

Mountaineering equipment — Pulleys — Safety requirements and test methods

The European Standard EN 12278:2007 has the status of a
British Standard

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National foreword

This British Standard is the UK implementation of EN 12278:2007. It supersedes BS EN 12278:1998 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee SW/136, Sports, playground and other recreational equipment, to Subcommittee SW/136/5, Mountaineering equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Foreword

This document (EN 12278:2007) has been prepared by the Technical Committee CEN/TC 136 "Sports, playground and other recreational equipment", 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of an identical text or by endorsement, at the latest by November 2007, and conflicting national standards shall be withdrawn at the latest by November 2007.

This document supersedes EN 12278:1998.

It is one of a series of standards for mountaineering equipment, see Annex A.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to support Essential Requirements of EU Directive 89/686/EEC.

For relationship with EU Directives, see informative Annex ZA, which is an integral part of this document.

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

1 Scope

This European Standard specifies safety requirements and test methods for pulleys for use in mountaineering including climbing.

2 Normative references

Not applicable.

3 Terms and definitions

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

3.1
pulley
one or more sheaves mounted in a block or a body, which can be used to link a rope (in accordance with EN 892 and EN 1891) or an accessory cord (in accordance with EN 564) to a connector (in accordance with EN 12275) to safeguard a mountaineer, and which reduces the friction while the rope or accessory cord is moving under load

NOTE Typical examples of use are load reduction systems, tyrolian travers, zip wires and top rope belay.

3.2
sheave
grooved wheel to locate the rope

4 Safety requirements

4.1 Design

4.1.1 Pulleys shall have a means for attachment of a connector which is large enough to accommodate a pin of diameter 12 mm. Testing shall be in accordance with 5.2.1.

4.1.2 The pulley, particularly its sheaves, shall be large enough to accommodate a rope or an accessory cord of such diameter as marked on the pulley. Testing shall be in accordance with 5.2.2.

4.1.3 All edges of the pulley, which come into contact with fingers, shall be free from burrs and the like which could cause irritation or injuries. Testing shall be in accordance with 5.2.3.

4.1.4 If any sheave axle is secured by nuts or screws, the nuts and/or screws shall be locked and secured by means other than friction.

4.2 Strength

4.2.1 When tested in accordance with 5.3.2, the sheave(s) shall be capable to rotate ten times in either direction under a force of 2 kN, applied to each sheave individually.

4.2.2 When tested in accordance with 5.3.2, the pulley shall not show signs of damage or deformation, which could affect its function.

4.2.3 When tested in accordance with 5.3.2, the pulley shall be capable of withstanding a static force of at least 15 kN, applied to each sheave individually, without completely releasing either the rope or the steel U-bar.

5 Test methods

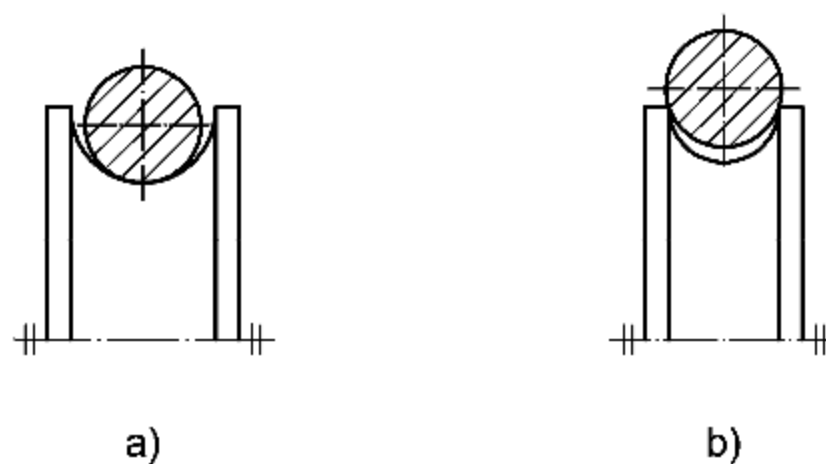
5.1 Sampling

For the tests the number of test samples required is determined by the number of sheaves, their size and the material from which they are made to ensure that each size/material-combination is tested.

5.2 Design

5.2.1 Test the means for attachment in accordance with 4.1.1, with the pin of $(12 \pm 0,1)$ mm diameter.

5.2.2 Test each sheave in accordance with 4.1.2, with the pin of $(1 \pm 0,1)$ diameter greater than the maximum diameter on the pulley. The pin shall touch the bottom of the groove (see Figure 1).



Key

- a) right
- b) wrong

Figure 1 — Testing the groove

5.2.3 Check by visual examination and handling that the requirements in accordance with 4.1.3 are met.

5.2.4 If any sheave axle is secured by nuts or screws in accordance with 4.1.4 check by visual examination that the requirements specified in 4.1.4 are met.

5.3 Determination of strength

5.3.1 Apparatus

The principle of the apparatus transmitting the force F is shown in Figure 3. The force F is to be transmitted

- by means of the U-bar in accordance with Figure 2 in the attachment point of the pulley and
- with a rope with nominal diameter equal to the maximum diameter on the pulley threaded through the sheaves of the pulley according to the instructions for use.

Dimensions in millimetres

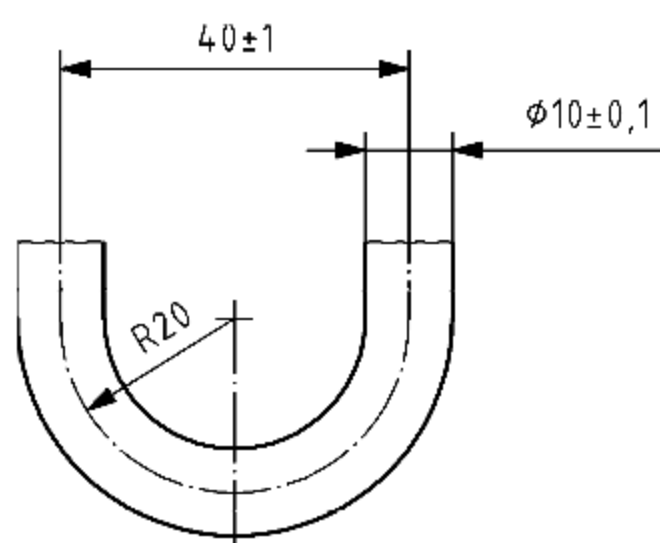
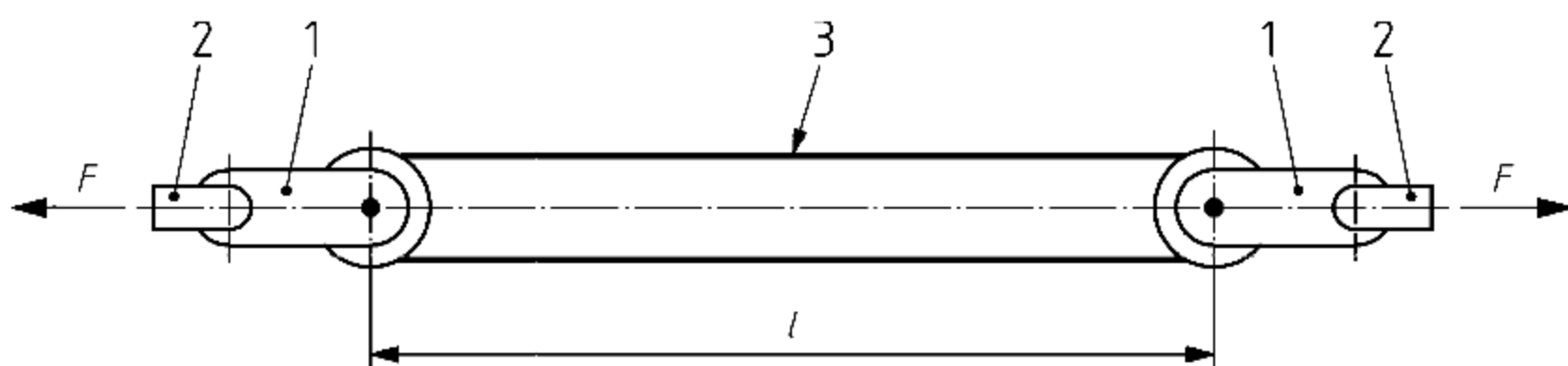


Figure 2 — Steel U-bar



Key

- 1 identical test samples
- 2 steel U-bar
- 3 rope
- l 500 mm < l < 1 000 mm
- F force

Figure 3 — Strength test apparatus

5.3.2 Procedure

- 5.3.2.1 Each sheave shall be tested separately on a different test sample in accordance with 5.1.
- 5.3.2.2 Carry out the strength test at a temperature of $(23 \pm 5) ^\circ\text{C}$.
- 5.3.2.3 Rate of loading shall be (100 ± 50) mm/min.
- 5.3.2.4 Under a force of $(2 \pm 0,05)$ kN pull the rope such that the sheave of the test sample rotates continuously ten times in each direction, or until it ceases to rotate.

5.3.2.5 After the test according to 5.3.2.4, check by visual examination that the requirements according to 4.2.2 are met.

5.3.2.6 After the examination according to 5.3.2.5, increase the force until breakage and check that the requirements according to 4.2.3 are met.

5.3.2.7 Repeat the test sequence in accordance with 5.3.2.2 to 5.3.2.6 for each sheave with a different size or material on different test samples.

6 Marking

Pulleys shall be marked clearly, indelibly and durably with at least the following items:

- a) name of the manufacturer or its representative in the European Community;
- b) maximum diameter of the rope in mm with which the pulley can be used;
- c) pictorial representation showing the maximum loads in kN which can be applied between any sheave and the attachment points, which the manufacturer ensures; the marked strength shall be a whole number of kN;
- d) year of the manufacture.

7 Information supplied by the manufacturer

The pulley shall be supplied with an explanatory leaflet, and written in at least the official language(s) of the state of destination within the European Community containing at least the following items:

- a) name and address of the manufacturer or its authorized representative;
- b) number of this European Standard, i.e. EN 12278;
- c) identification of the model, if more than one model is available;
- d) meaning of any marks on the product;
- e) advice on the use of the product, especially the maximum diameter of the rope with which the pulley can be used, on how to pass the rope through the pulleys;
- f) maximum strength in kN guaranteed by the manufacturer;
- g) advice how to choose other components for use in the system;
- h) advice how to maintain/service the product;
- i) effects of chemical reagents;
- j) lifespan of the product or how to assess it and that after a serious damage the product should be withdrawn from use as soon as possible;
- k) influence of wet and icy conditions;
- l) influence of storage and ageing due to use.

Annex A (informative)

Standards on mountaineering equipment

Table A.1 — List of standards on mountaineering equipment

No	Document	Title
1	EN 892	Mountaineering equipment — Dynamic mountaineering ropes — Safety requirements and test methods
2	EN 12275	Mountaineering equipment — Connectors — Safety requirements and test methods
3	EN 13089	Mountaineering equipment — Ice-tools — Safety requirements and test methods
4	EN 12277	Mountaineering equipment — Harnesses — Safety requirements and test methods
5	EN 12492	Mountaineering equipment — Helmets for mountaineers — Safety requirements and test methods
6	EN 564	Mountaineering equipment — Accessory cord — Safety requirements and test methods
7	EN 565	Mountaineering equipment — Tape — Safety requirements and test methods
8	EN 566	Mountaineering equipment — Slings — Safety requirements and test methods
9	EN 12276	Mountaineering equipment — Frictional anchors — Safety requirements and test methods
10	EN 12270	Mountaineering equipment — Chocks — Safety requirements and test methods
11	EN 567	Mountaineering equipment — Rope clamps — Safety requirements and test methods
12	EN 958	Mountaineering equipment — Energy absorbing systems for use in klettersteig (via ferrata) climbing — Safety requirements and test methods
13	EN 959	Mountaineering equipment — Rock anchors — Safety requirements and test methods
14	EN 568	Mountaineering equipment — Ice anchors — Safety requirements and test methods
15	EN 569	Mountaineering equipment — Pitons — Safety requirements and test methods
16	EN 893	Mountaineering equipment — Crampons — Safety requirements and test methods
17	prEN 15151	Mountaineering equipment — Descenders — Safety requirements and test methods
18	EN 12278	Mountaineering equipment — Pulleys — Safety requirements and test methods

Annex ZA (informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 89/686/EEC

Clause(s)/subclause(s) of this EN	Essential Requirements (ERs) of Directive 89/686/EEC	Qualifying remarks/ Notes
4.1.1, 4.1.2, 4.1.4, 4.2.1, 4.2.2	1.2.1 Absence of risks and other inherent nuisance	
4.1.3	1.2.1.2 Satisfactory surface condition of all PPE parts in contact with the user	
4.2.3	1.3.2 Lightness and design strength	
6	2.12 PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	
6, 7	1.4 Information supplied by the manufacturer	

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

- [1] EN 564, *Mountaineering equipment — Accessory cord — Safety requirements and test methods*
- [2] EN 892, *Mountaineering equipment — Dynamic mountaineering ropes — Safety requirements and test methods*
- [3] EN 1891, *Personal protective equipment for the prevention of falls from a height — Low stretch kern-mantel ropes*
- [4] EN 12275, *Mountaineering equipment — Connectors — Safety requirements and test methods*

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