INTERNATIONAL STANDARD

ISO 21853

First edition
2020-02

Kite boarding — Release system — Safety requirements and test methods

Kite — Système de sécurité — Exigences de sécurité et méthodes d'essai

Reference number
ISO 21853:2020(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

This document was prepared by Technical Committee ISO/TC 83, *Sports and other recreational facilities and equipment*.

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.

Introduction

In the last two decades, the sport of kite boarding/kite surfing has transformed from a marginal sport to a popular sport performed by people of varying age groups and physiological condition levels. However, it cannot be neglected that kite boarding still is considered an "extreme sport" due to risks associated with speed, water and nature and unforeseeable situations related to these. If a situation arising cannot be controlled by the user, the release system will be the component which would most likely prevent emergencies, incidents, further injuries, or death.

This document has been developed in connection with the Global Kitesports Association (GKA) and other stakeholders, such as trainers/instructors, test houses, universities and other manufacturers. The aim of this document is to lower the risks associated with the sport for users and others.

When developing this document, requirements and test methods have been considered that resemble as closely as possible situations occurring and conditions present while performing the sport. One of the aspects was related to salt water. Tests conducted for validating the test methods have shown that using salt water or non-salted water has no effect on the test results. In order to keep the test method as simple as possible, it was seen more practical for the test to use non-salted water. In contrast to salt water, sand has shown to have prominent effect on the function of the components and consequently the test results.

Kite boarding — Release system — Safety requirements and test methods

1 Scope

This document specifies the minimum safety requirement and test methods for a release system that reduces the pulling force of the kite and disconnects the user from the kite.

This document is applicable for release systems which are operated intentionally by the user or another person, and are used for the sport of kite boarding.

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 679, *Cement — Test methods — Determination of strength*

EN 12275, *Mountaineering equipment — Connectors — Safety requirements and test methods*

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 http://www.electropedia.org/

3.1
kite
wing which generates an aerodynamic force and propels the user

EXAMPLE A wing that uses wind.

3.2
kite boarding
sum of the disciplines that can be performed with a *kite* (3.1) attached to the user with any kind of board in any kind of environment

EXAMPLE Kite surfing, landboarding.

3.3
connection point
equipment on the harness or similar means affixed to the user where the *main release system* (3.4) is attached

3.4
connecting link
part which allows the rider to stay connected to the kite via the disconnecting release system after triggering the main release system

EXAMPLE A leash.

3.5
release system
set of elements dedicated to reduce the risk of the user and of third parties, providing the functions of the main release system and/or disconnecting release system

3.5.1
main release system
system that, when triggered via the trigger element, reduces or cancels the pulling force generated by the kite

3.5.2
disconnecting release system
system that, when triggered via the trigger element, disconnects the user from the kite completely

3.6
control system
sum of the components held in the user's hand that enable the kite to turn and the traction force to be altered

EXAMPLE A bar.

3.7
act of triggering
act of movement from first intended movement of any triggering element and releasing element until the system releases

3.8
space of activation
space required for the movement of all the involved triggering elements and releasing elements to function properly

4 Safety requirements

4.1 General

After each use, the release system shall not show signs of permanent deformation or of having been affected by the triggering in any way that could provoke malfunction.

Test in accordance with 5.6.

4.2 Strength

The main release system shall withstand a load of three times the maximum user weight as intended by the manufacturer or 3 600 N, whichever is greater, without any breakage and shall still function as intended by the manufacturer.

The disconnecting release system and the connecting link, if used, shall withstand a load of two times the maximum user weight as intended by the manufacturer or 2 400 N, whichever is greater, without any breakage and shall still function as intended by the manufacturer.

Test in accordance with 5.6.2.

4.3 Design

The design of the release system shall indicate how to trigger it. The direction of triggering shall be permanently identifiable.

Test in accordance with 5.8.

EXAMPLE An example for this is a 3D structure (such as an embossed or elevated arrow) on the surface, or a colour.

The part of the release system which is used for triggering, i.e. the triggering element, shall have a contrasting colour to the other parts of the release system, predominantly (>50 %) in red on its visible surface. The other parts of the release system shall not be in contrasting colours to each other.

The release system should be free from finger entrapments, squeeze and shear points.

Edges that could come into contact with the user's hands during use or handling and maintenance should not be sharp, e.g. deburred, broken, rolled or processed with comparable techniques.

Test in accordance with 5.7.

The space of activation shall not be restricted at any time by any part of the control system and by any part/component of the release system.

NOTE This also relates to soft parts/components of the release system which could, while being gripped and used for triggering, deform and/or tilt and consequently obstruct the actual movement of triggering.

While being triggered, no part/component of the release system should impact the user's hands.

4.4 Handling

4.4.1 General

It shall be possible to trigger the main release system by a first single action.

It shall be possible to trigger the disconnecting release system it by a second single action.

The action for triggering shall be ergonomically and kinematically suitable for the physiological movements of the user.

It should be possible to trigger the main release system/disconnecting release system with garments, e.g. gloves.

4.4.2 Triggering force

The force to perform the act of triggering shall be ≥20 N and ≤170 N.

Test in accordance with 5.6.1 in relation to certain conditions (see 5.6.3.1, 5.6.3.2, 5.6.4, 5.6.5 and, if appropriate, 5.6.6).

The release system shall not show signs of plastic deformation or of having been affected by the tests in any way that could provoke malfunction.

4.4.3 Release force

It shall be possible to trigger the main release system and/or disconnecting release system with one hand only, without any load simulating the pulling force of the kite.

Test in accordance with 5.5.2.

4.4.4 Duration of release

The main release system and/or disconnecting release system shall be triggered in ≤2 s.

Test in accordance with 5.6.1.

4.4.5 Reachability

It shall be possible to trigger the main release system and/or disconnecting release system with either of the user's hands as described in the user's manual. The connection points should not be on the back of the user.

4.5 Behaviour during release

All parts of the main release system and/or disconnecting release system designed to disengage as intended by the manufacturer, by the act of triggering, shall disengage (force generated by kite reduced or cancelled).

The disconnecting release system shall further disconnect the user from the kite.

Test in accordance with 5.6.

4.6 Additional requirements for cold and wet conditions

If the release system is designed to be used in cold and wet conditions, it shall be able to trigger the main release system and/or disconnecting release system in extremely cold and humid conditions, as defined in the test conditions.

NOTE Cold and wet conditions are related to snow kiting or other icy condition in which the user is likely to wear gloves or other garments.

Test in accordance with 5.6.6.

4.7 Information supplied by the manufacturer

4.7.1 User's manual

The manufacturer shall provide information for use in written form at the point of sale with at least the following:

a) reference to this document, i.e. ISO 21853:2020;

b) name and address of the manufacturer;

c) a recommendation to become familiar with the correct use of the release system;

d) warning to check the function of the release system before and after each use;

e) maintenance and cleaning instructions, including detail on wear, tear and replacement;

f) operating instructions outlining the main function(s) of the main release system for which it is designed and tested, each accompanied with illustrations:

   1) position of the connection points on the harness or similar means;

   2) how to attach the main release system and/or disconnecting release system onto the connection points of the harness or similar means to the user;

   3) how to trigger the main release system and/or disconnecting release system;

   4) how to reset the main release system and/or disconnecting release system;

g) warning that safety procedures cannot be learnt during an emergency situation and thus the use of the release system requires training, e.g. by a recognized instructor or in a kite school;

h) maximum user weight, recommended to also have minimum user weight;

i) if the test in accordance with 5.6.6 has not been performed or passed, an indication that the release system is impaired when used in icy conditions, e.g. for snow kiting;

j) information on compatibility with other systems, e.g. intended for hook, for ring, for rope and/or different means as connection point;

k) note on potential risks if the release system is not used as intended by the manufacturer.

If applicable, illustrations of secondary functions of the release system should be included.

4.7.2 Marking on the product

The release system shall be visibly and permanently marked at least with the following information:

a) reference to this document, i.e. ISO 21853:2020;

b) maximum user weight;

c) identification of the direction of the triggering operation;

d) name of the brand

   1) on the main release system, and

   2) on the disconnecting release system.

The user's minimum weight may be marked.

Test in accordance with 5.8.

5 Test methods

5.1 Test apparatus

The following equipment shall be used:

a) a dynamometric measuring device;

b) a time measuring device;

c) a tensile test bench with a metal oval connector class X in accordance with EN 12275 with an inner diameter of (30 ± 5) mm and a thickness of (10 ± 2) mm (see key detail Y in Figure 2) connected to the release system; if the release system is intended to be used with specific connection points, this shall be identified in the user's manual and provided by the manufacturer;

d) a trigger line with a total length of ≥1 m and ≤3 m, a diameter of (1,6 ± 0,3) mm and an elongation of ≤1,5 % at 1 000 N shall be connected between the trigger element and the peak load measuring device;

e) peak load measuring device, sample rate (2 000 ± 100) Hz, temperature coefficient of 0,03 % full scale per degree Celsius, overload capacity of 150 % full scale and accuracy of ≥0,2 % within the range of ≥0 N and ≤200 N;

f) a round tub with an inner diameter of (450 ± 50) mm (see Figure 2);

g) a device to measure the surface temperature, e.g. optical measurement or thermocouple.

The following additional equipment may be used:

h) a digital video equipment in order to time the operations, visualize the load losses and identify any complication in the activation of the systems;

i) a digital photo equipment in order to be able to save pictures of potential flaws in the safety systems.

If not specified otherwise, the following tolerances apply:

j) Force for the load application, in newton: $^{+5\,\%}_{-0}$

k) dimensions, in millimetre: ±1;

l) angle, in degree: ±1;

m) temperature, in degree Celsius: ±2;

n) time, in second: ±5 %.

5.2 Test environment

5.2.1 Dry and clean conditions

The ambient temperature shall be ≤23 °C.

5.2.2 Sand

The sand shall be in accordance with ISO 679.

5.3 Test conditions

5.3.1 Dry and clean conditions

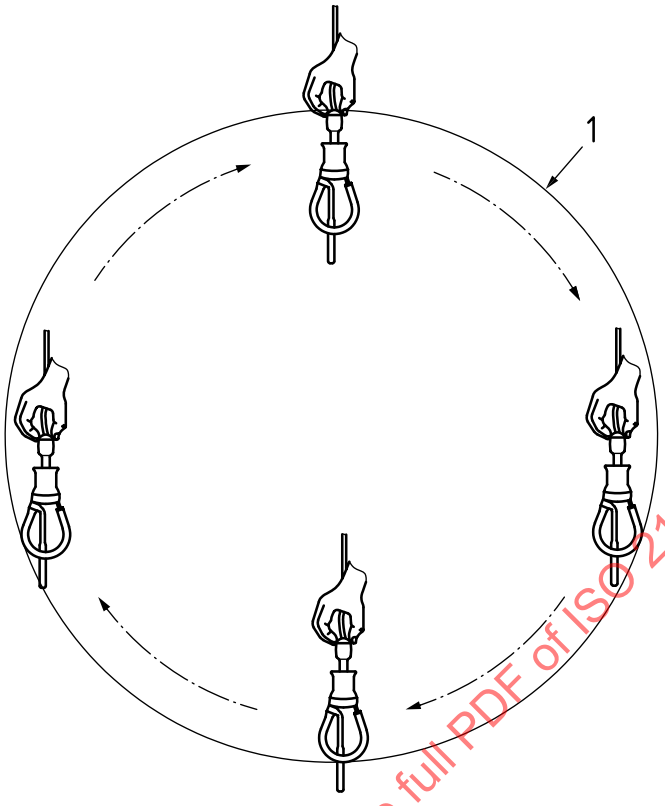
No conditioning shall be done.

5.3.2 Dry sand

The release system shall be cleaned without water to remove possible sand from a previous test sequence or test cycle and to keep it dry.

The main release system and/or disconnecting release system shall be moved clockwise in five full circles horizontally in accordance with Figure 1 in sand in accordance with 5.2.2 within (8 ± 2) s while touching the inner bottom surface and inner side wall of the tub in accordance with 5.1 f). The safety system shall be fully immerged in sand throughout that time.

NOTE The release system is usually moved around manually without touching the trigger element.



Key

1 inner side wall of the round tub

Figure 1 — Movement of release system in sand for conditioning

The release system shall not be triggered.

After each conditioning, the sand shall be redistributed evenly in the tub.

This conditioning shall be done before each test in 5.6.4.

5.3.3 Water with sand

The release system shall be rinsed in non-salted water in order to remove possible sand from a previous test sequence or test cycle.

The conditioning shall be done in accordance with 5.3.2 but with non-salted water. The water-to-sand-ratio shall be 1:1 by volume. This mixture shall cover the release system entirely throughout the conditioning.

This conditioning shall be done before each test in 5.6.5.

5.3.4 Cold and wet conditions

The assembled ("ready for use") main release system and/or disconnecting release system is fully spray covered by 20 ml of distilled water with a temperature of ≤10 °C. Without being dried and shaken, the main release system and/or disconnecting release system is exposed for 2 h to a temperature of (−18 ± 1) °C. For this, the main release system and/or disconnecting release system is suspended vertically in a use-like manner.

This conditioning shall be done before each test in 5.6.6.

5.4 Sampling

One sample of a release system ready for test for each test condition (see 5.3) shall be provided by the manufacturer.

NOTE 1 The complexity of the product might need a certain set-up for the connection point(s) of the sample which differs from the actual product for proper testing representative of the intended use.

NOTE 2 The manufacturer might provide additional instructions on how to apply the test load to be representative of the intended use.

NOTE 3 Annex A provides further information.

After the test, the manufacturer shall store and archive the samples for ≥5 years.

5.5 Preparation

5.5.1 General function

Prior to the test, the main release system and/or disconnecting release system should be triggered by hand in accordance with the manufacturer's instructions at least once in order to check it is functioning as intended by the manufacturer.

5.5.2 Releasing without generated load

The main release system and/or disconnecting release system shall be triggered by hand in accordance with the manufacturer's instructions. For this, the main release system and/or disconnecting release system shall be engaged to the connection point as intended by the manufacturer. It shall be held with one hand and triggered with the same hand while no load simulating the pulling force of the kite is applied. After being triggered, the main release system and/or disconnecting release system shall successfully deploy.

5.5.3 Pre-stress

For pre-stressing, the main release system, disconnecting release system and connecting link, if used, shall be loaded 10 times with a load of two times the maximum user weight as intended by the manufacturer or (2 400 ± 1) N, whichever is greater, lowered to ≤20 N after ≤2 s for each cycle.

5.6 Procedure

5.6.1 General

The test shall be conducted in the sequence given from 5.6.2 to 5.6.6.

Unless specified otherwise, each test sequence shall be conducted as follows, in accordance with Figure 2 and Figure 3.

a) The release system in accordance with 5.4 a) is connected to a fixed point in accordance with 5.1 c), remaining closed after the (re-)conditioning.

b) A load is applied to the other end of the system.

c) A trigger line in accordance with 5.1 d) is attached to the trigger element as close as practical to its operating axis, but ≤5°, without influencing the conditioning, in a way that it cannot move/slip. The force to trigger main release system shall be evenly distributed in the direction of release.

d) A peak load measuring device in accordance with 5.1 e) is connected to the trigger line in c).

e) The peak load measuring device is moved with a speed of ≥1 mm/s to ≤10 mm/s until a pre-tension to the trigger line of a load (10 ± 1) N is achieved and sustained for (0,5 ± 0,1) s.

f) The release system is triggered while it is under the load in b) and e) via the peak load measuring device. For this, the peak load measuring device is accelerated in a linear motion along the axis of the triggering line with (4 200 ± 420) mm/s^2 for 0,2 s ± 1 %. After that, the peak load measuring devise shall be decelerated to a stop in a linear motion along the axis of the triggering line with (4 200 ± 420) mm/s^2 for 0,2 s ± 1 %.

g) After the release, a visual verification of the equipment is performed.

h) After the release, the release system is reconditioned appropriately (see 5.3.1, 5.3.2, 5.3.3 and 5.3.4).

i) The cycle given in a) to g) is conducted three times. If the release system fails, the testing shall be repeated for another three times at the load given with the same release system.

j) The test given in a) to h) is repeated for a load

   1) equal to two times the maximum user weight as intended by the manufacturer or (2 400 ± 1) N, whichever is greater,

   2) equal to the maximum user weight as intended by the manufacturer or (1 200 ± 1) N, whichever is greater, and

   3) of (150 ± 10) N.

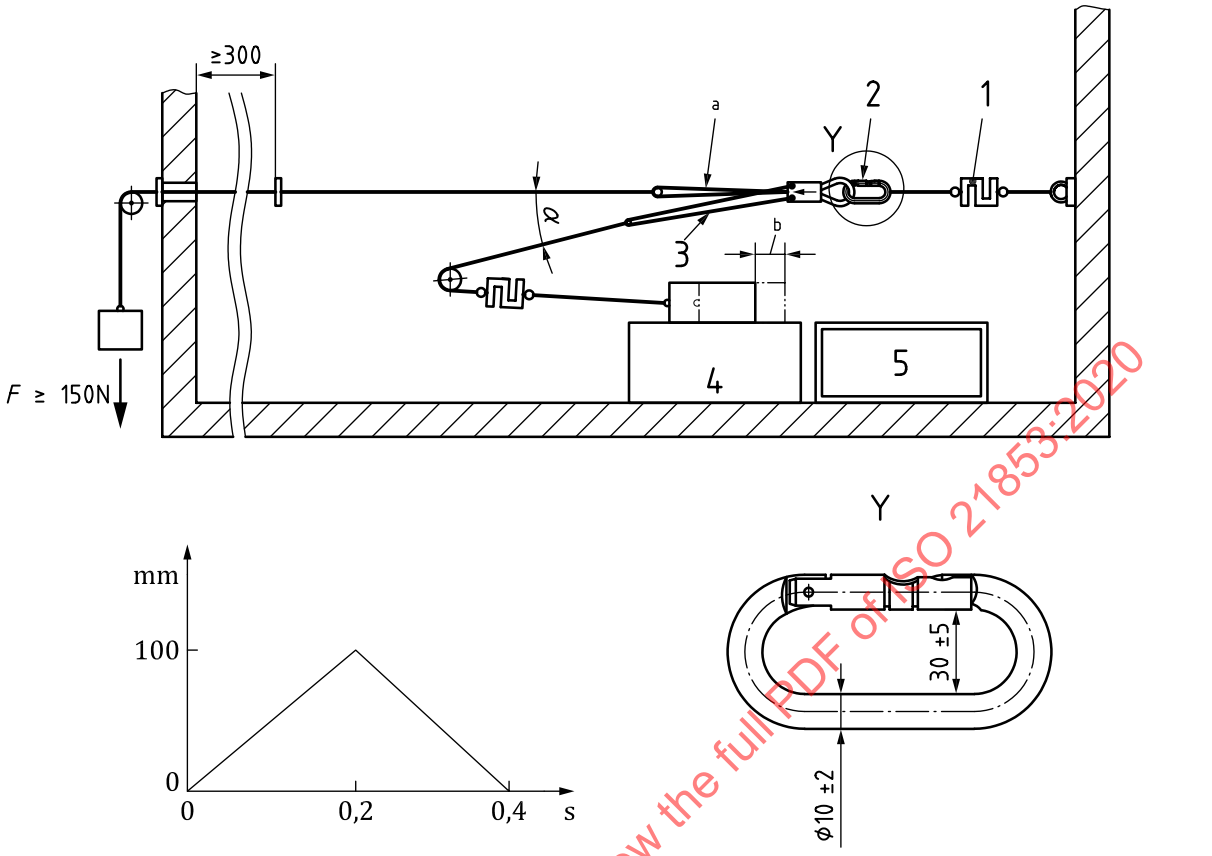
k) The test is considered to be passed if

   1) all nine consecutive measurements have been passed, or

   2) the release system has in total failed only once for each condition (i.e. clean, dry sand, wet sand and, if applicable, wet and cold conditions).

l) The test given in 5.6.1 a) to k) is repeated for the disconnecting release system including the connecting link, if used, with lowering the load in 5.6.1 j) 1) to be equal to 1,5 times the maximum user weight as intended by the manufacturer or (1 800 ± 1) N, whichever is greater.

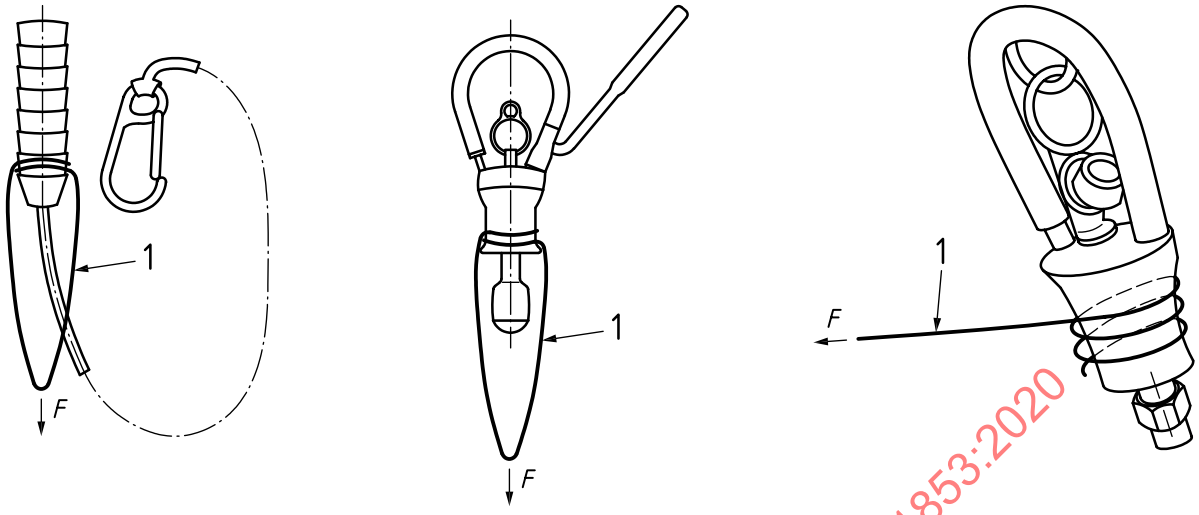
Dimensions in millimetres



Key

1 dynamometric measuring devices
2 metal oval connector class X in accordance with EN 12275
3 trigger line
4 peak load measuring device
5 round tub
α angle resulting from the test set-up (≤5°)
a Not influencing trigger line.
b Linear movement of peak load measuring device.

Figure 2 — Usual test set-up for triggering the release system



a) Example 1 b) Example 2 c) Example 3

Key

1 trigger line with a loop length of ≤300 mm [not applicable for c)]

F triggering force generated by the dropping mass *m*

Figure 3 — Examples for attaching the trigger line to different types of release systems

5.6.2 Strength test

The conditioning shall be done in accordance with 5.3.1.

After the test in accordance with 5.5, the main release system, disconnecting release system and connecting link, if used, shall be loaded once with the loads in accordance with 4.2 for (5 ± 1) s.

5.6.3 Dry and clean conditions

5.6.3.1 Release at maximum load

After the tests in accordance with 5.5 and 5.6.2 as well as after the conditioning in accordance with 5.3.1, the test in accordance with 5.6.1 shall be conducted.

5.6.3.2 Unintentional release

After the test in accordance with 5.6.3.1, the following test shall be conducted additionally.

a) The release system in accordance with 5.4 is connected to a fixed point in accordance with 5.1 c), remaining closed after the (re-)conditioning.

b) A load is applied to the other end of the system.

c) A trigger line in accordance with 5.1 d) is attached to the trigger element as close as practical to its operating axis, but ≤5°, without influencing the conditioning, in a way that it cannot move/slip. The force to trigger the main release system shall be evenly distributed in the direction of release.

d) A static load of a total of $(2^{\ 0}_{-0,1})$ kg is applied where the main release system is not allowed to trigger.

e) The test given in 5.6.3.2 a) to d) is conducted once each for a load

1) equal to 2 times the maximum user weight as intended by the manufacturer, and

2) of (150 ± 10) N.

5.6.4 Dry sand

After the test in accordance with 5.5 and after the conditioning in accordance with 5.3.2, the test in accordance with 5.6.1 shall be conducted.

5.6.5 Water with sand

After the test in accordance with 5.5 and after the conditioning in accordance with 5.3.3, the test in accordance with 5.6.1 shall be conducted.

5.6.6 Cold and wet conditions

If applicable, this test shall be conducted after the test in accordance with 5.5. The shall be in accordance with 5.6.1 but only once for each load. The release system shall trigger each time.

The conditioning shall be in accordance with 5.3.4. The surface temperature of the main release system and/or disconnecting release system shall be ≥−5 °C and ≤0 °C.

The assembled ("ready for use") main release system and/or disconnecting release system is connected to a fixed point in accordance with 5.1 c) without being triggered.

5.7 Sharp edges

All exposed edges that could come into contact with the user's hands shall be checked visually and by tactile means.

5.8 Durability of marking

Rub the marking by hand for 15 s with a piece of cloth soaked in water and again for 15 s with a piece of cloth soaked in isopropyl-alcohol.

6 Test report

The test report shall include at least:

a) a reference to this document, i.e. ISO 21853:2020;

b) the test results;

c) the brand, name, model designation and serial number of the tested model;

d) the name and address of the test house;

e) a statement on whether the release system passed or failed the test.

Annex A
(informative)

Test overview

Table A.1 provides an overview of the relation between the test methods and requirements for each test condition and set-up. This is only given for the convenience of the reader and meant for information. The normative Clause 4 and Clause 5 take precedence over the informative Table A.1.

Table A.1 — Information about recommended order

Recommended order	Test method	Requirements	Further detail
1	a) Checking general information b) 5.8 "Durability of marking"	a) 4.3 "Design" b) 4.7.1 "User's manual" c) 4.7.2 "Marking on the product"	—
2	a) Checking general function b) 5.5.1 "General function" c) 5.5.2 "Releasing without generated load"	a) 4.4.1 "General" b) 4.4.3 "Release force" c) 4.4.5 "Reachability"	—
3	a) 5.7 "Sharp edges"	a) 4.3 "Design"	—
4	a) 5.5.3 "Pre-stress"	—	loaded 10 times with two times the maximum user weight or (400 ± 1) N, whichever is greater
5	a) 5.6.2 "Strength test"	a) 4.2 "Strength"	loaded once with three times the maximum user weight or (3 600 ± 1) N, whichever is greater for the main release system and two times the maximum user weight or (2 400 ± 1) N, whichever is greater for the disconnecting release system and connecting link, if used
6	a) 5.6.3 "Dry and clean condition" b) 5.6.1 "General"	a) 4.1 "General" b) 4.4.2 "Triggering force" c) 4.4.4 "Duration of release" d) 4.5 "Behaviour during release"	test environment in 5.2.1 "Dry and clean conditions", conditioning in 5.3.1 "Dry and clean conditions", preparation in 5.5 "Preparation"