

Suggested Life-lining Systems/Devices for the Vertical Leader Award

The following notes have been drawn up based on correspondence with manufacturers, testing, users' experience, and consideration by Trainer/Assessors of the LCMLA and CIC schemes when selecting appropriate devices for life-lining within the Local Cave and/or Mine Vertical Leader Award.

This list is by no means definitive given there are numerous other devices on the market that may be suitable for use as part of a life-lining system. However, if selecting an alternative device, leaders are advised to satisfy themselves that the chosen device has been designed for use with EN1891 (low-stretch) ropes, are suitable for belaying/life-lining (i.e. conform to EN 15151-1), and are made of suitably robust materials to withstand the underground environment.

Rope Choice

It has been common practice to use EN1891 (low-stretch) ropes when life-lining underground in preference to EN892 dynamic climbing ropes.

Dynamic ropes are specifically designed to absorb some of the impact force transferred to a person should they fall. However, the stretch of a dynamic rope can be significant, particularly if the pitch is long. This can result in a person falling some distance or even hitting the ground before a fall is arrested. When underground even a minor injury can result in a serious rescue and so the chance of any fall must be limited. Dynamic ropes are also less efficient to haul with, less tolerant to wear, and tested to arrest a certain number of falls rather than hold a specific load. Taking these points into consideration a low-stretch (EN 1891) rope kept as tight as possible during use is arguably preferable for vertical rope work.

Leaders must bear in mind that any dynamic fall onto a low-stretch rope may result in significantly higher impacts, which may injure a falling climber or damage equipment. When life-lining with a low-stretch rope the following guidelines must be followed

- Ropes should be kept as tight as possible at all times
- If life-lining from the head-of-a-pitch, the rope should be positioned high to ensure that it is kept tight and above the climber until they have transferred to a traverse rope (normally onto cowstails), or safe ground
- If life-lining from the bottom of a pitch climbers should never climb above the karabiner/pulley at the head of the pitch

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Examples of Suitable Devices

The following list presents devices which manufacturers have confirmed are appropriate for abseiling with one or two people (in a rescue situation), can be used as part of a life-lining system from both a harness or a fixed anchor, lowering, for short hauls, and used with low stretch (EN 1891 low-stretch) ropes.

	<p>RIG/ID (both the pre and post 2018 models, RIG post 2018 illustrated): Provided they are used within the current manufacturer's guidance are appropriate devices to life-line, abseil and perform short improvised rescues. They are less appropriate for longer rescues due to the high levels of friction. Can be used in a Tyrolean.</p>
	<p>STec Flow: Provided they are used within the current manufacturer's guidance are appropriate devices to life-line, abseil and perform short improvised rescues. They are less appropriate for longer rescues due to the high levels of friction. Can be used in a Tyrolean. Made of harder wearing components so may last longer than a RIG/ID although heavier and more expensive. Option of "panic lock" and non-panic lock available. Subjective testing indicates it's a little harder to haul through the device.</p>
	<p>ISC D4: Provided they are used within the current manufacturer's guidance are appropriate devices to life-line, abseil and perform short improvised rescues. They are less appropriate for longer rescues due to the high levels of friction. Can be used in a Tyrolean. Subjective testing suggests the device can be a little 'snatchy' in use as a descender.</p>
	<p>Edelrid Eddy: Provided they are used within the current manufacturer's guidance are appropriate devices to life-line, abseil and perform short improvised rescues. They are less appropriate for longer rescues due to the high levels of friction. Can be used in a Tyrolean. Set up the opposite way to a GriGri which can be confusing for some. Has an anti-panic function which users need to be familiar with.</p>

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Examples of Suitable Devices (continued)

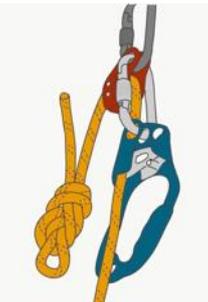
	<p>CAMP Druid/Druid Pro: Provided they are used within the current manufacturer's guidance are appropriate devices to life-line, abseil and perform short improvised rescues. They are less appropriate for longer rescues due to the high levels of friction. Can be used in a Tyrolean. Compact but robust device, however tricky to fit on and off the rope (needs to be removed from the carabiner, manufacture suggest a piece of cord is used to prevent dropping the device). Only officially endorsed by the manufacture for 11mm rope, however correspondence with the manufacturers indicate recognition of correct function with lesser diameter ropes. Subjective experience found it challenging to give slack rope to a client climbing down a pitch/ladder.</p>
	<p>CAMP Giant: Provided they are used within the current manufacturer's guidance are appropriate devices to life-line, abseil and perform short improvised rescues. They are less appropriate for longer rescues due to the high levels of friction. Can be used in a Tyrolean.</p>

Alternative systems that requires additional diligence

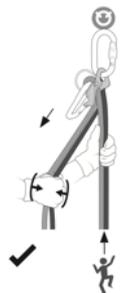
	<p>Italian (Munter) Hitch: Useful for short pitches or in an improvised system. Prolonged use, particularly when lowering, can cause the rope to kink significantly and become difficult to handle.</p> <p>Can be used to haul (although there's significant friction) or used to rig a Tyrolean (however the knot "flips" when loaded, significantly reducing the tension in the system).</p>
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Inappropriate Lifeline Devices

	<p>STOP (pre 2019 model): EN341. Rescue Descender. Suitable for descent with a one or two-person load. Suitable to lower a one-person load from a belay at the head of a pitch. Not endorsed by the manufacturer for life-lining. Can also be used to rig a Tyrolean.</p>
	<p>STOP (2019): The updated (2019) Petzl STOP has been tested to the EN 15151 Type 5. This is the standard for an "Assisted-breaking descending device", and so has not been tested to the standard to arrest a dynamic load. The manufacturer confirmed the device should not be used for life-lining. Can be used to rig a Tyrolean.</p>
	<p>Pulley/Jammer Systems: Shown to damage ropes with even a small dynamic fall. Should not be used or taught as a life-line system for the Vertical Leader award. Must not be used to support a tensioned line in a Tyrolean.</p> <p>Appropriate in some configurations (not with the jamming device on the "dead" side of the pulley; see warning notice on the BCA website) as a progress capture device for long hauls (although candidates must be aware of the difficulty in converting from a haul to a lower).</p>
	<p>Traxion devices: As with the pulley/jammer system. See Petzl technical notices on their website. Should not be used or taught as a life-lining system for the Vertical Leader award. Must not be used to support a tensioned line in a Tyrolean. Appropriate as a progress capture device for long hauls (although leaders must be aware of the difficulty in converting from a haul to a lower).</p>

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Pivot (DMM): DMM's manufacturer's instructions only endorse the use of their belay devices with EN1891 ropes to abseil (not to belay).

Discussions with DMM highlighted concerns over the potential impact forces generated from falling onto a low-stretch rope if using the Pivot, or other DMM belay devices. Other manufacturers of similar type devices may endorse their use with low-stretch ropes, however at the time of writing no other manufactures have been approached.

Inappropriate Lifeline Devices (continued)



GriGri: The GriGri 1 was endorsed by Petzl for use in life-lining underground. The GriGri 2 was not endorsed for use with low stretch ropes (EN1891), however the more recent GriGri's do have a note supporting the use of low stretch ropes for top-roping on the Petzl website. Petzl also indicate, on their website, methods to belay from a pitch-head and endorse the GriGri's use for rappelling.

However, Petzl also indicate that prolonged use in hauling (for example) generates such high friction that the device may wear out the lighter weight materials of the new GriGris, therefore they have significant limitations. Would suggest these devices are not taught or used within the Vertical Leader award. Limited use in rigging a Tyrolean; manufactures endorse a 3:1 haul with one person at the most and experience of the device has highlighted it is difficult to release under high tension.