Review of the use of ascenders in rope access.

Ascenders are being used extensively in rope access.

However. As with anything else, there is a tendency to accept and establish practices even though new knowledge, techniques and tools may have changed over time.

Sometimes it might be worth going back to investigate the evidence and the scientific background for the established practices.

This is an attempt at that, regarding our use of ascenders.

Two basically different constructions:

To start with it is important to understand, that there are vital differences in the construction and subsequently in the use of the Petzl Croll/new Petzl Basic and the Petzl Ascension/old Petzl Basic, as it is also outlined by the manufacturer.



Old and new Petzl Basic.

The primary difference lies with the construction of the two tools. In the Ascension/old Basic, there are two holes at the top of the tool on opposing sides of the rope channel, allowing a carabiner to be placed there, thus strengthening the construction and at the same time keeping the rope in place in the rope channel, even when the ascender is being used in a non vertical position. In the User Manual for the Petzl Croll (B16) and for the (new) Petzl Basic (B18), the manufacturer clearly warns against using them on non-vertical ropes due to the risk of the rope unclipping itself:



Ascenders for rope access use. A review. 1 of 6. © ScanRope, 2014. www.scanrope.eu

In the User Manual for the Petzl Ascension (and old Petzl Basic), however, it says, that..:

"The ASCENSION and BASIC ascenders are designed to be loaded in a direction parallel to the rope; if loaded at an angle to the rope, the cam may not correctly engage the rope and slippage can occur (See the technical notice, diagram 2). To limit the risk of slippage due to improper loading attach yourself to the rope with two ascenders, each with its own lanyard, load the ascender in a direction parallel to the rope, if you cannot load the ascender in a direction parallel to the rope, clip a carabiner through the two top holes of the ascender, making sure the rope is captured inside the carabiner, or pass the rope through the lanyard carabiner (see diagrams opposite)."

"Ascension & Basic/Improper loading can prevent the ascender from grabbing the rope" by Petzl.

http://www.petzl.com/en/security-alert-0/2006/04/19/ascension-basic-improper-loading-can-prevent-ascender-grabbing-rope



Also in the User Manual for the Petzl Ascension, B17WS-Ascension fra Petzl, it says:



So for non-vertical climbing with an asender an ascender with two holes at the top, eg. the Petzl Ascension (and old Basic ascenders) must be used and the rope must passed through a carabiner, placed through the two holes at the top of the ascender.

This is something, that is made even more clear by Petzl in their instruction for using the Petzl Ascension and (old) Basic for self-belaying or climbing a structure and belaying with the ascender:

Attaching the ASCENSION and BASIC for self-belaying:

The device must be installed correctly on the rope, connected by the upper attachment hole, taking care to capture the rope in the carabiner.



Also it can be seen from that same Petzl information, that new Basic is crossed out for this purpose, whilst the old Basic and the Ascension is allowed (as long as the necessary precautions are taken (placing a carabiner in the right place to ensure, that the can not unclip itself:



In conclusion:

The Croll (and new Basic) ascender must not be used on its own, unless it is attached parallel to the rope with the rope in a vertical position.

The Ascension (and old Basic ascenders can be used on ropes that are not vertical, if the rope is passed through a carabiner, placed through the two holes at the top of the ascender.

Shockload on the ascenders.

It is true, that the present SPRAT Certification Requirements state, that a "A single ascender connection to the working rope is acceptable as long as the dynamic fall potential is limited to less than 30 cm".

However, this is not something that finds much -if any- substantiation in the Manufacturers User Manual, neither for the Croll, the new Basic, the old Basic nor the present Ascension. On the contrary.

According to the manufacturer, the stated braking strength of both the Petzl Ascension and the Petzl Croll is 4-6,5 kN and even other manufacturers have only slightly higher braking strengths (See later).



At the same time, numerous tests, show that a 30 cm. fall can easily create forces that will exceed the stated braking strength of the Croll and Ascender by a factor 2-3!

Ie. tests, done by DMM in Wales, it is proven, that even 30 cm falls can easily create very high impact forces (11-16 kN).

And this is only with a FF1 fall !

http://dmmclimbing.com/knowledge/how-to-break-nylon-dyneema-slings/

Mean Results								
			Open Slings			Cowstail Rope 'Slings'		
			Dyneema		Nylon		Semi Static	Dynamic
Fall Factor: 1 or 2	Length of Sling	Length of Fall	8mm	11mm	16mm	26mm	11mm	10mm
FF1	120cm	120cm	-	22.4	12.8	-	-	-
FF1+ Overhand knot	120cm	120cm	-	11.1	11.0	-	-	-
FF2	120cm	240cm	-	21.2	17.6	-	-	-
FF2 + Overhand knot	120cm	240cm	-	11.7	14.3	-	-	-
FF1	60cm	60cm	17.8	16.7	11.6	11.8	7.3	5.7
FF1 + Overhand knot	60cm	60cm	-	10.2	-	-	-	-
FF2	60cm	120cm	22.5	25.1	15.4	16.3	10.3	7.4
FF1	30cm	30cm	14.8	16.4	10.6	11.0) -	-
FF2	30cm	60cm	22.6	18.7	14.0	-	-	-
Cling failure								

So even a 30 cm. fall, mentioned as acceptable in the SPRAT Certification Requirements, could easily and by FAR exceed the maximum breaking strength of the Ascender, even with a FF1 fall. And this is for the strongest of the three Petzl Accenders available (the Petzl Ascension) with the two holes at the top.

It is true, that even static and semistatic ropes contribute some dynamic shock absorption to the system, depending on the amount of rope above the climber, but as a rope access technician could just as well be working directly below the anchor, where the system will be almost completely static, the 30 cm fall, mentioned in the Certification Requirements is not aceptable, as it is a general acceptance level that does not take the amount of rope above the climber into account, it is unsafe and should as such be removed ASAP.

Apart from the Certification Requirements, we also have the questionable letters from the SPRAT Board of Directors from last year, where the BoD tries to dictate the Evaluators to evaluate certain tools in specific ways during evaluations and always to follow Manufacturers instructions.

Suggested changes to the SPRAT Certification Requirements:

Both for reasons of empirical evidence and because it conflicts with the letters from the SPRAT Board of Directors from 2013, it should be considered to - remove or revise 8.7.6 in SPRAT Certification Requirements as soon as possible. A suggestion for revised verbage for 8.7.6 could be:

"A single ascender connection to the working rope is acceptable as long as the ascender is loaded and on a vertical rope and as long as there is no dynamic fall potential."

- Also the example of a Discrepancy in 4.3.3.4 in the Certification Requirements: *"Not being attached to both ascender"*

should be removed, as it is fully acceptable to be hanging from just one ascender as long as it is placed on a vertical rope as documented above.

Anyway.

Knowledge, experience and documented evidence says that even 30 cm. (vertical) falls on any ascender, also from other manufacturers than Petzl (see below), could be dangerous and thus should not be allowed, particularly during evaluations, bacause the the breaking strength of the ascender, supplied by the manufacturer, may be exceeded by 2-300%.

When it comes to redirects, short and long rebealys, the situation might be slightly different, because the impact force, resulting from a pendulum fall will usally be less than the impact force, resulting from a vertical fall.

However, these are situations with many variables, and it would make good sense to keep a safety margin and basically regard even pendulum falls as falls, when it comes to using toothed ascenders.

Total conclusion:

For climbing with an ascender on a vertical rope, a single chest ascender is satisfactory as long as there is no risk of a fall.

For climbing with an ascender in situations, where the rope is not vertical, an ascender with two holes at the top (eg. Petzl Ascension or old Basic, Heightec Pulsar or Compact or Climbing Technology Quick-up or Single) should be attached to the climber and at least one carabiner should be clipped in to keep the rope in place in the rope channel, according to the manufacturers instructions.

Other manufacturers.

Another variable here are ascenders from other manufacturers than Petzl, ie. Heightec markets ascenders, which has markedly less aggressive teeth, and also Climbing Technology has ascenders with a construction, that differs from the Petzl products.



Heightec

Climbing Technology

But even those ascenders only has a very limitied breaking strength. Ie the Heightees claim to have a 15% higher breaking strength (675 kg) which is still far less than the potential shockload, even from a 30 cm. FF1 fall (see above). Also with these ascenders, there is a requirement to put in an extra carabiner as soon as the direction of load is not vertical or there risk of even a minor fall of 20 cm (double length of a carabiner):



It is my hope, that the above information might help us to understand the tools and techniques, that we use in rope access better. Please do not hesitate to ask, if you have any questions. Sincerely

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