access to pitched roofs with angles between 25° and 65° for tasks that are of short duration and low risk.

In particular, it specifies:

- a) general design features, requirements and test methods;
- b) the supporting elements, the bearers and ridge hook, and their connections to the ladders, including how a ladder is supported and located by the ridge of a pitched roof;
- c) the pitch, dimensions and form of a roof ladder's climbing surfaces, according to the intended angles of use;
- d) the wheels used to manoeuvre a roof ladder into position on a pitched roof; and
- e) markings and user instructions.

Roof ladders conforming to this standard are only intended for use on pitched roofs with angles between 25° and 65° and for no other purpose. They are not intended for use as leaning or standing ladders.

This British Standard covers single section roof ladders, extending roof ladders, roof ladders with hinge (articulated) joints, roof ladders with telescopic joints and multi-part (sectional) roof ladders.

It is not applicable to:

- 1) aftermarket accessories which are intended to convert leaning ladders into roof ladders;
- 2) roof ladders for use on mono-pitch roofs, e.g. a pent roof;
- 3) roof ladders used with personal protection equipment intended as a means of fall arrest unless the roof ladder is part of a proprietary system designed for that purpose; or

*NOTE* See [Annex A](#) for further information.

- 4) crawling boards for use on roof angles less than 25°.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions 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.

BS 245, *Specification for mineral solvents (white spirit and related hydrocarbon solvents) for paints and other purposes*

BS 7371 (all parts), *Coatings on metal fasteners*

BS EN 131-1, *Ladders — Part 1: Terms, types, functional sizes*

BS EN 131-2:2010+A2:2017, *Ladders — Part 2: Requirements, testing, marking*

BS EN 131-4, *Ladders — Part 4: Single or multiple hinge-joint ladders*

BS EN 131-6, *Ladders — Part 6: Telescopic ladders*

BS EN ISO 3834 (all parts), *Quality requirements for fusion welding of metallic materials*

BS EN ISO 14713-1, *Zinc coatings — Guidelines and recommendations for the protection against corrosion of iron and steel in structures — General principles of design and corrosion resistance*

BS EN ISO 14731, *Welding coordination — Tasks and responsibilities*

## 3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN 131-1 and the following apply.

### 3.1 aftermarket accessory

component not made or supplied by the original equipment manufacturer as a part of the original product but which is added to the product after it has been produced and distributed, to enable that product to serve an additional function

### 3.2 bearer

component of a roof ladder that provides support between the roof ladder and the roof, spreads the load, provides distance from the roof to the user's feet and hands and accommodates the form of the roof

### 3.3 locking device

means of preventing unintentional movement relative to each other between the connecting parts or sections of extending, hinged, telescopically jointed or multi-part (sectional) roof ladders

### 3.4 maximum total load

maximum weight that the ladder is designed to support when set up in accordance with the manufacturer's instruction

[SOURCE: BS EN 131-2:2010+A2:2017, 3.4]

### 3.5 ridge hook

component at the top of the roof ladder that utilizes the opposite slope of the roof to retain the ladder

## 4 Design

### 4.1 General

#### COMMENTARY ON 4.1

*The requirements of this British Standard are based upon a roof ladder with a maximum total load of 1 472 N (150 kg). This value, taken from BS EN 131-2:2010+A2 for tests in the position of use, takes account of the weights of European professionals working at height and their equipment together with factors including safety, dynamic loads and material variations. Roof ladders are assumed to be used by one person at a time.*

- 4.1.1** The roof ladder and its parts shall conform to the requirements of [Annex B](#) to [Annex I](#). For all tests in this British Standard, unless otherwise stated in the particular test, the following tolerances shall apply:
- $\pm 1$  mm for longitudinal measurements;
  - $\pm 5$  mm for the measurement of the distance between the supports and the overhanging length;
  - $\pm 1^\circ$  for the measurement of angles; and
  - $\pm 1\%$  for static forces and torque.
- 4.1.2** The dimensions for the ladder element of the roof ladder shall conform to the dimensional requirements for a leaning ladder specified in BS EN 131-1, except where specified otherwise in this standard.
- 4.1.3** Components forming part of the roof ladder shall be secured such that they cannot be removed except by direct intentional action and where designed and detailed within the user instructions.
- 4.1.4** All fastenings shall be secured against accidental loosening.
- 4.1.5** Metallic welded joints shall be welded in accordance with BS EN ISO 3834 (all parts) and BS EN ISO 14731.
- 4.1.6** Nails shall be allowed only if their function is related to the production process, e.g. fixation during the drying of glues.
- 4.1.7** Accessible edges shall be free of burrs or sharp points and chamfered, rounded or otherwise formed in order to avoid injuries. The design shall seek to minimize the existence of shearing and squeeze points and where they do exist to minimize the shearing and squeezing effects as far as practicable.
- NOTE* Shear or squeeze points exist if the distance between two accessible parts relative to each other is less than 18 mm and more than 7 mm in any position during movement (see BS EN 581-1 for further guidance).
- 4.1.8** Extending, hinged, telescopically jointed or multi-part (sectional) roof ladders shall be provided with a means of preventing unintentional opening, closing or movement between the connecting parts or sections, relative to each other.

## 4.2 Rungs and steps

4.2.1 Rungs and steps shall have a standing surface designed to reduce slipping.

4.2.2 Rungs and steps shall be firmly and durably connected to the stiles.

## 4.3 Ridge hooks

4.3.1 Ridge hooks shall be permanently attached to the ladder. It shall not be possible to separate the ridge hook from the ladder without the use of tools.

4.3.2 Ridge hooks shall be designed to operate on all common roof tiles, ridge tiles, slates, shingles and sheeting profiles when the ladder is in its intended position of use and at all intended angles of use.

4.3.3 Ridge hooks shall be designed to reduce point loads on the roof generated by the weight of the ladder and the user to lessen the possibility of damage to the surface of the roof during use.

4.3.4 The width dimension of the ridge hook at its widest contact points with the roof ( $W_1$ ) shall be equal to or greater than  $b_2$ .

## 4.4 Bearers

4.4.1 Bearers shall be permanently attached to the ladder. It shall not be possible to separate the bearers from the ladder without the use of tools.

4.4.2 Bearers shall be of sufficient number and designed to reduce the point loads on the roof generated by the weight of the ladder and the user to lessen the possibility of damage to the surface of the roof during use.

4.4.3 The width dimension of the bearers at their widest contact points with the roof ( $W_3$ ) shall be equal to or greater than the sum of  $b_2 + 2 W_2$  where:

$b_2$  = the outside width of the roof ladder at its widest point;

$W_2 \geq g_2$  (the unobstructed gap behind climbing surface – see [Table 1](#) and [Figure 1](#)).

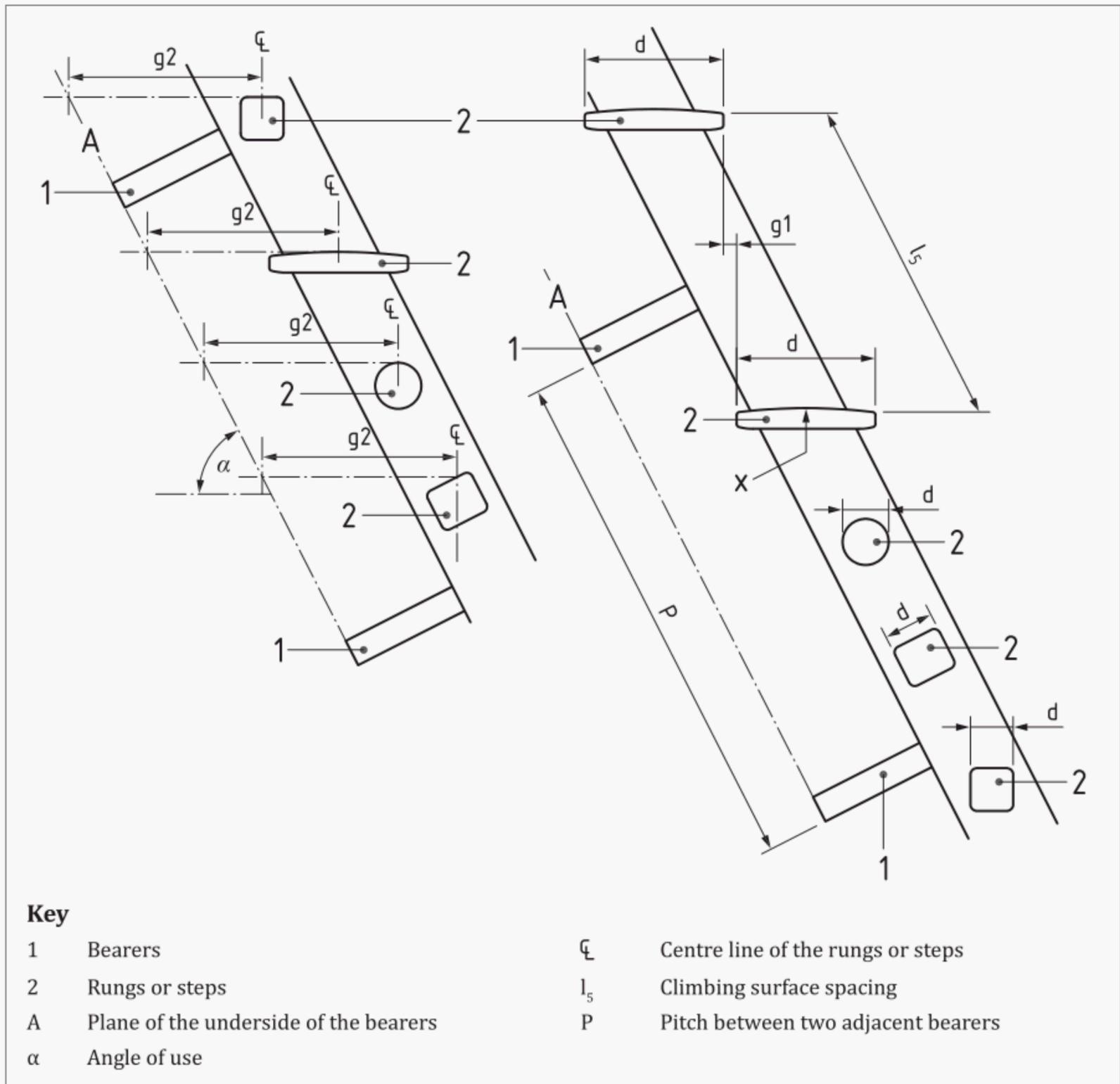
See [Figure 2](#).

**Table 1** — Dimensions for rungs and steps

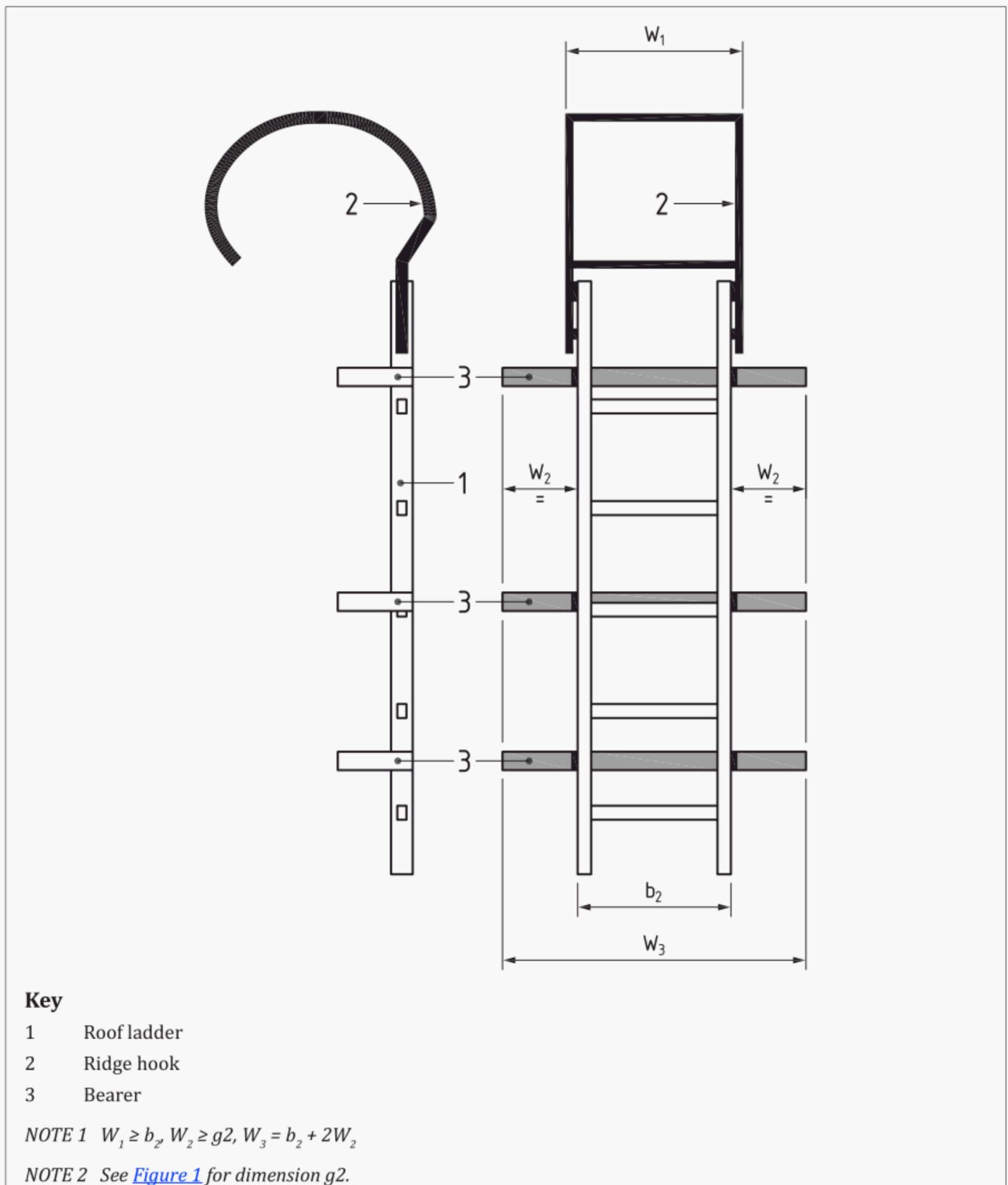
Dimensions	Symbol	Rungs		Fixed steps		Articulating steps	
		Max	Min	Max	Min	Max	Min
Inside width	$b_1$	—	280 mm	—	280 mm	—	280 mm
Outside width	$b_2$	—	$b_1 + 2t$	—	$b_1 + 2t$	—	$b_1 + 2t$
Climbing surface depth	$d$	51 mm	20 mm	—	80 mm	—	100 mm
Climbing surface spacing	$l_5$	300 mm	250 mm	300 mm	250 mm	300 mm	300 mm
Climbing surface radii	$x$	—	—	—	300 mm	—	—
Inclination	$\alpha$	65°	35°	<35°	25°	65°	25°
Unobstructed horizontal gap between climbing surfaces	$g_1$	—	—	—	0 mm	—	0 mm
Unobstructed gap behind climbing surface measured under load	$g_2^{A)}$	—	150 mm	—	150 mm	150 mm	150 mm

<sup>A)</sup>  $g_2$  is measured under load (see [Annex H](#)) horizontally from the centreline of the rungs or steps to the plane of the underside of the bearers where they contact the roof. See [Figure 1](#) and [Annex H](#) for test arrangements.

**Figure 1** — Dimensions for rungs or steps and the pitch of bearers



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**Figure 2** — Width of ridge hook and bearers

#### 4.5 Locking devices and connections between the parts or sections of the ladder

The parts or sections of extending, hinged and telescopic roof ladders shall be secured with a locking device to prevent un-intentional opening, closing, separation and movement of the parts or sections relevant to each other when the ladder is in the position of use.

*NOTE* It is the choice of the manufacturer whether the operation of the locking device is manual or automatic.

#### 4.6 Positioning wheels

Positioning wheels shall have a minimum diameter of 100 mm.

## 5 Materials

Materials shall conform to the material requirements of BS EN 131-2:2010+A2.

Roof ladders made from plastic materials shall conform to the requirements for plastic ladders in BS EN 131-2:2010+A2.

All metal components, with the exception of metal fastenings, shall be protected from corrosion by one of the methods given in BS EN ISO 14713-1.

Metal fastenings shall be protected against corrosion by one of the methods given in BS 7371 (all parts).

*NOTE Under normal conditions, aluminium alloys are not considered to be susceptible to corrosion and might not be protected.*

Wooden parts shall be smooth and coated on all sides. The coating shall be transparent and permeable to water vapour.

## 6 Safety markings

**6.1** Only ladders which fully conform to all requirements of this British Standard shall be marked BS 8634.

**6.2** Markings shall be legible and durable. The durability of the marking shall be checked by inspection and by rubbing the marking lightly, first for 15 s with a cloth soaked in water and then for 15 s with a cloth soaked in white spirit conforming to BS 245. After the test, there shall be no reduction in the legibility of the markings and adhesive labels shall not have loosened or become curled at the edges.

**6.3** Roof ladders shall be marked with at least the following safety markings.

- a) The identity of the producer or supplier.
- b) The product standard to which the ladder conforms, i.e. BS 8634.
- c) The month and year when the ladder was manufactured.
- d) The extended length of the ladder in m.
- e) The weight of the ladder in kg.
- f) The tipping point or points of the ladder (longitudinal centre of gravity of the ladder) where this does not vary by more than two positions because of the design. Where the tipping point varies by more than two positions because of the design, the user instructions shall contain information regarding the positions of the tipping points.

*NOTE Examples of where the tipping point might vary by more than two positions because of the design are: an extending ladder, a sectional ladder, hinged ladder or a telescopic ladder.*

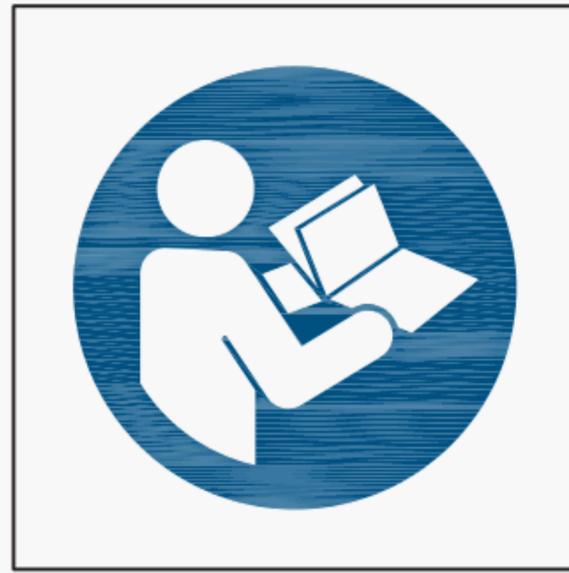
**6.4** Roof ladders shall be marked with at least all of the safety symbols shown in [Figure 3](#), with the exception of Figure 3t) and Figure 3u), which shall be used only if applicable to the design of the ladder.

**6.5** The markings shall also include any other information identified as necessary by the manufacturer.

Figure 3 — Safety symbols



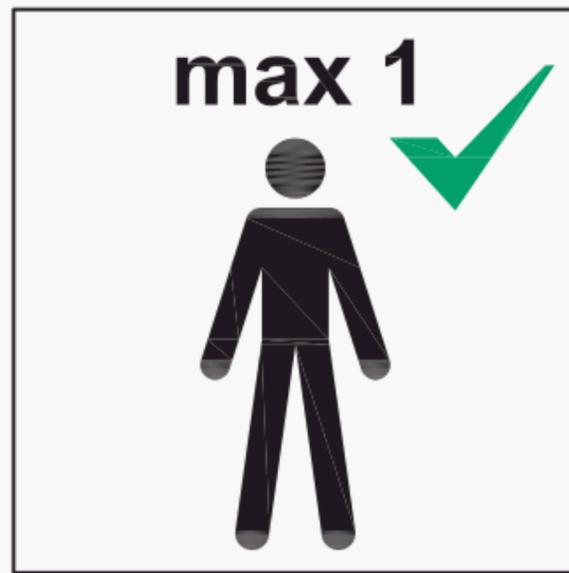
a) General warning symbol



b) Read the instructions



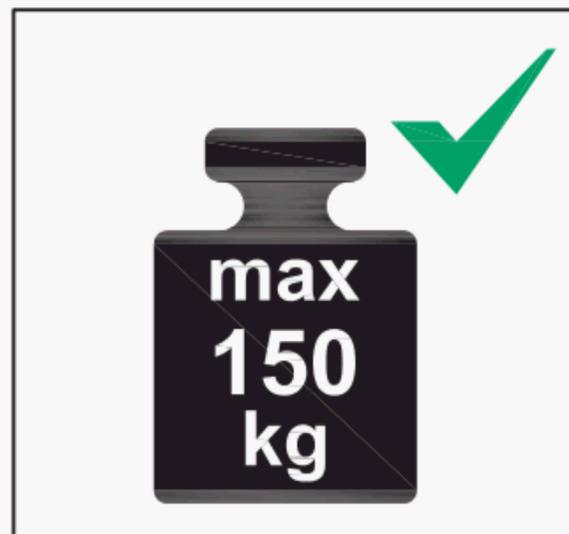
c) Danger of fall



d) Maximum number of persons on the ladder



e) Angles of use (values change according to design)



f) Maximum total load

Figure 3 (continued)



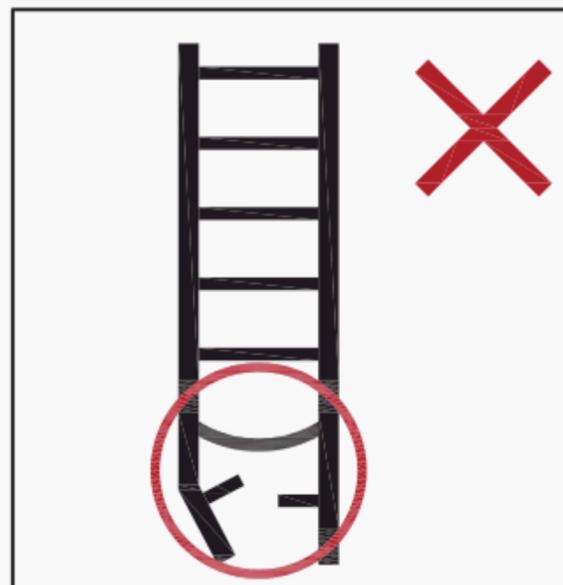
g) Maintain a firm handhold



h) Wear appropriate footwear



i) Do not use ladder if unwell or unfit



j) Do not use a damaged ladder



k) Do not carry anything too heavy or too big



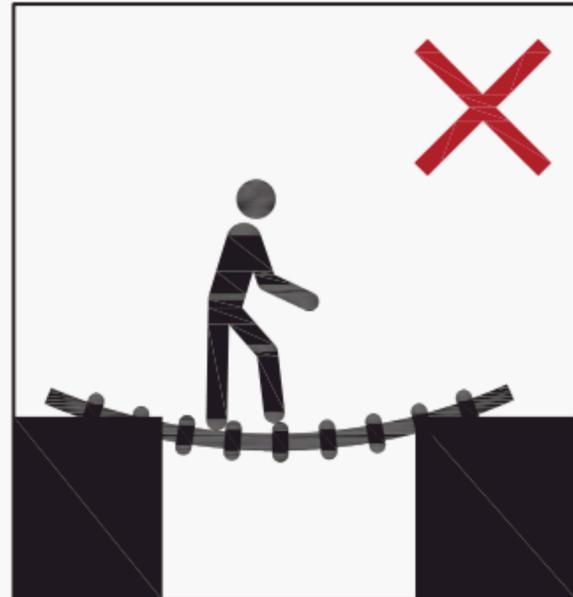
l) Face the ladder when climbing

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Figure 3 (continued)



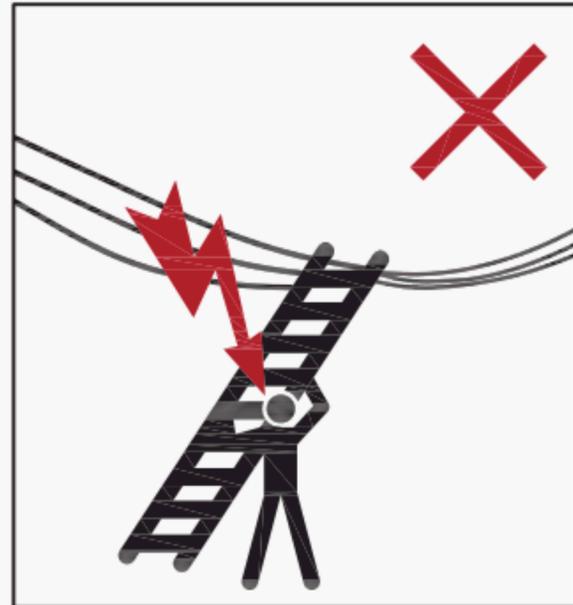
m) Do not overreach or apply sideways forces



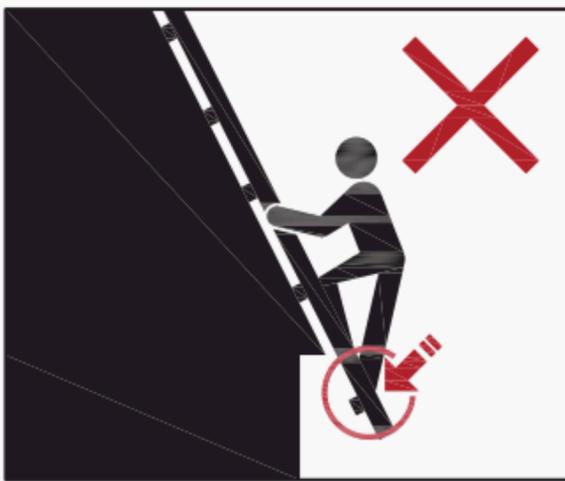
n) Do not use the ladder as a bridge



o) Beware of electricity



p) Beware of overhead power lines



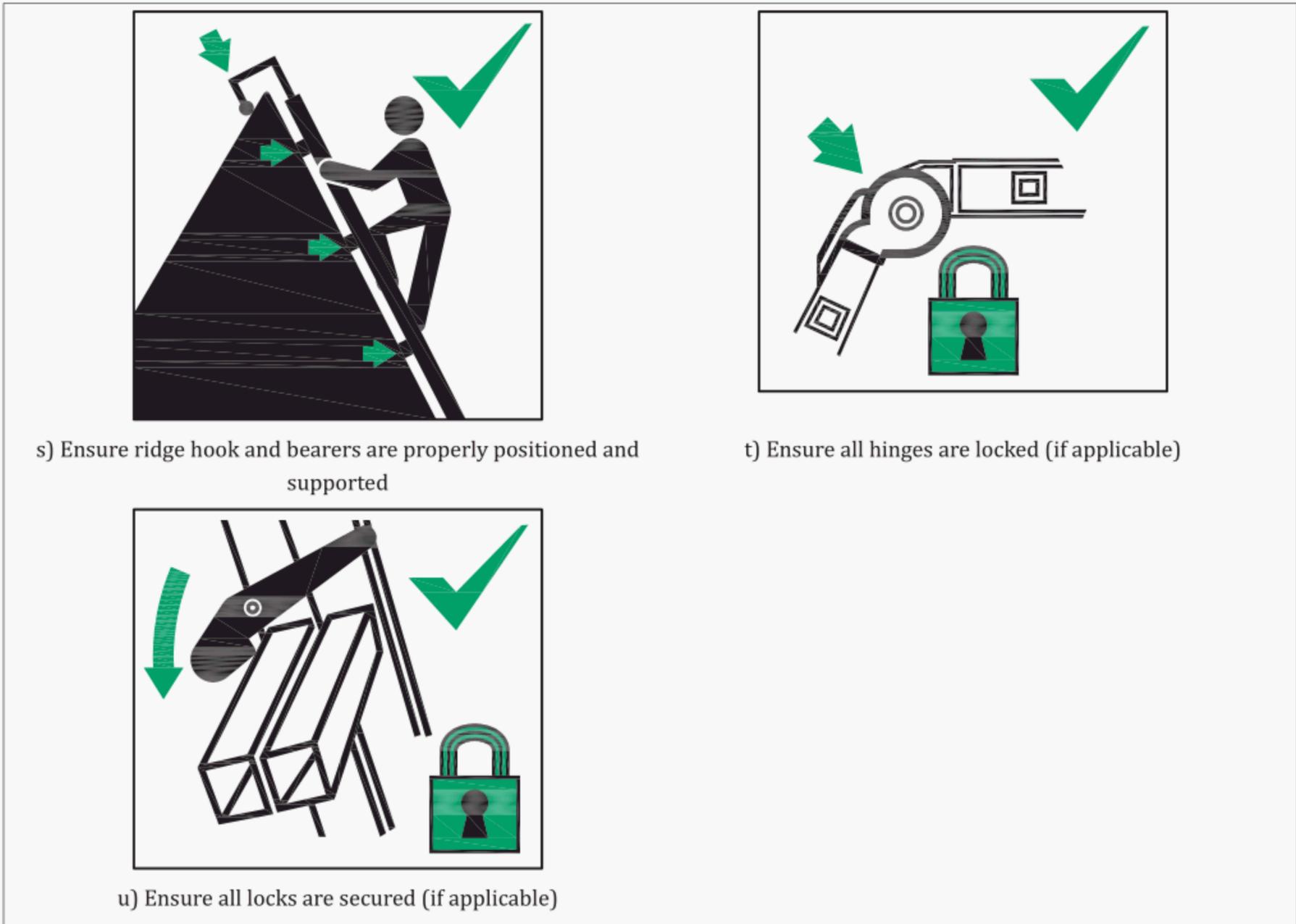
q) Do not stand on unsupported ladder



r) Ensure ladder is long enough

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Figure 3 (continued)



## 7 User instructions

7.1 A copy of the user instructions shall be provided with each ladder in the language of the country where the ladder is placed on the market. User instructions shall contain the following information.

- a) The marking information given in 6.3 and 6.4 and, where required, instructions regarding the tipping point of the ladder – see 6.3 f).
- b) Instructions for extending, opening, closing, assembling, dismantling, the sections of extending roof ladders, roof ladders with hinge (articulated) joints, roof ladders with telescopic joints and multi-part (sectional) roof ladders.

7.2 The user instructions shall contain the following text as a minimum.

*READ THESE INSTRUCTIONS BEFORE YOU USE THE LADDER AND KEEP THEM SOMEWHERE SAFE FOR FUTURE REFERENCE*

*To use a roof ladder safely you need to have received instructions and understand how to use the equipment properly.*

*You should carry out a risk assessment to be sure that a roof ladder is suitable and the correct equipment for the task that you intend to carry out.*

*Roof ladders are only intended for work that is both short duration work AND low risk,*

*You need to ensure that the roof ladder is the right size and type for that task and that it is in good condition.*

*The following list of hazards and examples of their causes, which is not exhaustive, are common reasons for accidents encountered when using roof ladders:*

- a) *loss of stability caused by:*
  - *incorrect choice of ladder – too short or too long or the wrong type of ladder for the angle of the roof, or where a roof ladder is unsuitable for the task;*
  - *incorrect positioning of the ladder, e.g. where the ridge hook is not positioned correctly against the roof or the bearers are not properly supported;*
  - *working on a fragile or weak roof which is not capable of supporting the combined load of the ladder, the user and any tools or materials;*
  - *unsafe condition of the ladder (such as missing rungs, bearers or damage to the ridge hook);*
  - *stepping on or off an unsecured ladder when transferring from or to a leaning ladder or other place;*
  - *standing on parts of the ladder not intended as a step or rung; and*
  - *adverse weather conditions (such as heavy rain, ice, snow or windy conditions);*
- b) *unsafe manual handling when:*
  - *carrying the ladder to the place of work or up to the roof;*
  - *positioning the ladder on the roof, e.g. incorrect handling when the ladder moves over the point of balance or when turning it over to the climbing face;*
  - *opening or extending hinged or extending ladders; and*
  - *carrying items up the ladder;*
- c) *slip, trip and fall of user caused by:*
  - *wearing inappropriate footwear;*
  - *contaminated rungs or steps; and*
  - *unsafe user practices – such as climbing two rungs at time or sliding down stiles;*
- d) *structural failure of ladder resulting from:*
  - *damage, degradation or wear and tear;*
  - *overloading;*
  - *dropping; and*
  - *incorrect use, e.g. use as a bridge;*
- e) *electrical hazards through:*
  - *incorrect selection of type of ladder for electrical work, e.g. using an aluminium ladder for live working;*
  - *positioning ladders too close to live electrical equipment such as overhead power lines; and*
  - *ladders damaging electrical equipment such as covers or protective insulation.*

*Roof ladders should be visually checked at the beginning of the day before use. They also should be thoroughly inspected:*

- *at suitable intervals depending on their frequency of use, condition at the last inspection, conditions of use and conditions of storage; and*
- *following any event which may have jeopardized their safety.*

*List of items to be inspected:*

- *check that the sides of the ladder, rungs/steps, bearers and ridge hook are not damaged, e.g. loose, missing, bent, twisted, dented, cracked, corroded or rotten;*
- *check that the fixings (rivets, screws or bolts) are not damaged, missing, loose, or corroded;*
- *check that connections and locking mechanisms between sections are not damaged, loose or corroded and are functioning properly; and*
- *check that the entire ladder is free from contaminants (e.g. dirt, mud, paint, oil or grease).*

*If any of the above checks cannot be fully satisfied, you should NOT use the ladder.*

*Ladder repairs and maintenance should be carried out by the manufacturer or their approved repairer.*

**7.3** The list of items shall also include any other information identified as necessary by the manufacturer.

**7.4** The user instructions shall contain the following text regarding storage and transportation as a minimum.

*Ladders should be stored and transported safely.*

- *Store ladders in covered, ventilated areas, protected from the weather.*
- *Ladders can fall if stored vertically. Never hang a ladder vertically from a rung. Store ladders on one edge, in racks or hung from a stile with enough supports to prevent sagging.*
- *Don't store or transport ladders underneath materials or other items.*
- *Don't store a ladder where a child might be tempted to climb it.*

**7.5** The list of items regarding storage and transportation shall also include any other items identified as necessary by the manufacturer.

---

## Annex A (informative)

# Information regarding systems intended to provide a means of fall prevention by the connection of personal fall protection equipment

The information in this annex provides a summary of the properties of a roof ladder designed in accordance with this British Standard. This annex is provided for the use of competent persons responsible for the design of systems intended to provide a means of fall prevention by the connection of personal protection equipment to roof ladders designed in accordance with this standard.

The test loads in this British Standard are taken from standards for other portable ladders. These test loads include factors for dynamic and asymmetric loads generated in climbing a ladder. Similarly to other portable ladder standards, the requirements of this standard do not consider the potential loads generated by the attachment of systems intended to provide a means of fall prevention by the connection of personal fall protection equipment.

The magnitude of the loads generated on the ladder, in the event of a fall prevention by a connection to the ladder, is a function of:

- the weight of the person;
- the distance that they fall created by the free length of the restraint in the system; and
- the elasticity in the system connecting the person to the ladder.

The system designer should take these factors into account in relation to the properties of the ladder which result from the requirements of this standard.

Whilst ladders designed in accordance with this standard meet its minimum performance requirements, the amount by which different ladder designs might exceed those requirements is unknown. Therefore, designs for systems intended to provide a means of fall prevention by the connection of personal protection equipment to any roof ladder designed in accordance with this standard should take into account the minimum performance requirements of this standard and not the test results of a specific ladder in conjunction with the system. Ladder manufacturers might change their designs over a period of time, for example the alloys that they use in an aluminium ladder or the design of the section used in rungs or stiles. Whilst still adhering to the minimum requirements of this standard, these types of change, which might not be visible to the eye, could significantly reduce the ladder's ability to withstand the loads applied by an attached fall prevention system.

HSE Research Report RR342 *Revision of body size criteria in standards – Protecting people who work at height* [2] has recommended that the weight of torso dummies and test loads used to replicate persons working at height should be increased to around 122 kg (95<sup>th</sup> percentile). The CEN committee for ladders, TC 93 Ladders, and its working group WG 10 have concluded that a reasonable figure for test loads for ladders should be 150 kg to account for that figure and potential future growth. Accordingly, the requirements of this standard are based upon a maximum total load on the ladder of 1 471 N (150 kg). It is recommended that a similar maximum total load plus appropriate factors for safety are used in the calculation and testing of systems intended to provide a means of fall prevention by the connection of personal protection equipment to roof ladders designed in accordance with this standard.

## Annex B (normative)

### Sequence of testing

The tests specified in [Annex C](#) to [Annex I](#) shall be carried out in the sequence listed in [Table B.1](#).

**Table B.1** — *Sequence of testing*

Number in sequence	Annex	Test	Roof ladder types applicable to
1	C	Cyclic test of locking devices and hinged joints (this is a pre-conditioning test for the other tests in this standard)	Hinge jointed, telescopic
2	D	Test for strength of the ridge hook, its connections to the roof ladder and any locking device(s)	All types
3	E	Test for strength of the roof ladder and its bearers	All types
4	F	Test for strength of the bearers and their connections to the ladder	All types
5	G	Test for longitudinal strength of the bearers	All types
6	H	Test for strength of rungs and steps and dimension g2	All types
7	I	Torsion test for rungs or steps	All types

## Annex C (normative)

### Cyclic test of locking devices and hinged joints

Hinged joints of roof ladders shall be tested in accordance with the cyclic tests for hinge joints specified in BS EN 131-4.

Telescopic joints of telescopic roof ladders shall be tested in accordance with the cyclic tests specified in BS EN 131-6.

*NOTE* These tests are a pre-conditioning test for the other tests in this standard.

## Annex D (normative)

### Test for strength of the ridge hook, its connections to the roof ladder and any locking device(s)

#### D.1 Apparatus

D.1.1 *Roof ladder.*

D.1.2 *Supporting structure, capable of supporting the roof ladder with the stiles vertical and the ladder suspended only by its ridge hook on a surface at 65° to the vertical (see [Figure D.1](#)). The supporting*

structure shall have contact points upon which all of the bearers of the ladder may rest only to maintain the ladder in the vertical position during the test and without providing any vertical support to the ladder when the test load is applied. The surface of the contact points where they have contact with the bearers shall be firm and smooth stainless steel, smooth glass or smooth high pressure laminate.

- D.1.3** *Steel load pad*, measuring 100 mm wide × the distance front to back of the rung or step.
- D.1.4** *Means of applying a 100 N pre-load (f)*, vertically downwards and smoothly, to the steel load pad.
- D.1.5** *Means of applying a 2 447 N test load (f)*, vertically downwards and smoothly, to the steel load pad.
- D.1.6** *Means of measuring any elastic vertically downwards deflection (d1)* of the rungs or steps whilst the test load is applied.

---

## D.2 Procedure

- D.2.1** Roof ladders that are extendable, telescopic, hinged, or sectional shall be extended or assembled to their maximum length.
- D.2.2** Examine the ridge hook and its connections to the ladder to ensure that they are not damaged prior to the test.
- D.2.3** Examine locking devices to ensure they not damaged prior to the test. Locking devices shall be properly locked in accordance with the user instructions.
- D.2.4** Position the roof ladder on the supporting structure suspended only by its ridge hook, with the stiles vertical and with the roof bearers positioned against the contact points of the supporting structure.
- D.2.5** Position the steel load pad at one end of the lowest rung or step of the ladder and as close as possible to the inside faces of the stile.
- D.2.6** Apply the pre-load to the load pad for a period of 1 min. Remove the pre-load and establish a datum for measurement of:
  - a) any vertically downwards movement (d) of the rung or step whilst the test load is applied; and
  - b) any separation or movement relative to each other, of the parts or sections of extending, telescopic, hinged and multi-part (sectional) roof ladders, whilst the test load is applied.
- D.2.7** Apply the test load to the load pad for a period of 1 min. Whilst the test load is applied, measure any vertically downwards deflection (d) of the rungs or steps and check for any separation or movement relative to each other, of the parts or sections of extending, telescopic, hinged and multi-part (sectional) roof ladders.
- D.2.8** Remove the test load and inspect the ladder to confirm that it conforms to the requirements in [D.3](#).

---

## D.3 Requirements

- D.3.1** The ladder shall remain functional with no fracture or visible cracks. The ladder shall sustain the load without ultimate failure and there shall be no permanent deformation of the ridge hook.
- D.3.2** With the test load applied there shall be no vertically downwards movement (d) of the rung or step greater than 25 mm.
- D.3.3** With the test load applied there shall be no separation or movement relative to each other, of the parts or sections of extending, telescopic, hinged and multi-part (sectional) roof ladders.
- D.3.4** At the end of the test there shall be no damage to the connections between the ladder part of the roof ladder and the ridge hook.

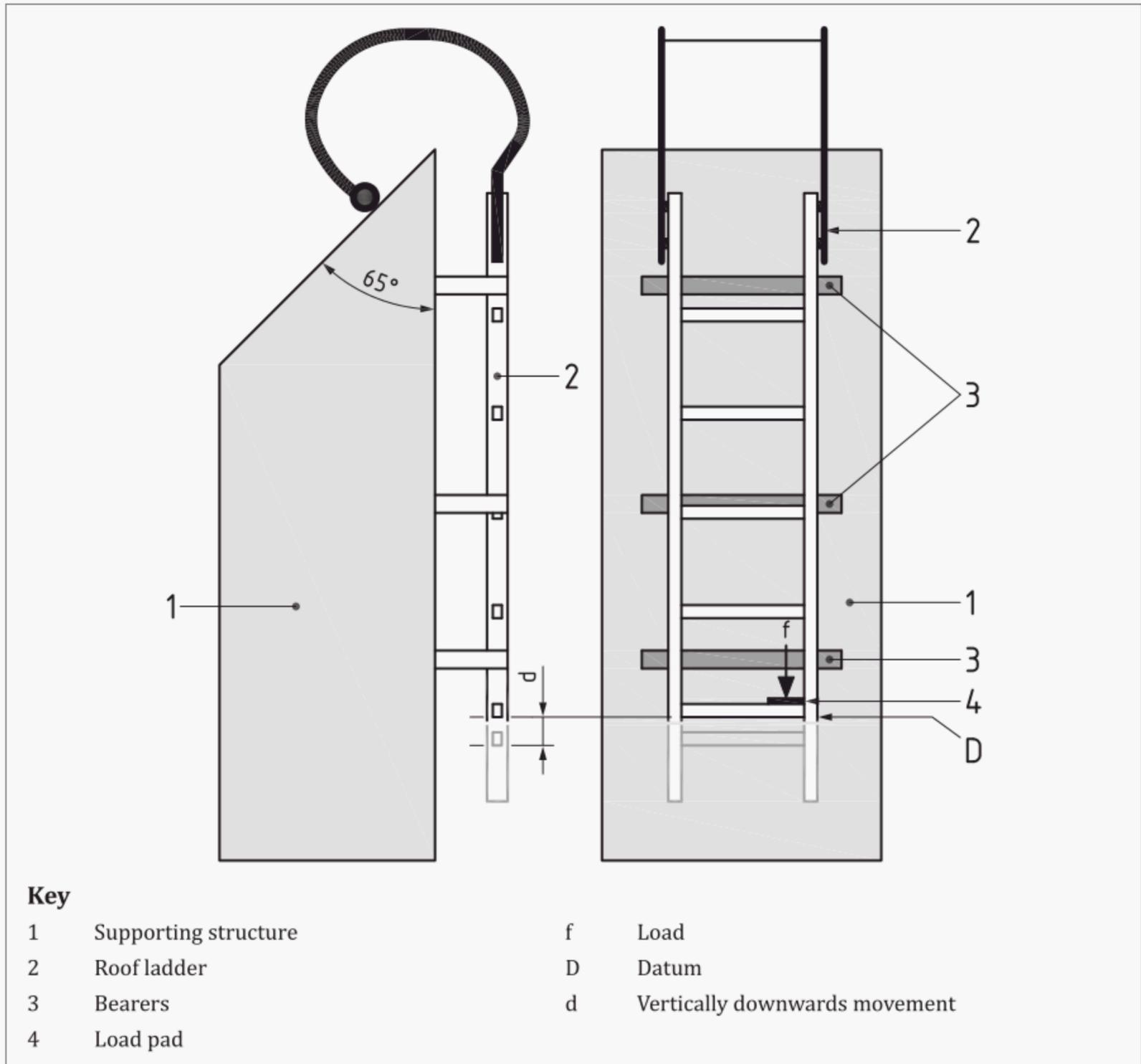
**D.3.5** During and after the test, any locking devices shall remain locked.

**D.3.6** At the end of the test any locking devices and connections between the ladder parts or sections of the roof ladder shall be undamaged and operate and function in accordance with the user instructions.

*NOTE 1* The test considers the contact between the bearers and the surface of the roof in the position of use provides no frictional resistance to movement of the ladder to account for the most unfavourable conditions of use.

*NOTE 2* The test load is derived from the test load for strength given in BS EN 131-2:2010+A2, but adjusted for the fact that the ladder is tested in a vertical position rather than in its position of use.

**Figure D.1** — Test for strength of the ridge hook and its connections to the roof ladder and any locking devices



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## Annex E (normative)

### Test for strength of the roof ladder and its bearers

---

#### E.1 Apparatus

- E.1.1** *Roof ladder.*
- E.1.2** *Flat horizontal supporting surface, or number of surfaces which are vertically aligned and suitably dimensioned to allow the bearers of the ladder to rest in full contact with the supporting surface or surfaces with the ladder in the horizontal position. The supporting surface or surfaces shall be of sufficient strength to support the ladder and the test load (f) and suitably dimensioned such that the ridge hook provides no support to the ladder during the test.*
- E.1.3** *Steel load pad, measuring 100 mm long × the depth of the stile of the ladder.*
- E.1.4** *Means of applying a 100 N pre-load (f), vertically downwards and smoothly, to the steel load pad.*
- E.1.5** *Means of applying a 750 N test load (f), vertically downwards and smoothly, to the steel load pad.*
- E.1.6** *Means of measuring any vertically downwards deflection (d1) of the underside of the stile adjacent to the end of the rung or step subjected to the test load, relative to the datum position.*
- E.1.7** *Means of applying a 1 141 N test load (f), vertically downwards and smoothly, to the steel load pad.*
- E.1.8** *Means of measuring any vertically upwards movement (d2) of the ridge hook whilst the test load of 1 141 N is applied, relative to the datum position.*
- 

#### E.2 Procedure

- E.2.1** Roof ladders that are extendable, telescopic, hinged, or sectional shall be extended or assembled to their maximum length.
- E.2.2** Examine the bearers and their connections to the ladder to ensure that they are not damaged prior to the test.
- E.2.3** Position the roof ladder such that it is horizontal with its bearers in contact with the supporting surface or surfaces and so that the ridge hook provides no support to the roof ladder.
- E.2.4** The test shall be carried out with the test load (f) applied consecutively at the longitudinal midpoint between each pair of adjacent bearers on the ladder, e.g. if there are two bearers the test shall be carried out at the longitudinal midpoint between those adjacent bearers and if there are three bearers it shall be carried out twice, at the two longitudinal midpoints between each pair of adjacent bearers.
- E.2.5** Position the load pad as close as possible to the inside face of the stile at a rung or step closest to the longitudinal midpoint between a pair of adjacent bearers.
- E.2.6** Apply the pre-load to the load pad for a period of 1 min. Remove the pre-load.
- E.2.7** Establish a datum for measurement of any vertically upwards movement (d1) of the ridge hook whilst the test load is applied. Establish a datum for measurement of any vertically downwards movement of the underside of the stile adjacent to the end of the rung subjected to the test load. Establish a datum for measurement of the unobstructed gap (g2) at the rung or step subjected to the test load.
- E.2.8** Apply the 750 N test load vertically downwards and smoothly to the steel load pad for a period of 1 min.

- E.2.9** Measure any vertically downwards deflection ( $d_1$ ) of the stile (see [Figure E.1](#)) from the datum position.
- E.2.10** Increase the test load to 1 141 N for a period of at least 1 min.
- E.2.11** Measure any vertically upwards movement ( $d_2$ ) of the ridge hook from the datum position.
- E.2.12** Examine any locking devices to determine if they remain locked in accordance with the user instructions.
- E.2.13** Remove the test load and inspect the roof ladder and bearers to confirm that they conform to the requirements in [E.3](#).
- E.2.14** Where the ladder has more than one pair of adjacent bearers, carry out this test procedure ([E.2.1](#) to [E.2.13](#)) with the load applied between each pair of adjacent bearers.
- E.2.15** At the end of the test, inspect the ladder to confirm that it conforms to the requirements of [E.3](#).

### E.3 Requirements

**E.3.1** Whilst the 750 N test load is applied, the maximum vertically downwards deflection ( $d_1$ ) of the underside of the stile adjacent to the end of the rung subjected to the test load, measured from the datum position, shall be  $d_1 = 5 \times p_2 \times 10^{-6}$  mm where:

$d_1$  = the maximum vertically downwards deflection of the underside of the stile adjacent to the end of the rung subjected to the test load, measured from the datum position;

$p_2$  = 0.5 of the pitch ( $P$ ) between the two adjacent bearers.

**E.3.2** The ladder and bearers shall sustain the test load without ultimate failure and remain functional with no fracture or visible cracks.

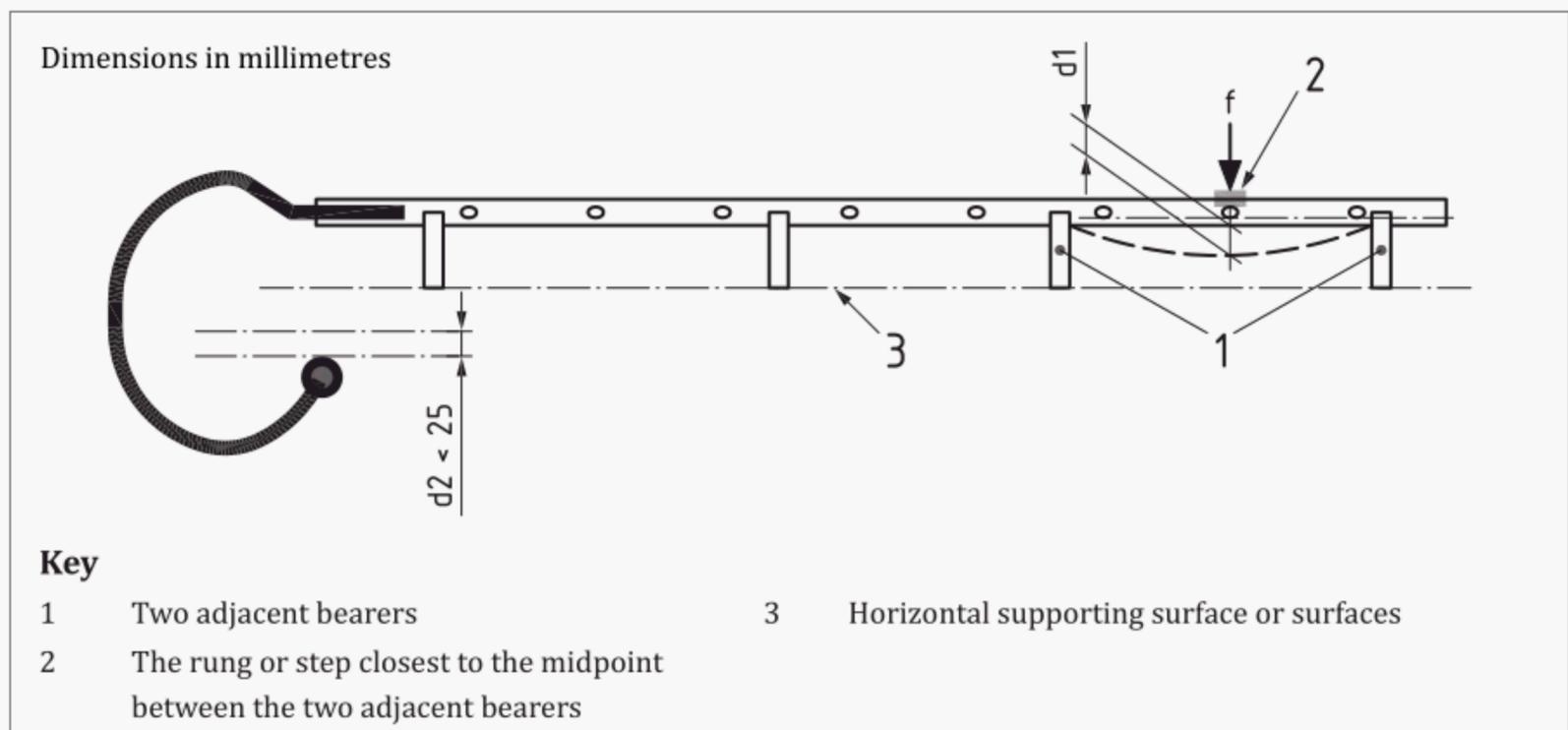
**E.3.3** Whilst the 1 141 N test load is applied, the ridge hook shall not move vertically upwards ( $d_2$ ) by more than 25 mm from the datum position.

**E.3.4** At the end of the test any locking devices shall remain locked.

**E.3.5** At the end of the test any locking devices and connections between the ladder parts or sections of the roof ladder shall be undamaged and operate and function in accordance with the user instructions.

*NOTE* The test load of 1 141 N is derived from the test load for strength given in BS EN 131-2:2010+A2, but adjusted for the fact that the ladder is tested in a horizontal position rather than in its position of use.

**Figure E.1** — Test for strength of the roof ladder and its bearers



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## Annex F (normative)

# Test for strength of the bearers and their connections to the ladder

---

### F.1 Apparatus

- F.1.1** *Roof ladder.*
- F.1.2** *Flat horizontal supporting surface, or number of surfaces which are vertically aligned and suitably dimensioned to allow the bearers of the ladder to rest in full contact with the supporting surface or surfaces with the ladder in the horizontal position. The supporting surface or surfaces shall be of sufficient strength to support the ladder and the test load (f) and suitably dimensioned such that the ridge hook provides no support to the ladder during the test.*
- F.1.3** *Steel load pad, measuring 100 mm long × the depth of the stile of the ladder.*
- F.1.4** *Means of applying a 1 141 N test load (f), vertically downwards and smoothly, to the steel load pad.*
- 

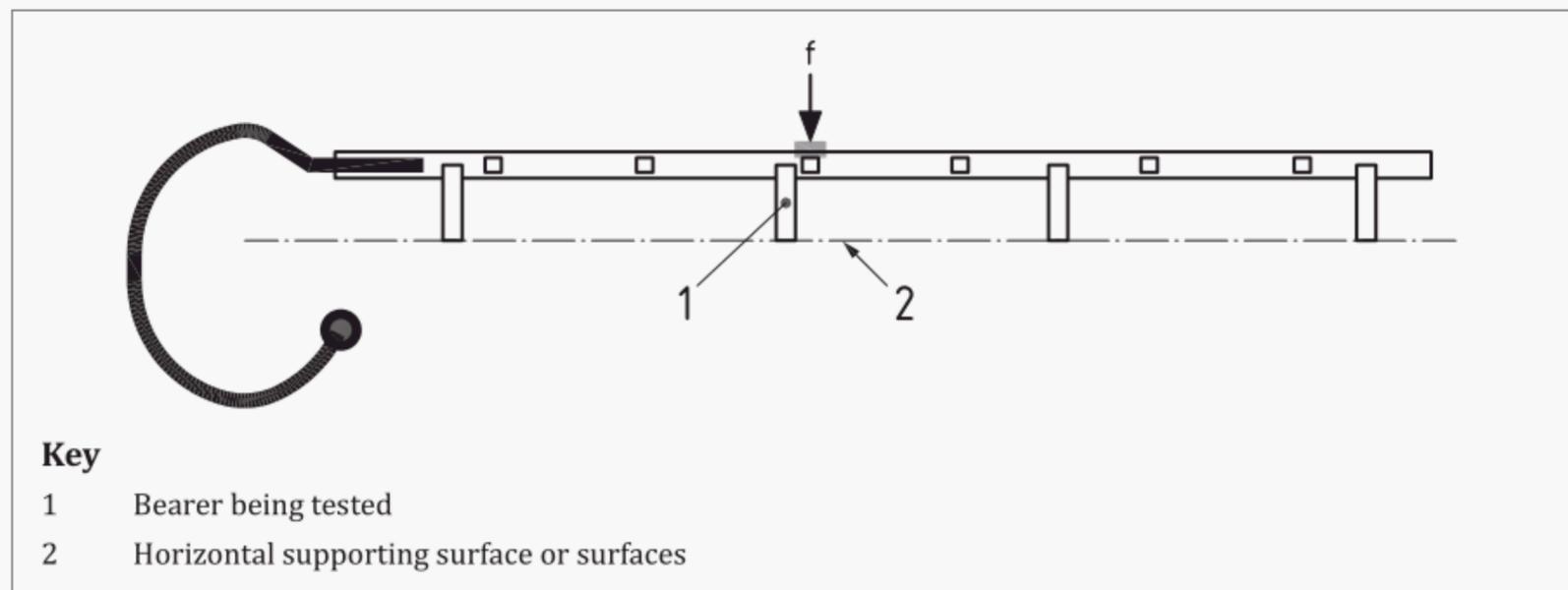
### F.2 Procedure

- F.2.1** Roof ladders that are extendable, telescopic, hinged, or sectional shall be extended or assembled to their maximum length.
- F.2.2** Examine the bearers and their connections to the ladder to ensure that they are not damaged prior to the test.
- F.2.3** Position the roof ladder such that it is horizontal with its bearers in contact with the supporting surface or surfaces and so that the ridge hook provides no support to the roof ladder (see [Figure F.1](#)).
- F.2.4** Where a ladder has more than one design of bearer, the test shall be repeated for each design.
- F.2.5** Position the load pad as close as possible to the inside face of the stile at a rung or step closest to the bearer to be tested (see [Figure F.1](#)).
- F.2.6** Apply the 1 141 N test load (f) vertically downwards and smoothly to the steel load pad for a period of 1 min.
- F.2.7** Remove the test load and examine the roof bearers and their connections to the ladder to confirm that they conform to the requirements of [E.3](#).
- 

### F.3 Requirements

At the end of the test there shall be no permanent deformation or other damage to the bearers and their connections to the ladder shall be undamaged and not loosened.

*NOTE* The test load of 1 141 N is derived from the test load for strength given in BS EN 131-2:2010+A2, but adjusted for the fact that the ladder is tested in a horizontal position rather than in its position of use.

**Figure F.1** — Test for strength of the bearers and their connections to the ladder

## Annex G (normative)

### Test for longitudinal strength of the bearers

#### G.1 Apparatus

**G.1.1** *Roof ladder.*

**G.1.2** *Supporting structure*, capable of supporting the roof ladder as if it were in the position of use except that the stiles of the ladder shall be vertical and the ladder suspended only by a single bearer. The supporting structure shall have contact points upon which the other bearers of the ladder may rest only to maintain the ladder in the vertical position during the test and without providing any vertical support to the bearer under test when the test load is applied. The surface of the contact points where they contact the other bearers shall be firm and smooth stainless steel, smooth glass or smooth high pressure laminate.

**G.1.3** *Steel load pad*, measuring 100 mm wide × the distance front to back of the rung or step.

**G.1.4** *Means of applying a 100 N pre-load ( $f$ )*, vertically downwards and smoothly, to the steel load pad.

**G.1.5** *Means of applying a 2 447 N test load ( $f$ )*, vertically downwards and smoothly, to the steel load pad.

**G.1.6** *Means of measuring any permanent residual vertically downwards deflection* of the ladder after the test load is removed.

#### G.2 Procedure

**G.2.1** Roof ladders that are extendable, telescopic, hinged, or sectional shall be extended or assembled to their maximum length.

**G.2.2** Examine the bearer to be tested and its connections to the ladder to ensure that they are not damaged prior to the test.

**G.2.3** Where a ladder has more than one design of bearer, each design shall be tested.

**G.2.4** Position the roof ladder on the supporting structure such that it is in its position of use except that the stiles of the ladder shall be vertical and suspended only by the bearer to be tested resting on a batten fixed to the supporting structure and with the other roof bearers positioned against the contact points of the supporting structure (see [Figure G.1](#)).

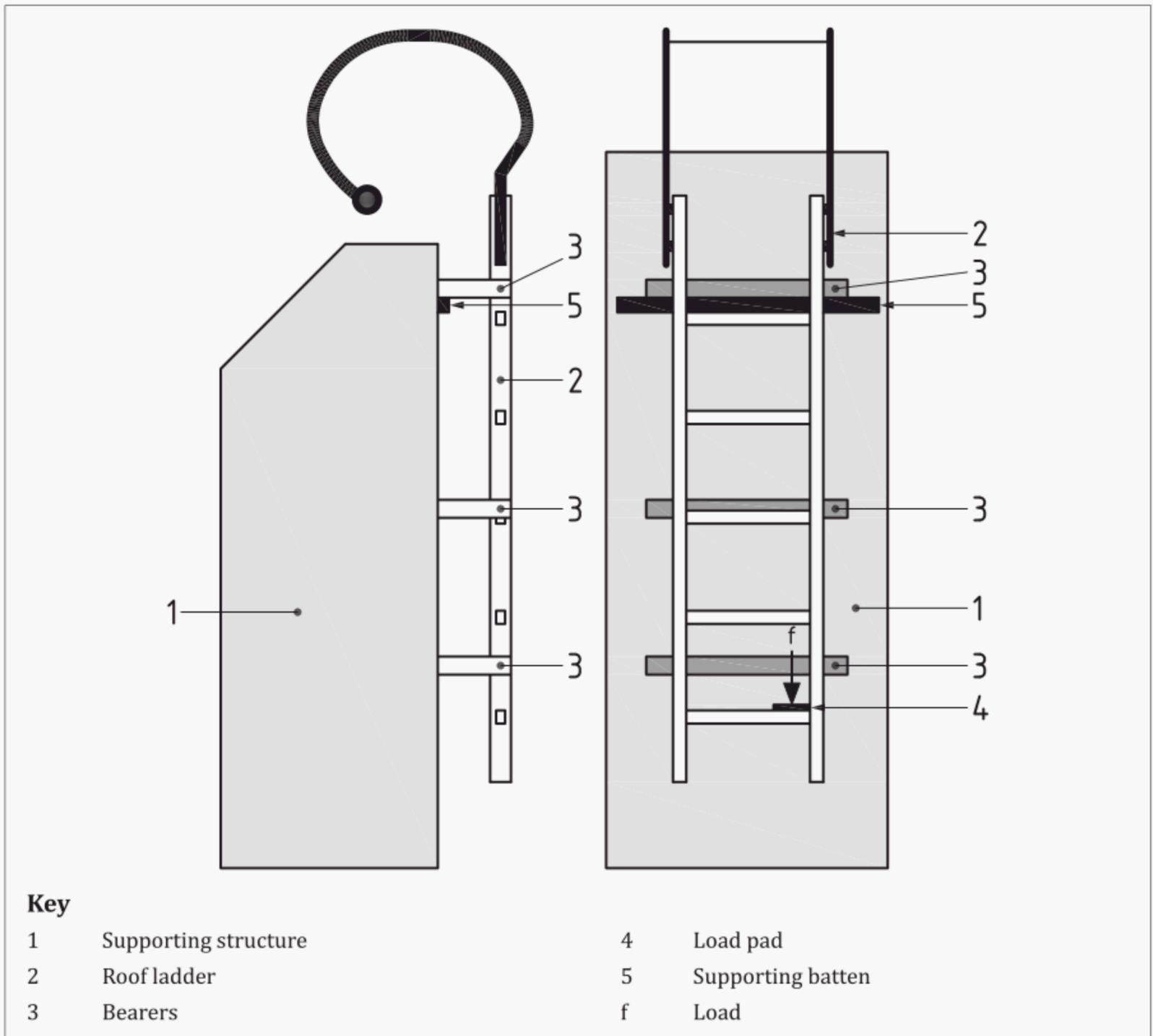
- G.2.5** Position the steel load pad at one end of the lowest rung or step of the ladder and as close as possible to the inside faces of the stile (see [Figure G.1](#)).
- G.2.6** Apply the pre-load to the load pad for a period of 1 min. Remove the pre-load and establish a datum for measurement of any permanent residual vertically downwards ( $d_2$ ) deflection of the rungs or steps after the test load is removed.
- G.2.7** Apply the 2 447 N test load to the load pad for a period of 1 min.
- G.2.8** Remove the test load and inspect the ladder to confirm that it conforms to the requirements of [G.3](#).

### G.3 Requirements

After removal of the test load, there shall be no permanent residual vertically downwards deflection of the ladder and the bearer subjected to the test shall not be permanently deformed or otherwise damaged.

*NOTE* The test load of 2 447 N is derived from the test load for strength given in BS EN 131-2:2010+A2, but adjusted for the fact that the ladder is tested in a vertical position rather than in its position of use.

**Figure G.1** — Test for longitudinal strength of the bearers



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## Annex H (normative)

### Tests for strength of rungs and steps, and dimension $g_2$

---

#### H.1 Apparatus

H.1.1 *Roof ladder.*

H.1.2 *Support for the roof ladder, representing the plane of the roof with the ladder in its position of use and set at angles ( $\alpha$ ) of:*

- a) 35° and 65° for ladders with rungs;
- b) 25° and 34° for ladders with fixed steps; and
- c) 25°, 35° and 65° for ladders with articulating steps.

The support for the ridge hook shall be set at 65° to the stiles of the ladder (see [Figure H.1](#)).

H.1.3 *Removable support* at the base of the ladder to prevent downwards movement of the stiles. The supporting surfaces shall be of sufficient strength to support the ladder and the test load. The supporting surface(s) shall not support the rungs or steps of the ladder during the test.

H.1.4 *Steel load pad*, measuring 100 mm wide  $\times$  the distance front to back of the rung or step.

H.1.5 *Means of applying a 200 N pre-load ( $f$ )*, vertically downwards and smoothly, to the steel load pad.

H.1.6 *Means of applying a 2 700 N test load ( $f$ )*, vertically downwards and smoothly, to the steel load pad.

H.1.7 *Means of measuring any permanent vertically downwards deformation ( $d$ )*, measured underneath the rung or step which has been tested.

H.1.8 *Means of measuring the unobstructed gap ( $g_2$ )*, at the rung or step whilst it is subjected to the 2 700 N test load.

---

#### H.2 Procedure

H.2.1 Examine the rungs or steps and their connections to the ladder to ensure that they are not damaged prior to the test.

H.2.2 Position the ladder on the supporting surface set at its lowest angle in the position of use and with the removable support in position at the base of the ladder.

H.2.3 Position the steel load pad at the centre of the weakest rung or step of the ladder.

H.2.4 Apply the 200 N ( $f$ ) pre-load to the load pad for a period of 1 min. Remove the pre-load and establish a datum for measurement of any permanent vertical downwards deformation of the rung or step once the test load has been removed.

H.2.5 Apply the 2 700 N ( $f$ ) test load to the load pad for a period of 1 min.

H.2.6 Remove the test load and measure any permanent vertically downwards deformation of the rung or step.

H.2.7 Remove the test load, load pad and the removable support at the base of the ladder.

H.2.8 Reposition the load pad on the rung or step closest to the midpoint between two adjacent bearers which are furthest apart on the ladder.

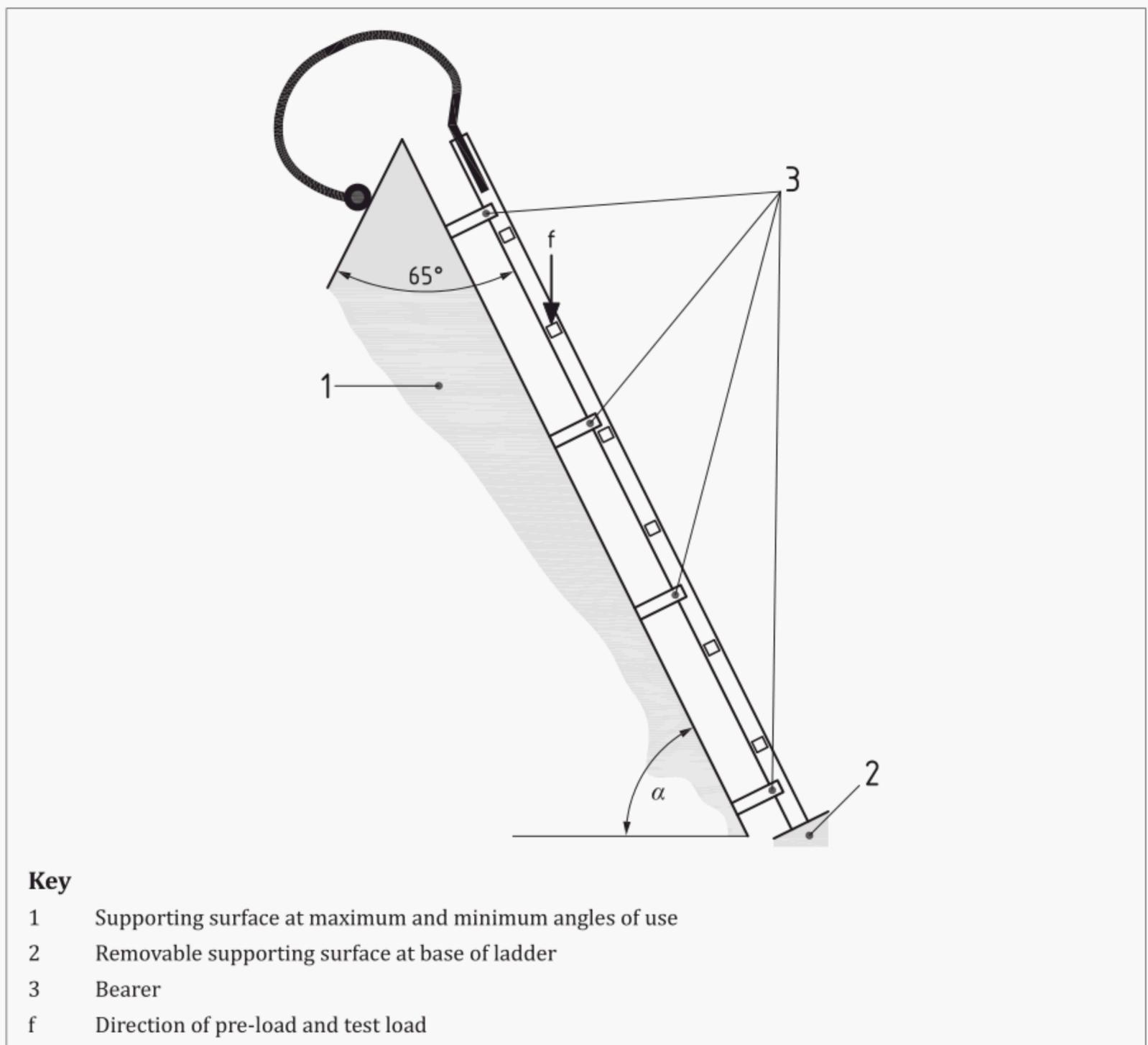
H.2.9 Reapply the 2 700 N ( $f$ ) test load to the load pad for a period of 1 min.

- H.2.10** Measure the unobstructed gap ( $g_2$ ) at the rung or step subjected to the 2 700 N ( $f$ ) test load.
- H.2.11** Repeat the test sequence with the ladder set at its highest angle in the position of use.
- H.2.12** Remove the test load and inspect the ladder to confirm that it conforms to the requirements of [H.3](#).

### H.3 Requirements

- H.3.1** The maximum permanent vertically downwards deformation of the rung or step after removal of the test load shall be less than or equal to 0.5% of the inner width  $b_1$  (see BS EN 131-1) measured underneath the rung or step which has been tested.
- H.3.2** Whilst the 2 700 N test load is applied, the unobstructed gap ( $g_2$ ) between the rung or step subjected to the test load, and the supporting surface representing the plane of the roof, shall conform to the requirements for  $g_2$  given in [Table 1](#).

**Figure H.1** — Test for strength of rungs and steps and dimension  $g_2$



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## Annex I (normative)

### Torsion test for rungs or steps

---

#### I.1 Apparatus

- I.1.1 *Roof ladder.*
  - I.1.2 *Steel clamping device, measuring 100 mm wide capable of fixing onto the rung or step at its centre and applying a rotational torque in both directions thereto.*
  - I.1.3 *Means of applying a 50 Nm rotational torque load to the clamping device, in both directions.*
- 

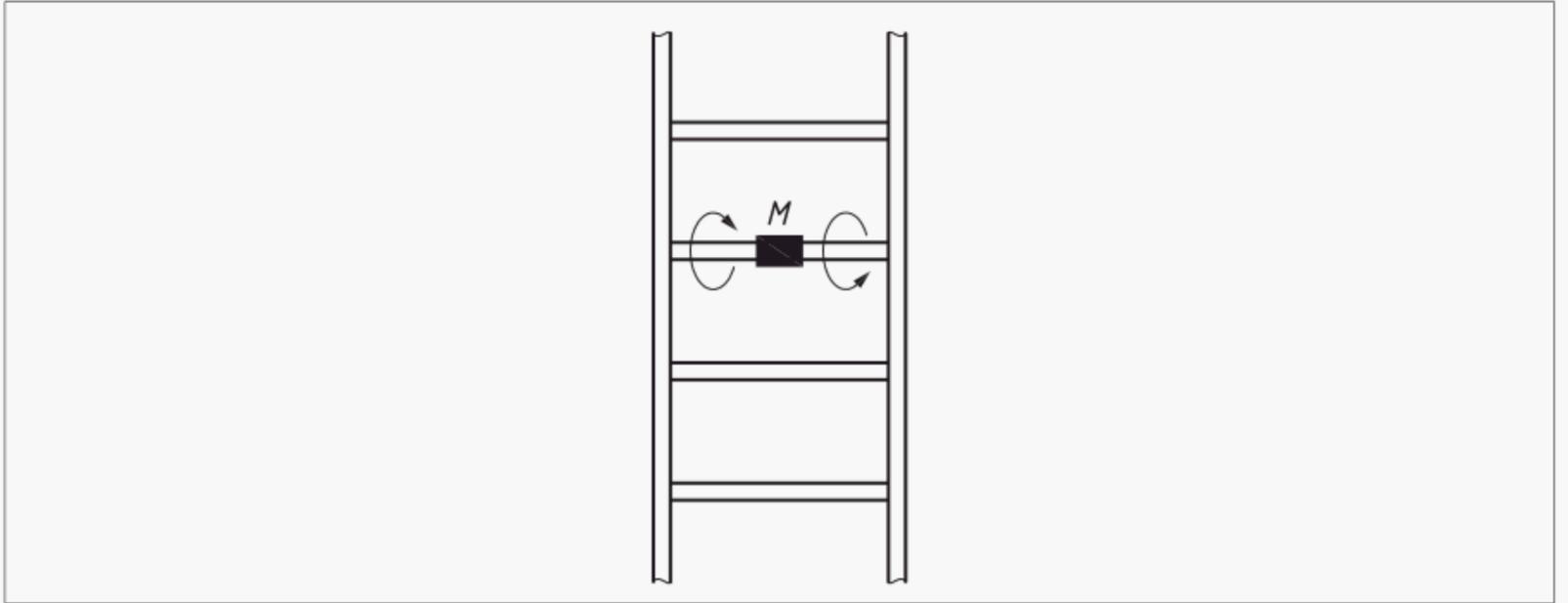
#### I.2 Procedure

- I.2.1 Examine the rungs or steps and their connections to the ladder to ensure that they are not damaged prior to the test.
  - I.2.2 Position the steel load pad at the centre of the weakest rung or step of the ladder.
  - I.2.3 Mark the rung or step and the stiles of the ladders at each end as an origin for measurement of any relative movement in the connection between the stiles and rung or step. Establish an origin for measurement of any permanent rotational deformation of the rung or step at its centre, in either direction.
  - I.2.4 Apply a rotational torque (M) of 50 Nm to the rung or step via the clamping device. The torque shall be applied alternately 10 times in clockwise and 10 times in counter clockwise direction for a period of 10 s each. After each application of the torque examine the marks at the ends of the rung or step to determine if there has been any relative movement in the connection between the stiles and rung or step (see [Figure I.1](#)).
  - I.2.5 At the end of the test inspect the ladder to confirm that it conforms to the requirements of [I.3](#).
- 

#### I.3 Requirements

- I.3.1 With the test load (M) applied, there shall be no relative movement in the connection between the rung or step and the stiles of the ladders
- I.3.2 After the test, determine if there is any permanent rotational deformation of the rung or step at its centre, in either direction, greater than  $1^\circ \pm 0.2^\circ$ .

**Figure I.1** — *Torsion test for rungs or steps*



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