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To: SNS CAI Working Group and all of our customers.

Subject: Response to SNS CAI web publication, posted April 20, 2013, regarding the new Petzl CROLL

1- Facts:

- The **SNS CAI Working Group** questioned the safety of the new Petzl CROLL. The question raised indirectly by their work is this: while the removal of the cam stop and reduction in frame thickness have contributed to the lighter weight and smaller size of the new CROLL, have these improvements been made at the expense of user safety?
- To clarify this question, a three-page report dedicated entirely to the Petzl CROLL chest ascender was published on the SNS CAI website on April 20, 2013. In the report, the SNS CAI working group concluded: *"the 2013 Petzl CROLL is an ascender that should be used with extreme caution, with frequent inspections of its condition, and should be replaced if subjected to a load of greater than 4 kN (400 kgf)"*.
- The results of this work and its conclusions were published on the web, without the SNS CAI first trying to present them to Petzl. We can only be disappointed by this process, since such information, communicated without a balanced view and clearly raising doubt about the safety of the product, is harmful to the company, and to the trust that users place in their equipment. Following a phone conversation with the SNS CAI coordinator, Francesco SALVATORI, we understand that the implied questions are:
 - Why did Petzl make these technical choices?
 - Why did Petzl remove the cam stop?
 - Why would Petzl have put an item of PPE (personal protective equipment) on the market that the SNS CAI judged a posteriori, "should be used with extreme caution"?
 - Why would APAVE, an independent lab overseen by the Ministry of Industry, have given its approval for this apparently risky product to be put on the market?



In alcuni casi la gola non si è aperta completamente, il cricchietto sia pur di poco non si è ribaltato, la calza si è rotta, ma immediatamente dopo il cricchietto a strozzato a tal punto i trefoli da romperli tutti in pochissimo tempo. Non si è innescato alcun fenomeno di dissipazione di energia con scorrimento della calza sull'anima delle corde.



I risultati peggiori si sono avuti con le corde Courant Ultima (calza incollata ai trefoli) e, soprattutto, con le corde usate (stato più comune nella progressione in grotta).

Nei test a caduta ($v_u = 4,429 \text{ s}^{-1}$) la gola non si è aperta e il cricchietto non si è ribaltato, ma dopo la rottura della calza tutti i trefoli sono stati tranciati a rapida successione. In questi casi il bloccante è risultato inutilizzabile in quanto la gola si è aperta di alcuni millimetri e la corda poteva fuoriuscire con una minima trazione trasversale.

La deformazione della gola avviene anche con piccole sollecitazioni (300 kgp - 400 kgp) a seguito delle quali si misura una apertura aggirativa di qualche decimo di millimetro. Sommandosi ad altre simili sollecitazioni l'apertura della gola continua ad aumentare.

I risultati sopra elencati sono stati ottenuti sulle seguenti corde:

1. Beal Antipodes 10 mm Nuova (statica),
2. Beal Antipodes 10 mm Usata (statica),
3. Edelrid SS 10 mm Usata (statica),
4. Courant Ultima 10 mm Nuova (statica) con trefoli incollati internamente alla calza,
5. Courant Ultima 11 mm Nuova (statica) con trefoli incollati internamente alla calza.

In order to help shed light on the debate, Petzl would like to contribute the following:

2- Tests carried out on the new Petzl CROLL:



Before elaborating on the completed tests, it is important to bear the following in mind:

- During normal use for which the product is designed (see the instructions for use), typically a rope ascent in combination with a BASIC ascender, the maximum loads that could be registered during an ascent that is rough/jerky and close to the anchor have a maximum value of 2.5 kN.
- The CROLL is Category 3 PPE. In this context, it meets the strict requirements of the EN 567 and EN 12841 standards.
- Beyond these standards tests, Petzl has its own strict internal requirements and performs an analysis of its competitors. For reasons of confidentiality, we are only publishing a portion of those here.

We perform three types of tests:

- Tests using standards requirements
- Performance tests that put the product under the maximum stresses that could be encountered in the field, within the uses specified in the instructions for use.
- Destructive tests that stress the product to the breaking point. These extreme tests allow us to see the failure mode of the safety chain. This failure mode differs from product to product.

3- The results of STATIC tests:

3-1: STATIC standard requirement:

- Protocol:
 - Slow pull according to the EN 567 standard protocol
 - 5 consecutive pulls of 4 kN (400 kg) on the same product
- Results:
 - No significant result, *i.e.* meets the standard requirement (no deformation of the CROLL, no damage to the rope sheath).

Note: The SNS CAI mentions deformation starting at 3 kN (without providing photos or details), which was observed neither at Petzl nor in the APAVE tests.

3-2: Destructive STATIC tests:

- Protocol:
 - Slow pull test according to the EN 567 standard protocol
 - Test until the rope sheath breaks or the product fails
 - Tests on new ropes
- Results: summarized in the table below

Semi-static CAVING ropes	Tensile load (kN)
Antipodes 8mm	5.8
Unicore Spelenium 8.5mm	6.1
Antipodes 9mm	5.9
Dana Kordas 9mm	5.5
Antipodes 10mm	6.3
Semi-static INDUSTRIAL ropes	
Petzl Parallel 10.5mm	5.8
Petzl Axis / Industry 11mm	6.2
Petzl Vector 11mm	6.1
DYNAMIC ropes	
IceLine Beal 8.1mm	5.5
Ice Twin Beal 7.7mm	5.2
Joker Beal 9.1mm	5.4

- In the great majority of cases, the breakage occurs in the rope sheath.

- In only a few cases, on thick ropes (starting with the 10 mm-thick Antipodes), we observed breakage on the back of the CROLL, leading to inversion of the cam (and not the other way around), always at values above 6 kN, well above the standards requirements.
- This failure mode is different from that of the older CROLL, which had a greater tendency to "unfold" under the same stresses. In both cases, the device is no longer usable.
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Note: the SNS CAI mentions failure between 4 and 6 kN without providing details or precise values of these failures, while we observed no failure of the CROLL with anything less than a static load of 6 kN.

4- The results of DYNAMIC tests:

During these tests, we record the peak dynamic impact load generated by arresting the fall. The value of this impact load, which is applied to the CROLL for only a few milliseconds, should not be directly linked to the static breaking load of the product, which results from a slow and prolonged application of stress!

4-1: DYNAMIC standard requirement:

This dynamic requirement is described in Standard EN 12841 Type B

- Protocol:
 - Dropping a 100-140 kg mass attached to the end of a 1 m dynamic lanyard with the device situated 1 m below the anchor
- Results: MEETS REQUIREMENTS of the EN12841 type B standard
 - On a new Béal Antipode 10 mm at 100 kg: 4.5 kN shock load, rope and device intact
 - On a new Béal Antipode 10 mm at 140 kg: 5.8 kN shock load, rope and device intact

4-2: DYNAMIC performance tests:

When designing PPE, Petzl systematically performs dynamic fall tests to measure the capacity of its products to sustain a dynamic load as a result of improper usage. This fall risk exists, for example when passing intermediate anchors, and its limits are clearly described in the instructions for use.

- Protocol:
 - Tests on new ropes
 - Mannequin + harness connected directly to the CROLL
- Results:

Fall factor 0.5 / 80 kg	Impact 1m below anchor with mannequin + harness (superavanti or fractionné type)	Antipodes 8mm Impact force 3.6kN Rope and device intact
		Ice line 8.1mm Impact force 3.2kN Rope and device intact
Fall factor 0.5 / 100 kg	Impact 1m below anchor with mannequin + harness (avao or falcon type)	Antipodes 10mm Impact force 4.6kN Rope and device intact
Fall factor 0.5 / 140 kg		Antipodes 10mm Impact force 5.6kN Slippage 60cm / 1 strand broke

- **No inversion of the cam**
- **No breakage of the CROLL**
- In real-world situations, dynamic loads will be even smaller, as a part of the kinetic energy is absorbed by the human body.

4-3: Destructive DYNAMIC tests:

These extreme tests allow us to see the dynamic failure mode of the safety chain. This dynamic failure mode differs from product to product.

- Protocol:
 - Tests on new ropes
 - Mannequin + harness connected directly to the CROLL
- Results:

Fall Factor 1 / 140 kg	Impact 1m below anchor with mannequin + harness (avao or falcon type)	Antipodes 10mm – new Impact force 6kN Slippage 2.3m / 2 strands broke
		Antipodes 10mm – used Impact force 6.3kN Slippage 1.25m / 0 strands broke
		Beal Access Unicore 11mm Impact force 6.8kN Slippage 1m / 4 strands broke
		Courant 10.5mm Impact force 6.4kN Slippage 0.95m / 2 strands broke

- **No inversion of the cam**
- **No breakage of the CROLL**
- Photos of results of these destructive dynamic tests:



- Videos of these destructive tests are available at the following address: www.Petzl.com/...
- Observations from this destructive test:
 - Tearing of the sheath over 0.95 to 2.3 m: this result is consistent with what is known about the functioning of an ascender on a rope with a core and sheath, where above a certain level of energy, the sheath acts as a fuse (breaking, slipping and bunching).
 - If this extreme event were to occur in the "real world", the dynamic loads involved would be smaller, as a part of the kinetic energy would be absorbed by the human body and the harness.
 - We did not test all the ropes on the market, new or used. Is it possible that the rope could be cut under certain lab testing configurations? We did not observe this, but any destructive test will reach a breaking point for one of the links in the safety chain (the rope or the ascender or the connector or the anchor).

5- Safety standards and references

What is the reference that defines the level of safety of ascenders? Who oversees the level of safety?

- Ascenders are PPE (personal protective equipment), and their placement on the European market is governed by the CE 89/686 Directive. This directive outlines the essential requirements for the health and **safety** of users according to CE standards. Ascenders such as the CROLL used for sport must meet the requirements of the CE EN 567 standard. The EN 567 standard is referred to when the level of safety of an ascender for sport use is in question. For professional use of the device, the EN 12841 type B standard is the reference.
- The creation of the CE standards is well supervised. A committee of experts is mandated to write the health and safety requirements that apply to the range of PPE. These experts are named by member states and come from independent labs, or are representatives of the state, representatives of the activity and/or manufacturers. If the work of these professionals were to be called into question, it would have to be based on solid evidence that the committee failed to meet the essential health and safety requirements of the PPE Directive.
- Further, the CROLL has been certified EN 567 by an independent organization overseen by the state. To claim that a certain product is potentially dangerous is a serious accusation, as it calls into question the work and responsibility of this independent organization, as well as that of all the experts who define the requirements within the standards.
- If a piece of PPE in particular were considered that it "should be used with extreme caution", this would imply that it needs to be considered potentially dangerous! Therefore, this piece of PPE would have to be immediately taken off the market. If the SNS CAI believes that the Petzl CROLL is a potentially dangerous product, it should then demand either that it be pulled from the European market or that the EN 567 and EN 12841 standards be withdrawn.
- Before being put on the market, the CROLL underwent numerous tests beyond those required by the EN 567 and EN 12841 standards: multiple field tests, as well as static and dynamic performance tests. When developing new products, Petzl commits to internal performance requirements that go beyond those described in the standards.

6- Conclusions:

- All the tests performed throughout development as well as during certification have validated the technical choices made for the new CROLL. The absence of a cam stop and the reduced thickness of the frame do not in any way alter the safety of the new CROLL. This reduced weight and size were not implemented at the expense of user safety! Further, the reduced weight is an improvement in terms of speed, and therefore safety, during more challenging activities such as caving.
- The new CROLL can be used with confidence, as long as you follow its instructions for use.

We are committed to earning and deserving the trust of our customers every day, by demanding the very best of ourselves and our products. We work to achieve the highest standards, and we are acutely conscious that we must always listen to our customers, in order to continue to develop the products that help you live your dreams and your passions more fully!

Thank you for your continued trust.

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