



**Mountaineering and
Climbing Equipment**

**CRASH PADS
Determination of the critical
fall height**

**UIAA
161**

Foreword

This UIAA Standard is only published in the English language version, which is the master text. For any validations in translation, the UIAA Safety Commission should be contacted via the UIAA Office in Bern, Switzerland.

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The UIAA invites manufacturers of mountaineering and climbing equipment worldwide to become members of the UIAA Safety Commission as Safety Label Holders. Members can participate in discussions on standard requirements, test methods and revisions thereof (see the "General Regulations for the UIAA Safety Label").

A complete list of UIAA Standards for mountaineering and climbing equipment can be found on the UIAA website.

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www.theuiaa.org

UIAA, Monbijoustrasse 61, Postfach, CH - 3000 Bern 23, Switzerland
t: +41 31 370 18 28 e: office@theuiaa.org

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This document was first published in English. The English master text is decisive in any conflict of interpretation. For any validations in translation, the UIAA should be contacted via the UIAA office in Bern, Switzerland.

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The version number refers to the latest revision, e.g. UIAA 161-1 is the first published version and UIAA 161-4 would be the fourth change to the document. The date is the publication of this latest version.

1. Scope

This standard specifies safety requirements and test methods for crash pads for use in bouldering climbing.

2. Definitions

For the purpose of this standard, the following definitions apply:

2.1. Crash Pad: a pad intended to be placed below a climber during bouldering to attenuate the effect of the impact when falling.

2.2 Impact attenuation: a property of a surface that dissipates the kinetic energy of an impact by localized deformation such that the acceleration is reduced

2.3. Critical fall height: maximum free height of fall from the top of the crash pad to the lowest part of the climber for which a surface will provide an acceptable level of impact attenuation, determined as described in 4.1.

2.4. Head injury criterion (HIC) value: criterion for head injury caused from falls as calculated in accordance with 4.6.

3. Safety Requirements

3.1. Design

3.1.1. Dimensions: no minimum or maximum dimensions are required, a crash pad shall be easily transportable by a single person.

3.2. Critical fall height

When tested in accordance with 4. the critical fall height shall be determined as the lowest drop height producing a HIC value of 400.

4. Test Methods

4.1 Principle:

Test specimens are struck by an instrumental headform in a defined series of impacts from different drop heights. The signal emitted by an accelerometer in the headform during each impact is processed to yield a severity from the measured impact energy, defined as head injury criterion (HIC) . The HIC of each impact is plotted and the critical fall height is determined as the lowest drop height producing a HIC value of 400.

4.2 Apparatus: See *EN 1177:2008, 4.2. Apparatus*

4.3 Accuracy of tests: See *EN 1177:2008, 4.3. Accuracy of tests*

4.4 Conditions for testing: See *EN 1177:2008, 4.4. conditions for testing*

4.5 Procedure: Follow the procedure in *EN 1177:2008, 4.5. Procedure*, where 4.5.3 is replaced by the following:

The tests shall be done on 3 samples.

Conduct the drop test (minimum 4 drops heights) for each test position, each drop should be completed within 15 minutes, in the following positions:

- a) In the center (± 10 cm) of the pad or the center of each part of the pad.
- b) In the center (± 10 cm) of a joint between two pad parts.
- c) At any inhomogeneity or discontinuity (± 10 cm) to obtain the lowest value for the critical falling height anywhere on the pad, but never at fewer than 250 mm from any edge.

Record HIC value.

4.6 Calculation of results: See *EN 1177:2008, 4.6. Calculation of result*, where 4.6.3 is replaced by the following:

For each position (center, joint and place(s) of inhomogeneity if relevant) calculate the average of the 3 values found on each sample, and as result for the critical falling height consider the lowest value. Round the result to the nearest multiple of 5 cm (for example: 2,33 m would round to 2,35 m).

4.7 Test report: See *EN 1177:2008, 4.7. Test report*

5. Information to Be Supplied

- a) The name or trademark of the manufacturer, importer, or supplier
- b) The critical fall height as determined in 4.1.
- c) How to use the product
- f) How to choose other components for use with the product, if relevant
- g) How to maintain and service the product
- h) The lifespan of the product
- i) The effects of chemical reagents and temperature on the product.

This information shall be given at least in the five official UIAA languages (English, French, German, Italian, Spanish) or alternatively in the language of the country in which the product is sold.

6. Marking

Crash pads shall be marked with at least the following information:

- a) name or trademark of the manufacturer, importer or supplier
- b) the critical fall height as determined in 4.1.

7. Demonstrating that the Requirements are met

7.1. The safety requirements shall be satisfied by either

- (a) a test report from a UIAA-approved test laboratory, or
- (b) a test report from a test laboratory acceptable to an EU Notified Body.

7.2. Every test shall be carried out on three items of production, and every item of production shall pass the test(s).

8. Attachment of the UIAA Label

8.1. For any model of mountaineering equipment, which has been awarded the UIAA Label, the UIAA recommends that the UIAA Trademark (see below) or the four letters "UIAA" be marked clearly and indelibly on each item sold.



8.2. In addition, the UIAA Trademark or the four letters "UIAA" may be included in the instructions for use and/or on a swing ticket as well as in catalogues and other publications of the manufacturer. In the last case, the illustration and/or the text must clearly apply only to equipment which has been awarded the UIAA Label.

Annex A

See Annex A of EN 1177 :2008

Annex B

See Annex B of EN 1177 :2008

UIAA 161 Crash Pads revision history		
Version	Date	Comments
UIAA 161-1	June 2015	Accepted, Chamonix, June 2015; proof edits to be made
UIAA 161-2	November 2015	Accepted, corresponding vote, Oct 2015; proof edits and inclusion of details for joint and edge testing in section 4.5.
UIAA 161-3	December 2015	Further clarifications added without vote: clarifications better define the method, but do not change it.