A Guide to Long and Extreme Abseils

By

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A Guide to Long and Extreme Abseils

1 Introduction

This guide was compiled by Jacques Raubenheimer of Mountain Pursuits, using as a basis a guide on long abseils provided by Andrew Friedemann of Wildways (it is not certain who actually compiled the guide). Andrew’s guide has been considerably revised, corrected and expanded, although here and there, elements of his original wording may show through. Further comments are welcome.

Many of the problems and issues raised in the current guide were “discovered” in the process of setting up and running the Maletsunyane waterfall abseil at the Semonkong Lodge in Lesotho. The Guinness Book of World Records™ has officially recognised this abseil as the “Longest single-drop commercial abseil” in the world. The numerous operators who have been advertising themselves as having the longest commercial abseil in the world have not gone to the effort of substantiating their claims, and have often been incorrect—e.g., when I researched the topic for Semonkong in April 2003, I found no less than four abseil operators (all with different length abseils) claiming to have the longest commercial abseil in the world! At the time, the award definitely went to an outfit in Australia that offered a 140m abseil from the Gordon dam wall, which was, then, the longest, and the longest from an artificial structure, and to the Knysna Heads abseil (which was longer than the other two claimants—the Oribi Gorge and Table Mountain abseils) for an abseil from a natural feature. Kudos are also due to the Howick falls abseil, which retained due modesty and did not claim the title!

I have been able to re-apply these solutions in an advisory capacity with other clients, notably Sheercliff Adventures (110m abseil) and Barnabas Outdoor Adventures (115m abseil), and have also received valuable feedback from them. These issues were then discussed further at the MDT AS workshop held at Semonkong from 25–27 February 2005. Further valuable input was gained at this workshop, and the subsequent e-mail discussion, from Rob Thomas, Andrew Friedemann, and Simon Bernhardt (Simon was also the first guide at the Maletsunyane abseil). Their comments and suggestions have been included in this guide.

My thanks go to the various guides who have worked at Semonkong and raised these issues, and also contributed to, what I believe, their satisfactory resolution. I would like to mention by name Simon Bernhardt, the first guide, and Henk Storm, as well as Johan de Bruijn of Sheercliff Adventures and Niklaas and Isabel Arangies of Barnabas Outdoor Adventures. I would also like to thank Jonathan and Armele Halse of Semonkong, for the opportunities provided (and funded!) by them.

2 Background to long and extreme abseils

Long abseils, to the best of my knowledge, started in the 1990s. Western society as a whole has seen a perception change about adventure sports (even warranting a cover-page article in Time magazine—Life on the edge-Why we take risks, 6 Sept 1999). Adventure sports are becoming the “in thing,” and something of a status symbol. Although these sports have seen a definite increase in active participants, the reality is that many of the people who partake of these sports do not really have the heart for it. Their participation is once-off, or, at best, incidental. This has, however, created a situation in which commercial operators can make a good living offering extreme sports activities to an audience of primarily incidental users. Obviously, the commercial activities which work best in this regard are ones which require little or no training (trad climbing would never be a drive-by thing…) and offer a big adrenaline rush, such as bungi-jumping or abseiling, to name but a few. Attendant to this mindset, the bigger the abseil (or bungi, or whatever), the better. This has created the scope for ever longer abseils to be run commercially.
2.1 Long abseils in operation

From an unknown “sport” a few years ago, abseiling has grown tremendously, so much so that titles such as the Out There Adventure Guide include sections devoted solely to abseiling. As the activity has grown, so also the number of operators offering long abseils. Table 1 lists all known long and extreme abseils, as best as I could find (as at May 2005). My primary sources of information for this were personal contact and commercial abseils advertised on the Internet. It is evident from Table 1 that running commercial abseils, especially long commercial abseils, is a “Southern Hemisphere” thing, and, it seems, very much a South African thing.

Table 1 Known Commercial Long Abseils as at May 2005

<table>
<thead>
<tr>
<th>Country</th>
<th>Vicinity</th>
<th>Place</th>
<th>Current operator</th>
<th>Height**</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>Howick</td>
<td>Howick Falls</td>
<td>Over the Top</td>
<td>107m</td>
</tr>
<tr>
<td>South Africa</td>
<td>South Coast</td>
<td>Oribi Gorge</td>
<td>Wild5</td>
<td>110m</td>
</tr>
<tr>
<td>South Africa</td>
<td>Somerset East</td>
<td>Kamala Game Reserve</td>
<td>*Sheercliff Adventures</td>
<td>110m</td>
</tr>
<tr>
<td>South Africa</td>
<td>Cape Town</td>
<td>Table Mountain</td>
<td>Abseil Africa</td>
<td>112m</td>
</tr>
<tr>
<td>South Africa</td>
<td>Ficksburg</td>
<td>Rooikrans</td>
<td>*Barnabas Outdoor Adventures</td>
<td>115m</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Victoria Falls</td>
<td>Zambezi river</td>
<td>Adrift</td>
<td>120m</td>
</tr>
<tr>
<td>South Africa</td>
<td>Knysna</td>
<td>Knysna Heads</td>
<td>S.E.A.L. Adventures</td>
<td>121m</td>
</tr>
<tr>
<td>Australia</td>
<td>Hobart</td>
<td>Gordon dam wall</td>
<td>Aardvark Adventure</td>
<td>140m</td>
</tr>
<tr>
<td>Lesotho</td>
<td>Semonkong</td>
<td>Maletsunyane Waterfall</td>
<td>*Semonkong Lodge</td>
<td>205m</td>
</tr>
</tbody>
</table>

* Set up with training and/or advice and/or consultation from Mountain Pursuits.

** To the best of my knowledge, none of these heights have been officially measured by a surveyor, with the exception of the Maletsunyane abseil. The heights are as best I could establish them from the available sources, and may differ from the official (but unsubstantiated) claims of operators.

2.2 Defining long and extreme abseils

First it is necessary to redefine what we understand with abseil lengths. The old classification for abseils defined short and long abseils as shown in the first two lines of the table below. Now the third line has been added.

Table 2 Abseil Classification by Length

<table>
<thead>
<tr>
<th>Classification</th>
<th>Length</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short abseil</td>
<td>≤60m</td>
<td>Standard abseil devices (e.g., Figure 8s) are rated for 300ft, which is about 60m.</td>
</tr>
<tr>
<td>Medium abseil</td>
<td>60m-150m</td>
<td>Devices for long abseils (e.g., Racks) are rated to 150m.</td>
</tr>
<tr>
<td>Extreme abseil</td>
<td>≥150m</td>
<td>Currently up to 205m, but can potentially be longer. Described as extreme because equipment used is not rated for this kind of use.</td>
</tr>
</tbody>
</table>

I have found it very difficult to substantiate the motivations used in Table 2. The UIAA has been preparing a standard for abseil devices (UIAA129) for at least the last three years (as posted on their website— http://www.uiaa.ch/?c=188). However, this standard is still forthcoming. I have examined the product brochures for all the abseil devices on the market in SA, and have not found maximum abseil distance ratings on any of them. I have also asked the agencies of Petzl, Lucky, DMM, Clog, Wild Country, and Black Diamond to contact those companies requesting information on this. Thus far, only Black Diamond has answered, but they have no knowledge of any such maximum ratings.

Obviously this definition is reasonably arbitrary. There may very well be some abseils, e.g. 120m long, on terrain that necessitates measures more similar to the extreme abseils, and even longer abseils (say 180m) with easy and clean drops, that would feel and operate more like standard long abseils. Also, the difference between a 59m and a 61m abseil is definitely not great. This definition of abseils should thus not be taken too far. Far rather, a competent AS will be aware of the various techniques for short, long and extreme abseils, and should know when to apply which techniques. What is important in this abseil definition, and is the overriding factor in decisions made about an abseil, as will be seen below,
is that it defines limitations of equipment rating. This is, from a liability perspective, very important. As in all cases, err to the side of safety. When operating near to one of the limits set out here, rather adopt equipment and techniques suited to the more extreme than the less extreme end of the scale. In closing, I have found that many of the techniques used for extreme abseils work well for even short abseils, and thus, in my own guiding, you will see very few differences in the way I run an 15m and a 150m abseil (although the differences that you will see are very important).

3 Running long and extreme abseils

Running a long and/or extreme abseil requires special training. For that matter, even just doing an extreme abseil requires special training. As a simple example, most competent rock climbers, even climbers who have done multi-pitch abseils, have never yet abseiled with a Rack. Even those climbers who have abseiled with Racks, will probably not have used the Rack with varying the number of brake bars in use. At best, members of advanced rescue teams will have done this. Note that the techniques defined below explain standard practice for both long and extreme abseils. Only where relevant, will additional measures which need to be taken with extreme abseils be shown. For the rest, the techniques for long and extreme abseils remain the same—the level of expertise in them should just be higher the more extreme the abseil.

These techniques will be discussed under a number of conceptual headings which will help the abseil guide think through the whole process of setting up and running a long or extreme abseil.

3.1 Abseil site

Some specific site considerations will be mentioned before looking at site design as a whole.

3.1.1 Holding zones

While the requirements for the top holding zone remain more or less the same regardless of the length of the abseil (the effect is much the same, whether you fall from a 30m cliff or a 130m cliff!), the bottom holding zone needs to be reconfigured for long and extreme abseils. Primarily, there is more danger from rock fall since, with rocks falling further (and gaining more momentum), they could bounce further away from the cliff, thus endangering a larger area of ground. Also, a pebble falling 10m may only cause an annoying bump on the head, but the same pebble having gained 200m of momentum can cause considerably more damage. Thus holding zones at the bottom should arguably be further away from the bottom of the cliff than normal. It is proposed that a 68° slope should be drawn in semi-circular from cliff face to cliff face, with the abseil point as the apex. This area will then be defined as the danger area.

More assistants may be needed at the bottom to shuttle clients from the landing zone to the bottom holding zone, depending on the distances involved (this is sort of offset—the longer the abseil, the further the bottom holding zone is going to be from the landing zone, but the longer a client takes to complete the abseil (i.e., the assistant has more time to travel between the bottom holding and landing zones). Also, if assistants wait for the clients at the landing zone, it should be recognised that they are in the danger area, and they should have safe waiting areas (probably right up against the cliff face, possibly under an overhang).

3.1.2 Time constraints

It stands to reason that longer abseils take more time. There are a large number of constraints on the time available for an abseil outing. The setup and preparation and cleanup after the abseil have to be factored in. Provision also has to be made for rescues (i.e., if you have ten hours of available time, don’t book clients for all ten hours, as, should an accident occur, you could find yourself having to turn away paid clients, or, if the accident was with the last client, just before sunset, performing a rescue in the dark!). Then also the walkout time and weather constraints have to be taken into consideration. The amount of time available per day for the abseil may also vary considerably with the seasons. As a rule of thumb, the guide can work on ±15min per 50m per client, although this needs to be tested anew at
each abseil site, and cannot just be assumed to hold. The setup time per client should also be taken into
account. For example, the typical client at the Maletsunyane waterfall takes 45min to do the 205m
abseil, but the guide needs about 15min to pull up the belay rope again (Thus still resulting in a pretty
accurate time of 60min). As a side note, guides have done the same abseil in 5min!

A limit has to be set on the number of clients who can feasibly do the abseil in a single day. This
should include a safety factor for emergencies or extra-slow clients. The guide should stick to the limit
without exceptions, as this could cause problems. This may also mean that pre-training at a short abseil
(a prerequisite for extreme abseils) may have to be done on the preceding day.

Time should also be allowed for the clients to return to the top of the abseil site, or wherever their
guided trip ends. It may be possible for the clients to wait and reform as a group at the bottom holding
zone, before proceeding together to the top. But the implication is that the last clients have to end their
abseils with sufficient time remaining for the clients to reach the top safely (i.e., at least before dark!).

3.1.3 Site management

Site management principles do not change dramatically with the length of the abseil, but the longer the
abseil, the better prepared and better organised the guide has to be. Nevertheless, there are some
additional points of consideration for long and extreme abseils.

3.1.3.1 Equipment sets

Getting equipment back to the top of long abseils is problematic. It is not usually convenient for clients
to bring the gear back to the top, as they may not even return to the abseil site before the end of the
day, and even if they did, it would take so long that they could hold up the running of the abseil site,
which could lead to all sorts of other problems. It is not advisable to use a haul bag tied to the belay
line to bring the gear back up (nor to tie the gear directly to the rope as is sometimes done with short
abseils), as it adds weight to an already extremely heavy rope, and could easily get snagged en route,
requiring the rope either to be dropped again, or worse, the guide having to abseil down to retrieve the
entangled gear!

The only satisfactory solution for this situation is that there should be enough equipment for each
client, so that clients can bring the gear back with them, or leave the gear with the bottom guide,
without the abseil guide having to wait for it (i.e., all the guide should have to pull up after each abseil
is the empty belay line). Obviously, this means that there should be a complete set of equipment
(harnesses, helmet, abseil device, karabiners, etc.) for each client—it won’t do to have them each with
a harness, but still having to share helmets.

More will be said on equipment at a later stage (3.3).

3.1.4 Site design

Part of the setting up of an extreme abseil should include actual simulations of various rescue scenarios
(lowers, hoists, pick-offs) to test their workability (designers should, however, take into consideration
the ways in which the priority of rescue procedures change in extreme situations-cf. 3.6). Furthermore,
extreme abseils are literally pushing the envelope, not only in terms of the activity, but also in terms of
the equipment. Because of this, a standard part of the design of an extreme abseil should be a complete
system safety analysis. Rescue technicians will be familiar with the terms Static System Safety Factor
and Dynamic System Safety Factor\(^1\). This analysis basically entails examining the strength of each part
of the system (from the anchors, through the abseil and belay ropes, to the client’s harness) to identify
the weakest component of the system. This weakest component should meet the requirement of being
stronger than the expected load by a certain ratio. Various suggestions exist as to what this ratio should
be, from 5:1, to 15:1. A commonly accepted standard in rescue circles is 10:1. It should be noted that
this analysis should take into account the greater loads generated during rescues (e.g., two-person

weights in a pick-off, multiplication of forces on the anchors during hoists). Rob Thomas has created an easy-to-use Excel spreadsheet that can assist in such an analysis.

### 3.2 Abseil clients

The fact about abseil guiding is that most clients are novice abseilers, having done no or very few abseils. Most people, like seasoned climbers, who have done many abseils, generally try to avoid the activity as far as possible (“How long is that walk down again?”), and generally consider the thought of having to pay for an abseil as ludicrous. This means that most clients arriving at a long or extreme abseil site are actually, in terms of experience, not up to the task that lies before them. This is not so critical, because of the “artificial” environment that exists at a well-run commercial abseil, with all its built-in safety procedures. But it does mean that for more out-of-the-ordinary (i.e., technical) long abseils, and definitely for all extreme abseils, pre-training on a short abseil is a prerequisite. Furthermore, even for seasoned climbers a certain amount of pre-training may be required before they set off on an extreme abseil, as most climbers have never abseiled with a Rack, and even those that have, have not toyed around with the Rack bars as is required on an extreme abseil (cf. 3.4).

#### 3.2.1 Client considerations

Further to this, long and extreme abseils place extra demands on the client over and above what is experienced on short abseils. This may limit the accessibility of the abseil to all clients.

##### 3.2.1.1 Physical considerations

The extreme nature of long and extreme abseils (even if just thinking of the walk back up) means that they are much more demanding physically than short abseils. I have had 140kg clients go down a short abseil (30m), and that was challenging enough. The simple reality is that these people will not be able to make it down an extreme abseil, and will definitely not be able to make it back to the top unassisted. To allow such clients onto an extreme abseil is to be negligent, and to place them in bodily danger. On the other end of the spectrum, the less a person weighs, the more they have to actually physically lift the rope to allow it to pass through their abseil device. There may be a point where a client is just too light to be physically capable of doing a long or extreme abseil. Maybe one needs to have minimum and maximum permitted weights for clients. Should they be required to step on a scale before signing up for the abseil? I have taken a four-year old (±25kg) child down a short (15m) abseil. This client would never be able to lift the 20+kg weight of an extreme abseil rope.

##### 3.2.1.2 Psychological issues

Apart from (and because of) their inexperience, clients may be extra-scared, due to the height of the drop they are about to abseil. The guide will need to reassure a scared client somewhat more than usual. These people skills should be thought through before taking clients on a long abseil. On the other hand, some, of course, may argue that the ignorance of inexperience may actually make clients less afraid than people who know the real dangers of abseiling. Again, guides need to know how to deal wisely with overconfident and brash clients. The guide’s focus should be on clearly communicating the technical requirements of the abseil, but with good people and communication skills.

### 3.3 Abseil equipment

The longer an abseil gets, the more “equipment-intensive” it gets. Clients need chest harnesses, different abseil devices, and more rope and more sets of equipment are needed. The equipment requirements for long and extreme abseils will be discussed below.
3.3.1 Anchors
Although anchors could be discussed under the heading of the abseil site (3.1), the variety of anchor choices (e.g., between removable and in situ anchors), warrants its place under the heading of equipment.

Abseil guides (or at least abseil site designers) need to be aware of what is called, in rescue terms, the System Safety Factor (SSF). The anchor setup needs to be analysed to determine whether it is sufficient to meet the maximum expected load under the SSF. What needs to be realised is that the static load is much greater on an extreme abseil (due to the additional weight of the rope), and so the maximum load is higher. The equipment, including the anchors, has to be able to handle the higher load.

Anchors need to be inspected on a predefined regular basis, and if natural anchors are used, they have to be placed by a guide experienced in the use of traditional gear.

3.3.2 Abseil device
The abseil device needs to be chosen with care (a Figure 8, for example, simply cannot handle the length of descent on a long or extreme abseil in terms of heat build-up, and simply shuts down at the start of such an abseil because of the weight of the rope). There are, however, other devices (e.g., the Rack, Petzl Stop, Petzl ID) that are made specifically for longer descents. However, when the abseil gets too long, the weight of the rope makes the ID’s safety catch extremely fiddly. Even an experienced user will struggle with it, let alone an inexperienced client. Also, a locking device (ID, Stop, etc.) which allows the client to stop themselves in the middle of an abseil (e.g., before a scary bit), can cause problems and necessitate unnecessary pick-offs. Therefore, the Rack is the only device currently recommended for long or extreme abseils. A Rack was used on the successful World Record attempt of Ian Ashpole, who, on 15 October 1996, abseiled 1600 ft (488m) from a hot air balloon.

Furthermore, my experience with the Rack has led me to recommend it alone for both long and extreme abseils. Finally, note that racks come with aluminium or Stainless Steel (SS) bars. Obviously the SS bars last longer, but they also provide less friction. This means that a client using a SS rack will be able to start the abseil easier, but may experience more problems towards the end of the abseil, where there is very little rope left.

It should also be noted that test have shown that abseils with Figure 8s greatly reduce rope strength. Racks also limit the wear on, and kinking in, the rope. Because they can be loaded without unclipping, Racks can also be attached to the harness with a maillon or something similar, if desired, instead of a karabiner. This has two effects: There is a reduced chance of cross-loading; and the client does not need to remove the Rack to detach from the rope. This means that the chances of gear getting lost, or the constant irritation of gear sets getting broken up (clients arriving at the abseil stance with a harness but no abseil device!) is reduced. It is for this reason that I am systematically removing Figure 8s from even my short abseils, and introducing Racks. The initially steep cost of the 4x more expensive Rack (compared to a Figure 8) is recouped by longer rope life. Racks also have longer expected life spans themselves than do Figure 8s.

It should also be noted that there are a number of Rack types on the market (see Slide 1). Some have four, some five, and some six bars. Some have a J-shape (e.g., the Petzl Rack) and some a U-shape. The shape is significant, as the U-shape is generally lighter (the frame uses less material), but is more

2 On their website (www.rocknrescue.com, accessed 26 November 1999), Rock’n Rescue report that “Racks have been used for rappels in excess of 3,000’ (914m).” However, they give no more information. Since the information on the longest abseil still seems to stand, I must assume that their reference is to multi-pitch abseils, which, in a sense, do not apply here.

3 The UIAA international conference on nylon and ropes held in Turin, in March 2002 confirmed that 50 careful descents with a Figure 8 could reduce the dynamic resistance (i.e., number of falls held) of a dynamic rope by 1/3, which, incidentally, is the same as several thousand metres of climbing! In contrast, rack-type devices (they tested the Kong Robot) have a much smaller effect on the dynamic resistance of a rope. Although the results presented there were on dynamic ropes, any person with experience in using both the Figure 8 and the Rack will concur on the similarity of effect with semi-static ropes.
fiddly to lock and to introduce additional friction\footnote{4} (cf. 3.4.3). J-shaped Racks are thus preferred. Also, the frame may be straight (all U-shaped frames and most J-frames) or twisted (J-frames only), referring to the orientation of the clip-in loop of the Rack with regards to the Rack body. The twisted frames are better suited to harnesses with a horizontal belay loop (e.g., Alpine harnesses), and the straight frames are better suited to harnesses with a vertical belay loop (most climbing harnesses). Since the latter harnesses are in any case preferred for long and extreme abseils, especially because of their padding (cf. 3.3.5.1), the straight J-shaped frames with five aluminium bars (the most common on the market anyway, e.g., the Petzl Rack) work very well.

Slide 1 Rack types (J-shaped, U-shaped, Straight and Twisted J-frames) \footnote{5}

3.3.3 Belay device

An Italian hitch cannot handle the amount of friction generated by this length of rope, and will trash the belay rope in no time. In fact, the karabiner on which the knot is made can get so hot that it starts to melt the sheath of the belay rope. Furthermore, the kinking caused by the Italian hitch is exacerbated by the sheer weight of the belay rope, leading to serious rope degradation in a very short space of time. Most other belay devices are also not suitable for the conditions experienced with a long abseil. Therefore, the Rack is the recommended device for belaying long abseils (generally belaying with 3 bars). It should also be noted (this is quite obvious, but is also an innocent mistake to make), that when the Rack is set up for abseiling, the rope leading to the anchor comes out of the top of the Rack, and the rope going to the controlling hand comes out the bottom. When used for belaying, the rope going to the abseiler comes out of the top of the Rack (which is now pointing down) and the rope going to the belayer’s hand comes out of the bottom of the Rack (see Slide 2). If the rope’s orientation is reversed, the belayer firstly cannot introduce more Rack bars, and secondly, the abseiler’s weight will be clamping the Rack bars down on the rope, effectively stopping the descent, and the belayer will have a seriously wonderful time trying to keep the Rack open for belaying. I typically start by setting the Rack up with three bars, and then adding and removing the fourth bar as needed to control the amount of friction.

Note that the use of the Rack for belaying has training implications, as specific techniques have to be mastered to use the Rack as belay device in these situations (adapting the number of bars used to the amount of friction, bypassing the rack in an assisted hoist, etc.), which are not commonly taught in AS courses. Having said that, the Rack works so well as an abseil belay device, that most people who have been trained in its use “convert” to its use, even with short abseils.

\footnote{4} Although some U-shaped Racks have an extended top bar with an extra post which accomplishes the extra friction function. Friction on a rack can be controlled in two ways: by adding or removing bars, or by changing the bar spacing. On U-shaped bars, only the second option is available once abseiling has commenced.

\footnote{5} Taken from www.rocknrescue.com on 26 November 1999.
Further advantages of the Rack are that it can be used multi-directionally (as can the Italian hitch), i.e., the guide can stand behind the Rack, or between the Rack and the cliff edge, and still maintain control over the device. This is not true of most other devices. With the Grigri, guides are limited to standing where they can reach the Grigri to keep it open, unless they want to belay off their own harnesses, which is not advisable, especially on a long or extreme abseil (belaying a client with an additional 20kg of rope is no joke). Plate/tubular devices such as the Sticht plate or ATC, which need to be redirected in certain instances (typically when the guide is between the device and the cliff edge), can also be worked remotely, but not as easily and safely as the Rack. The Rack can also be locked off and unlocked very easily and quickly, especially when a Rack with an extension on the top bar is used. This means that the guide can allow a few metres of slack, long enough to reach the tie-in point, lock off the Rack (cf. Slide 3), then meet the client at the tie-in point, return to the belay while the client remains motionless, and then unlock the Rack and belay the client in to the abseil take-off point, and then just continue belaying the client down. This is a quick and efficient system with very little fuss. A clip-gate karabiner attached to the top of the (J-shaped) Rack helps in this belaying-in process, where it acts as a handle by which to hold the Rack for pulling the rope through. When the client abseils, the client pulls the rope through the Rack, and the belayer can focus on the client with the minimum of attention to the device. Furthermore, as the client proceeds, the belayer can introduce or remove bars to increase or decrease the friction, and the clip-gate karabiner serves as an easy way of introduction even more friction into the belay when needed.

Because of its lower friction, the SS Racks are best for belaying. This means that when the client is near the top, and the weight of the belay rope is minimal, the guide can get by easily with less friction. And when the client is near the bottom, and the belay rope is heavy, the lower friction prevents the belay device from hampering the abseiler’s progress. The SS Racks are still entirely capable of braking
a client, even near the bottom of the abseil. Also, the SS Racks wear better, and put less wear on the rope because of the lower friction.

3.3.4 Ropes

Traditional wisdom has been to abseil on a semi-static rope, and belay with a dynamic rope. For reasons discussed, this is not simply impractical on long and extreme abseils, but could even be dangerous. However, the points raised will show that even on short abseils, using dynamic ropes are not desirable.

Traditional wisdom has also been (rightly) that abseils can be run quite efficiently with two ropes. While this may still hold for some long abseils, it will be shown that extreme abseils need to be run with a minimum number of three ropes.

3.3.4.1 Belay rope

Dynamic ropes normally only come in max 60m lengths, but can be bought off a reel in any desired length. Thus finding a suitable length dynamic rope with which to belay could be problematic, but not impossible (see the issues in obtaining ropes for extreme abseils in 0).

However, it is my opinion that belay ropes for all abseils (short, long, and extreme) should be static (i.e., semi-static). The higher static elongation of dynamic ropes makes them unsuitable for abseil belay lines, regardless of length. The UIAA requirement for the elongation of dynamic ropes with an 80kg weight is a maximum of 10% for static elongation, and a maximum of 40% for dynamic elongation\(^6\). By contrast, the static elongation for semi-static ropes is a maximum of 5%\(^7\), and values

reported by manufacturers are typically between 3% and 4%. While this might not make a big difference on a short abseil, it means that, on a 200m abseil, you would be looking at approximately 16m–20m of stretch on a dynamic rope. This means that if a client fell, they could fall almost 16m before the belayer caught them. Also, the dynamic stretch on these ropes is up to 30%, which, when the client experiences a serious fall (e.g., the failure of the abseil line) near the bottom of the abseil, could lead to a potentially serious groundfall before the belay line catches the client.

Several objections have been raised in the past to the use of static ropes as belay lines, and these will be answered here.

In UIAA testing\textsuperscript{8} for the number of falls, static ropes are subjected to a fall factor 1 drop test, type A ropes with a 100kg weight and type B ropes with a 80kg weight. The minimum number of falls the rope must hold is five. In the commercial, “single-pitch” (regardless of the length of the “pitch”) abseiling context, it is impossible for the fall factor to rise above 1, as should there be more slack belay rope than the distance fallen (which itself cannot be more than the height of the abseil), the client will simply hit the ground without being caught by the belay rope. There is thus no danger of a static rope breaking when used as a belay line in an abseil context\textsuperscript{9}.

Impact force is much more of an issue here, as the low dynamic stretch of semi-static ropes will create unacceptably high impact forces in the event of a dynamic fall. Thus, while the rope will not break, it might overload the other equipment in the safety chain in terms of the impact force. The UIAA test standard is that on the first fall (fall factor = 0.3 for static ropes), the impact force must be less than 600daN\textsuperscript{10} for static ropes. The impact force on the factor-1 test falls is about 10kN\textsuperscript{11}. Considering that the same belay and anchoring equipment is used as in lead climbing, the impact force is still well within the 1200daN limit set there. Note, however, that this will be a “hard” fall. Thus, despite recommendations that semi-static ropes should not be used in environments where fall factors greater than 0.3 are anticipated\textsuperscript{12}, I still think the use of semi-static rope for belaying abseilers is justified.

The final question that has to be answered is what is the likelihood of the fall factor rising above 0.3 in the abseiling context? Let’s examine some scenarios:

\textbf{Table 3 Fall Factors for Some Selected Scenarios}

<table>
<thead>
<tr>
<th>Distance abseiled</th>
<th>Slack</th>
<th>Fall</th>
<th>Rope</th>
<th>FF</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>0.5</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>0.75</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>0.571</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>0.8</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>0.625</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>0.833</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

\textsuperscript{7} Schubert, P. 5 July 2007. Personal correspondence via e-mail.
\textsuperscript{8} A complete list of the UIAA standards for mountaineering and climbing equipment can be found on the [UIAA website](http://www.uiaa.org). The standards for dynamic climbing ropes are UIAA 101 (cf. EN 892) and UIAA 108. The standard for semi-static (“low stretch” in the standards) ropes is UIAA 107 (cf. EN 1891).
\textsuperscript{10} Note that this is substantially less than the impact force allowed for dynamic ropes in lead falls (less than 1200daN for single and twin ropes, 800daN for half ropes). The difference, of course, lies in the fall factor used in the test—dynamic ropes are tested with a Fall Factor of 1.78!\textsuperscript{11}
\textsuperscript{11} Michel Beal, private communication (e-mail), 14 June 2006.
Table 3 shows three scenarios, each subdivided again into the same three subsets. The scenarios are based on slack (i.e., rope that should not be in the system at the time of the fall) of 3, 4 and 5m. Each of these assumes a distance abseiled of 0, 1 and 3m. It should be noted that the abseil distance of 0 is a practical impossibility, as the abseiler cannot be attached to the system with no rope. This does allow a theoretical baseline, however. In fact, as can be seen, if there were 0m abseiled and the abseiler were to fall, the fall factor would always be 1. Furthermore, it should be noted that the distance fallen will always be equal to the slack (this applies to the abseiling context only), as the abseiler cannot abseil more than the distance of belay rope paid out. The total rope in the system is thus always equal to the distance already abseiled (for which there must be an equivalent amount of rope) and the slack introduced into the system by the belayer (i.e., Column 4 = Column 1 + Column 2). Examining the three scenarios, it can be seen that for a given distance abseiled, more slack results in a higher fall factor. This has two implications: Firstly, if the abseil guide keeps slack out of the system, the abseil is safer. Secondly, slack in the system has more dire implications the closer the abseiler is to the top of the abseil, not the bottom. Or, although it is not recommended, an abseil guide can introduce slack when the abseiler is nearer the bottom without threatening the integrity of the system. The further the abseiler is from the top, the less of a threat slack in the system becomes (from a system perspective, not a groundfall perspective). The last note is that these calculations can be done regardless of the height of the abseil, as they are always calculated from the top, the abseil being conducted from the top. When this ratio is modelled for all possible scenarios (Slide 4), it can be seen that the relationship takes on a hyperbolic form, meaning that the fall factor will quickly drop as the amount of slack relative to the abseil height reduces.

In Table 4, a solver was used to calculate what the slack would have to be for the fall factor to be limited to 0.3. As before, should the distance abseiled be the theoretical 0, the fall factor cannot but be 1 (and the slack could thus not be “solved”). Furthermore, it appears from the remaining two scenarios (and this is confirmed with further testing not shown), that a fixed ratio will define the conditions under which the fall factor will rise above 0.3: The slack in the system would have to be just less than 43% of the distance abseiled. Thus when the belayer introduces more than 43% of this distance abseiled as slack, the fall factor will rise above 0.3. This is obviously more of an issue the closer the abseiler is to the start of the abseil: Should the abseiler have covered 1m, the belayer need only give 43cm of slack for the fall factor to be 0.3! Should the abseiler have covered 100m, the belayer now has to give 43m of slack for the fall factor to be 0.3!
Table 4 Fall Factors of 0.3 for Some Selected Scenarios

<table>
<thead>
<tr>
<th>Distance abseiled</th>
<th>Slack</th>
<th>Fall</th>
<th>Rope</th>
<th>FF</th>
<th>Slack as % of Distance</th>
<th>Slack as distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1.286</td>
<td>1.286</td>
<td>4.286</td>
<td>0.300</td>
<td>42.857%</td>
<td>129cm</td>
</tr>
<tr>
<td>1</td>
<td>0.429</td>
<td>0.429</td>
<td>1.429</td>
<td>0.300</td>
<td>42.857%</td>
<td>43cm</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>100.000%</td>
<td></td>
</tr>
</tbody>
</table>

A further mitigating circumstance is that the belay device is often set a short distance away from the start of the abseil, often at least 1m or more. This immediately reduces the fall factor (to .243 and .176 in the first two examples of Table 4 respectively), and increases the ratio (which now no longer stays constant) of slack to abseil distance for the fall factor to reach 0.3, as can be seen in Table 5.

Table 5 Fall Factors of 0.3 for Some Selected Scenarios when the belay is distanced from the abseil by 1m

<table>
<thead>
<tr>
<th>Distance</th>
<th>Slack</th>
<th>Fall</th>
<th>Rope</th>
<th>FF</th>
<th>Slack as % of Distance</th>
<th>Slack as distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1.714</td>
<td>1.714</td>
<td>5.714</td>
<td>0.300</td>
<td>57.143%</td>
<td>171cm</td>
</tr>
<tr>
<td>1</td>
<td>0.857</td>
<td>0.857</td>
<td>2.857</td>
<td>0.300</td>
<td>85.714%</td>
<td>86cm</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>3</td>
<td>4.000</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Slide 5 Slack as percentage of distance abseiled for belays from 0 to 5m in ½m increments

When there is a distance between the belay and the abseil starting point, modelling the relationship of the slack in the system to the distance abseiled (i.e., extending the data in Table 5) shows that the ratio of slack as a percentage of the distance abseiled takes on a hyperbolic curve (cf. Slide 5 and Slide 6). This means that the ratio quickly falls back from its high point to 43%. For example, if the distance is 1 m, as in Table 5, the abseiler starts with a “danger zone” of 85.7%, which reduces to 50% by 6m abseiled, and reaches the upper 43% limit by 38m. If the distance from the belay to the start of the
When an abseil is 2m, the abseiler starts with a much higher “danger zone” of 128.6% (i.e., to endanger the abseiler now, a total of 2.5m slack has to be given at the start). This then reduces to 50% by 12m, and reaches the upper 43% limit by 76m only. However, despite the fact that the ratio quickly falls back to 43%, the important thing is that, when the client is in the danger zone (the start of the abseil), the amount of slack needed to endanger the client rises equally as quickly when the belay is moved further and further back from the edge of the abseil. Slide 5 shows how the percentage of slack needed to raise the fall factor above 0.3 rises as the belay moves further back from the edge. Two things are apparent from this. Firstly, there will be a continuous rise in the percentage of slack needed to endanger the abseiler (by bringing the fall factor above 0.3). However, secondly, the increment decreases as the distance goes further back (i.e., the further the belay moves back, the smaller the rate of improvement becomes). At two metres, the belayer already has to give more slack than the distance abseiled (in fact, the double mark is already passed before 1.5m). The increase in safety as a percentage really becomes small after 2.5m (change, and I would consider this to be about the maximum needed to ensure a very safe abseil (at this point, the belayer has to give 1½ times more slack than the abseiler has abseiled to bring the fall factor above 0.3. Slide 6 shows the model for 2.5m only (taken from Slide 5), and there the advantage gained at the start of the abseil is readily apparent.

Of course, other practical considerations may necessitate putting the belay even further back from the edge than this, which is not wrong (and will increase safety even more), although I find that having a belay so far back brings its own problems in terms of practical workability.

In short, when using semi-static ropes for belay, it is thus very important for belayers to be extra vigilant at the start of the abseil. This is still always the danger zone, especially if the belay is close to the edge. Belayers need to be extra vigilant at this stage (and there is no excuse for them to relax their vigilance later on, either).

![Slide 6 Slack as % of distance abseiled for an offset of 2.5m and a fixed fall factor of 0.3](image-url)
Probably the most important consideration, however, for abseil guides is to set their belays just slightly back of the abseil take-off point. The further back the belay, the safer the abseiler. This might not be practical at all abseil sites, however, and needs to be taken into consideration in site design.

It is thus also not necessary to use an industrial shock-absorbing sling as an attachment between the client and the belay rope (in all likelihood, the forces generated will not be enough to activate the sling), but at the same time the guide should pay attention to not allowing long loops of slack to develop in the belay line (which necessitates visual contact with the client throughout the abseil, either from above or below, and also the use of radios for both the top and bottom guides and the client (cf. 3.3.6).

3.3.4.2 Abseil rope

While many operators use 10.5mm ropes on shorter abseils for the cost saving, only 11mm ropes should be used on long or extreme abseils, as they will handle the wear better, and will not allow the client to go too fast near the bottom of the abseil (as would happen with thinner ropes).

Furthermore, ropes may have to be specially ordered (e.g., lengths over 200m), and should a rope be damaged, it may take a considerable period of time for the rope to be replaced. This needs to be planned for, and definite guidelines should be set up for the replacement of ropes (including the logging of rope usage—cf. 3.3.4.3.2).

3.3.4.3 Rope usage

The way in which ropes are implemented differs significantly in extreme abseils to the typical setup advocated for short and long abseils. The extreme setup should, however, be considered for most (or at least all serious) long abseils.

3.3.4.3.1 Number of ropes

For long, but especially for extreme abseils, it is recommended that three ropes be purchased, approximately 5–10% longer than the length of the abseil (see 3.3.4.5). These ropes can then be alternated (i.e., on different occasions, different ropes are set aside as safety, belay, and abseil lines), so that the wear is spread out over all the ropes. This means that, despite the higher initial cost, the ropes will be used for a longer period of time than only two ropes. Alternatively, two ropes can be used and one kept (on site, not in store!) for use during emergencies. The third rope can then be introduced when one of the first two is retired and a new backup is purchased.

3.3.4.3.2 Rope logging

When I did the initial consultation for Semonkong Lodge (April 2003), I phoned most of the long abseil operators in the country, to try and get an idea of how many abseils an abseil rope should be able to take before being retired. To my dismay, it turned out that none of them were keeping detailed rope logs. I consider this to be appalling, and, from a liability perspective, not very judicious.

Simon Bernhardt initiated a rope logging system, which Semonkong is still using (modified in presentation, but not content, by Henk Storm). Basically, each use of the rope should be logged in terms of which ropes were used, which ends of the rope were used, where the ropes were used, what the ropes were used for, who used the ropes, how many uses each rope had, and any additional information the guide considers relevant. Logs should also be kept of the rope inspections done. Also, the characteristics of the rope should be recorded (date purchased, date retired, manufacturer, diameter, length, rope markings, etc.).

Of course, it is possible, but unlikely, that they withheld this information from me in some kind of attempt at retaining proprietary information. This is the kind of information, though, that I think abseil operators should be sharing with each other. There is no reason for “professional secrecy” or jealously guarding operation procedures, since most abseil operators who run permanently installed commercial sites are in totally different locations in the country. There is just no way that they could jeopardize their own operation by sharing such information. On the contrary, they can help each other become more efficient and, as a result, cost-effective.
An analysis of this kind of data gathered over time will help the abseil operator learn how his ropes are handling the wear and tear of abseil use, and will help him plan ahead for rope replacement. Of course, the greatest advantage is that should anything go wrong, it will be possible for the operator to demonstrate that proper care was being taken—something which will be hard to do if no logs are kept.

Lastly, it should be noted that I still believe a rope should be retired, not because a log says so, but because it has failed an inspection. The problem is, with the exception of one operator contacted in 2003, that it seemed as if most operators were also not inspecting their ropes in any sort of formal pattern. It may be sufficient for the guide using the rope to report any irregularities to the operator (if they are not the same person), as guides normally, in the process of running an abseil, handle the entire rope in any case. I just feel that even if that is the form that the inspection takes (which I think is fine), it should be formally logged as well.

3.3.4.4 Rope management

It should be totally unacceptable to use a fixed abseil on most commercial abseils (a small number of possible exceptions exists, but where a choice exists, releasable abseils should always be given preference), and even more so with long and extreme abseils, where the likelihood of having to initiate rescues increases dramatically (cf. 3.6).

Because the possibility of having to lower a client for a distance greater than the spare rope available on the abseil line increases dramatically with extreme abseils, a new rope setup is required. As an example, imagine a client runs into trouble 50m from the ground on a 200m abseil. Because of the length of the abseil, the provider has only purchased 215m lengths of rope, thus only allowing a maximum lower of 15m before the abseil rope has to be released. The guide cannot safely drop 165m rope onto the client (imagine the first bit of slack rope wrapping around the client’s neck, and another 150m of rope then dropping past the client). If a third rope is handy, the guide could attach that to the end of the abseil line, but then has to do this and perform a knot pass, both of which impact negatively on the lower.

A better suggestion is to tie the abseil line to the third line, and then set up the releasable knot in the end of the third line (not the abseil line), as is shown in Slide 7. The rope-joining knot is thus already on the abseiler’s side of the releasable knot, and any rescue operations requiring the engagement of the releasable knot can proceed without a knot pass. This does, however, not mean that guides running long and extreme abseils do not need to know how to perform knot passes. Looking at the setup, the two alternatives for rope use can again be considered. If the third rope is kept as the unused rope, this means that its ends get knotted every time the abseil is set up (the guide should thus be alternating ends for this). But it also means that the integrity of this rope is sound, and the guide thus has the best rope to rely on in abseils. On the other hand, the belay line and abseil line are still the ropes that actually take the beating in the rescue. If the ropes are alternated, then it means that each time the abseil is set up, one rope gets a “rest” as the standby rope.

The same two systems can be used with the two ropes used in short abseils—One rope can be used as the abseil line all the time, and one as the belay line, or the two can be alternated (once as the abseil line, once as the belay line—this is also my own preference). In either instance, the ends of the ropes should also be alternated. It should be noted that in short abseils, this means that the ropes will wear evenly, leading to a situation where the belay line is not necessarily in the best condition in the event of a rescue. However, having a dedicated belay line will not necessarily solve the problem, unless the guide is willing to replace the belay line well before it is due, as some crags may even put more wear on the belay line because of it being dragged over rough or sharp edges on the way down and the way back up for every abseil completed.
Working with so much rope can make for rope management problems at the top of the abseil. Thus the abseil guide needs to have an organised way of dealing with the long ropes used. Also, pulling the belay rope up after each client is quite a work out. The short and most practical solution is that the guides must build muscle! The advantage is that on a long or extreme abseil, there are less abseils to be done and each abseil takes longer. This means that there is a lower frequency (but much greater distance) of times that the belay rope must be pulled up, and the recovery time is also increased the longer the abseil gets. Another option is to have more staff than usual so that the task of pulling the long rope can be shared. A reel or winch can be used to bring up the rope. The best way of actually pulling the rope up manually is to connect a Jumar or prussik to the rope and “walk” it up so as to take the load off the guide’s arms (i.e., the guide’s arms are straight all the time—his legs and body do the “pulling”). Then only the last few metres (which are much lighter) can be pulled up in normal fashion to save time.

### 3.3.4.5 Rope care

Dirt in the rope may cause it to stiffen and shrink. Beal product brochures report that a rope may shrink by up to 10%! On short abseils, this is probably never noticed, but on a long or extreme abseil, where the operator may be working on the limits of the rope length, this may become a problem. As an example, a mere 2% shrinkage on a 50m rope results in a loss of only 1m, but the same 2% shrinkage on a 200m rope results in a loss of a full 4m! This may be the difference between the client reaching the bottom of the abseil or not. Should shrinkage be observed, the rope can be washed (natural soap [e.g. Nikwax Tech Wash, Woollite] only!), and this should partially resolve the problem. It is better to anticipate the shrinkage, and buy the rope long enough to cover shrinkage. In fact, Beal even recommend pre-shrinking ropes by submerging the new rope on the reel and then leaving it to dry.
A further problem may be experienced in setting up the abseil. Dropping the abseil rope down is not advisable, as it is hard on the rope. Amongst others, the rope itself can be damaged from being smacked across the rock, the rope could cause whiplash (although the rope should not be dropped if the landing zone is not clear), and if the rope is partially thrown relying on weight to pull the rest down the accelerating rope on the rope of the cliff can pull an unwary person off his feet or even over a cliff face. However, while it might be possible, in some circumstances, to lower a long loop of rope down the cliff, and then throw the end of the rope down, this is generally not advisable, as on a long abseil, this loop itself may snag on something (protruding rock, tree, etc.) and cause problems, and it is, in itself, a great candidate for whiplash. Furthermore, if the rope is the correct length, the drop will not be so hard on the rope, and using a proper rope bag with a tie-in allows the guide to throw the rope bag over the edge, with the rope coming out as the bag falls—the bag takes most of the punch, not the rope. The only other alternative would be for the guide setting up the abseil to do the abseil while feeding the rope out from a rope bag. Note that this is not always feasible or desirable—the context of the abseil site will determine which of these last two options will be followed. Regardless, it is vital to check the abseil line (if possible, this can be done visually, e.g., with binoculars) for snags, tangles or knots.

A further problem may be experienced by the large amount of wear placed on the rope when pulling it up (the abseil line after the day’s abseiling, and the belay line after each abseil). The only solution is to pad the areas that can be padded (the longer the abseil, the less control you have over this—e.g., sharp edges on the way down), especially the top edge at the abseil site (where the rope is pulled over with the full weight of the rope, which can be quite considerable on a long or extreme abseil). Also, by rotating the ropes (i.e., between abseil, belay and standby, as suggested in 3.3.4.3.1) and the rope ends, this wear can be distributed evenly across the ropes. Note that this can only really be done effectively if very accurate rope logs are kept.

### 3.3.5 Harnesses

Long and extreme abseils require a bit of a rethink of the selection and application of harnesses, as will be shown.

#### 3.3.5.1 Sit harness

Standard alpine harnesses commonly used on short abseils (especially due to their one-size-fits-all characteristics) should generally not be used on long or extreme abseils, as sufficient padding is essential for an abseil that may take an inexperienced client up to an hour. This also means that various sizes of padded harnesses (which are generally not one-size-fits-all) may need to be purchased. It is not necessary for the harness to have adjustable leg loops. In my experience, this only creates frustration when clients loosen the leg loops in the process of taking the harness off, leaving a Chinese puzzle for the guide to sort out, when other more important things generally need seeing to.

#### 3.3.5.2 Chest harness

Although long or extreme abseils can quite comfortably be done in only a sit harness, this is not advisable, as, should the client become unconscious, their body position will result in Suspension Induced Shock Syndrome (or Harness Induced Pathology). An additional chest harness or a full body harness may ease, but not solve the problem (i.e., it gives you more time to safely execute your rescue). However, the chest harness should not be connected in the conventional climbing style (belay rope fed through the loops of the chest harness, then tied to the sit harness), as this will mean that when the belay rope is released during a pick-off, the chest harness is removed from the “system.” The chest harness should also not be connected directly to the sit harness with a karabiner, as this in effect eliminates this function of the chest harness—the client might then as well not have been wearing the chest harness. Even though a configuration such as the latter (chest harness connected directly to the

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14 The argument that this is detrimental to the rope and the anchor system because the rope is very heavy and its lack of elasticity causes a high impact force has been answered in 3.3.4.1.
sit harness with a karabiner) will still prevent “hipless” clients such as small children or obese people from the unlikely event of falling out of the sit harness, it should be noted that this is not the main reason why chest harnesses are recommended for long abseils. It should be reiterated that the only real reason for getting clients to wear chest harnesses is in the case of an emergency situation, especially a situation where the client might become unconscious.

Slide 8  Chest harness setup for long and extreme abseiling (with maillon and express sling or 30cm sling) (Photos: R. Thomas; J. Raubenheimer)

The best attachment system is as shown in Slide 8:

- A short sling is attached to the sit harness—either with an oval Maillon and a 15cm quickdraw sling, or a Lark’s foot in a 30cm sling.
- The chest harness loops are attached to each other and to the short sling with a Demi-rond (or even a Delta maillon). The sling should be placed in-between the two chest harness loops (i.e., over the screw section of the Demi-rond).
- The abseil device is then attached to the sit harness (as if the client were not wearing a chest harness) and the belay line is attached to the Demi-rond.
- In the event of a pick-off, the rescue sling is attached to Demi-rond, which then becomes the main point of suspension. The client is then suspended in a slightly forward slumped position, not arched backwards like an upside down skydiver.

Of course, one might ask whether extreme abseils should then not be done in full-body harnesses. Given a rescue situation, the full-body harness will, in fact, be better, but considering the low likelihood of having to do rescues, the sit harness is more comfortable to the client, and the chest harness does provide the basic security needed in a rescue.

3.3.6 Radios

Communication at an abseil is almost always a problem, barring for the shortest of abseil sites, but at long or extreme abseils, difficulty in communication is a given. The ideal solution is to kit out all the guides and clients with waterproof, throat-mounted, voice-activated radios, although this is very
expensive. At the very least, the top and bottom guides should be able to communicate with each other with radios, so that at all times, the guide who has the client in sight can communicate with the guide who does not have the client in sight.

### 3.3.7 Gloves

The length of rope that has to pass through the client’s hands, and vastly different friction levels at the top and bottom of long and extreme abseils, mean that gloves should be standard (compulsory?) issue on long and extreme abseils.

### 3.4 Abseil technique

The length of long and extreme abseils requires a number of changes to be made to the abseil technique for a successful and pleasant experience. The longer the abseil, the more the changes that need to be made. Most of the issues centre around the fact that the longer the abseil, the greater the weight of the abseil rope (commercial abseiling generally cannot be presented safely and efficiently using the standard climbing approach of multi-pitch abseiling).

#### 3.4.1 Abseil device

The most obvious change is that standard abseil devices are no longer sufficient. As was discussed in 3.3.2, the Rack is the only device currently recommended for long and extreme abseils. For long abseils, using the Rack may be enough to accommodate all that lies ahead. But for extreme abseils, additional changes to standard abseil technique need to be made. These are discussed in 3.4.2 and 3.4.3. Sections 3.4.4 and 3.4.5 are again applicable to both long and extreme abseils.

#### 3.4.2 Starting the abseil

The very first challenge the guide faces is just to engage the Rack on the rope. It is generally best to do this with the Rack not clipped to the client’s harness (something which can be done on short abseils). If the client is already tied in, the client can assist the guide in pulling up a short length of the abseil line, and then holding it while the guide quickly engages the Rack into the slack part. Alternatively, an assistant (also tied in!) can help the guide, or the guide can pull up the abseil line with a prussik attached to their harness. Only very strong and very adept guides will be able to pull up 200m or more of rope with one hand and then attach the Rack with the other, although it is theoretically possible.

Clients should be aware that the weight of the rope will be felt very strongly once the Rack is clipped to their harnesses. They definitely need to be tied in when this is done, although, if properly pre-trained (cf. Section 4), they should be adequately prepared for this. The weight of the abseil rope means that clients may find it hard to lift, and they will not be able to move down the rope unless they lift the rope. The short answer is that the client will have to have the stamina to lift the rope many times in order to complete the abseil. It is, furthermore, **not advisable** for the guide to hold the weight of the rope for the client to help them as they approach the edge of the abseil, and then release it once they are progressing down the actual cliff face (i.e., the client starts on a loop of rope, and when the bottom of the loop is reached, the attachment point above is released, and the loop straightens out). This can cause rope snagging on long abseils, and thus necessitate emergency procedures (although this might be suitable for some long abseils with a clear drop, it is improbable that it would work in extreme abseil situations). The jerk on the client when the rope is dropped could also unsettle fearful clients, although preparing them in advance for this will obviously help.

A better solution is to pre-train the client in the technique of engaging additional bars on the Rack (cf. 3.4.3). This means that the client can then start with three or four bars (depending on their weight—cf. 3.2.1.1—with most clients starting with four bars, and very light clients only with three) and can then engage the remaining bar(s) as they get lower down and the speed increases. This will mean that even experienced climbers will have to go through the pre-training, as most climbers have never even used a Rack, and even those that have, will probably not have fiddled with bars in the middle of an abseil (cf. 3.2).
Correct manipulation of the rope will also allow the Rack to slide even with great weight (thus it is possible for two people to abseil simultaneously a short distance apart on a long rope with Racks). Generally, lifting the rope into a near-horizontal position will allow the Rack to slide a bit easier, and bringing it up above horizontal again slows the Rack down. By playing around with the rope, and varying its position from the “at rest” position of straight down, to more horizontal positions will allow abseilers to manipulate their speed with the rope (within limits).

This abseil configuration for starting the abseil (with not all the bars of the Rack in use) necessitates the discussion of a further technique modification—the introduction of the remaining bars during the abseil.

### 3.4.3 Introducing additional Rack bars

Starting an abseil with a Rack on three or four bars is fine, as this means that less friction is experienced at the top, and the abseiler can negotiate the top section easily despite the immense weight of the abseil rope. However, this means that as the abseiler approaches the end of the abseil, and the weight of the remaining portion of the abseil rope decreases, the friction becomes too little. This means that the remaining bars of the Rack have to be introduced, and the client may even have to be shown how to increase friction on the Rack even more. It should be noted, however, that starting an abseil on too few bars (i.e., mistakenly setting up 2½ bars instead of 3) is suicidal. When testing the Rack, this error was made, with near-disastrous results.

The general technique is actually quite simple, and can be mastered with a very small amount of practice. The idea is to lift the abseil rope into a more-than-horizontal position\(^\text{15}\) (thus compressing the Rack bars and stopping the descent) and then up vertically, so as to loop it over the top of the device, and thus soft-lock it\(^\text{16}\). Once this has been done, the next bar can be introduced, and the rope unlocked and brought down, and the abseil resumed. A fair (but not unreasonable) amount of pressure may be needed to click the bar into place, as the Rack will be under tension. If the client has started with three bars, both bars can be introduced at once (although the unlocking and locking procedure will have to be done in-between so as to thread the rope between the two new bars), or on two occasions. Most clients will only have to introduce the last (fifth) bar.

For some clients (e.g., very heavy clients; clients using SS Racks), the five bars of the Rack may actually not provide enough friction at the bottom of the abseil. The guide may choose to clip a karabiner into the top loop of the Rack (assuming that a J-shaped, not U-shaped, Rack—such as the Petzl Rack—is being used). The client can then, after all five bars have been introduced, and still more friction is needed, lift the rope again as if to soft-lock the Rack, but then, instead of locking it, clip the rope through the karabiner\(^\text{17}\), and then bring it down again and continue abseiling. The presence of the karabiner does not hamper soft-locking the Rack.

### 3.4.4 Spacing Rack bars

One last technique which is made possible by the Rack is that clients should be taught to control the spacing of the Rack bars. When the abseil is started (especially when not all the Rack bars have been introduced), the bars should be widely spaced, so as to minimise the friction of the device. When more friction is required, the bars can be tightly spaced (i.e., pressed up to the top of the Rack). This can be done easily with the non-rope-controlling hand, and makes a huge difference on its own, apart from all the fiddling of introducing additional Rack bars (although it does not make the need for that technique redundant).

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\(^{15}\) Remember that this is required because of the reduced friction on the rope near the end of the abseil, and the amount (and weight) of the rope that has to be lifted is thus greatly reduced.

\(^{16}\) Although abseilers very experienced in the technique can add the additional bars very quickly without even going into the lock, it is, from a safety point of view, desirable to lock it.

\(^{17}\) Note that if a screwgate karabiner is used (and a clip-gate may actually be more desirable), the client should be taught to check that the gate is unscrewed before starting this procedure, as it is irritating (and can be unsettling) to attempt to clip the rope through a locked karabiner. Obviously, twistlock karabiners are not ideal in this situation.
3.4.5 Rope placement
For some odd reason, perhaps because of the history of abseiling from classic to semi-classic style, to using abseil devices, abseilers tend to let the rope pass to the side of their dominant hand. While there is nothing inherently wrong with this, it is very unpractical when dealing with the weight of a long or extreme abseil rope. A better configuration, which also works well on short abseils, is to let the rope pass down between the abseiler’s legs. Granted, the side of the leg can then no longer be used for additional friction, but the abseiler can grip the rope comfortably with both hands, giving better control, and more friction.

3.5 Abseil guides
Guides running long and extreme abseils need to be prepared for a much wider range of eventualities than in standard abseils. This may seem to be evident, but it has been our experience that the general approach to running long abseils (and to training people for long abseils) has been to simply extend techniques and situations from the short abseil environment to the long abseil environment. Although this generally holds, we have found that it is not always adequate. Long, and especially extreme abseils provide new situations which require new solutions—a literal paradigm shift has to be made (cf. the sections on using three ropes instead of two (3.3.4.3.1), attaching the chest harness (3.3.5.2), using the rack (3.4), and rescues (3.6) for a point in case).

3.5.1 Belaying
The weight of the belay rope can give the belayer the impression that the client is moving when they are not, causing a large loop of belay rope to develop. This can be fatal if the client falls, and it may cause tangles in the belay rope, thus necessitating a pick-off. A visual of the rope and communication to the belayer is vital at all times. The full length of the drop must be able to be covered visually by a combination of the guides at the top and the bottom. Having a client out of sight to all guides is not conducive to problem solving. Again, communication between the top and bottom guides and the client via radio is essential (cf. 3.3.6).

3.5.2 People skills
Abseil guides need people skills, regardless of the height of the abseil they are working on. Nevertheless, abseil guides working on long and extreme abseils have to guide their clients through much greater challenges, and they need to work on their people skills to a greater extent.

Guides need to be able to inspire confidence in their clients, not only through demonstrating technical competence (see how your clients start getting nervous when you stand in front of them trying to figure out a knot…), but also through a confident personality. Furthermore, guides need to be able to comfort scared clients, help them focus on the task at hand, and cut out extraneous disturbances. Guides also need to be able to assume control of the abseil site, and must be able to exercise that control, even over sometimes unruly clients waiting in the top holding zone (especially the know-it-all clients who’ve abseiled twice before in their lives, ten and five years ago, and are now abseil experts).

Furthermore, guides need to be able to stay calm and focused in emergency situations, and need good decision making skills (the product of experience gained in the mountains) when things turn pear-shaped. Some situations I have had to deal with, from the common to the less common, are clients inverting themselves during the abseil (a common occurrence, which happens when the client gives slack on the abseil device but does not move their feet); stuck hair and clothes; clients who land on comfy ledges and decide that they do not want to go any further; a client getting stuck at a knot in the rope (don’t ask!) in the middle of a 205m abseil; getting benighted at the top of a cliff which the clients had climbed up (i.e., they had to abseil back down again) with three clients abseiling in the dark, and me breaking the belay up at the edge of the cliff and then down-climbing a chimney in pitch darkness and no headlamp (an incompetent assistant guide had a big share in creating this epic); and, finally, being on the side of a mountain with school children doing an abseil when a veldt fire swept the mountain…
3.6 Rescues

As a matter of good practice, long- and extreme-drop abseil supervisors should be encouraged to maintain their rescue skills by performing all the various rescue drills on a regular basis. Furthermore, the process of planning and preparing for, and executing rescues, changes dramatically as abseils go from short to long to extreme. Each of the three most common rescue techniques will be discussed, after some comments on rescues in general.

3.6.1 General comments

Note that the longer the abseil becomes, the more likely it is that rescues will have to be initiated. This means that abseil guides running long and extreme abseils need to be properly trained and prepared. They should also have regular rescue drills/training sessions, so that they can anticipate problem situations and know that, not only do they know what to do, but that they have already (albeit only in simulation) done it before. Of course, this means that rescue drills will probably place extra wear on the equipment (i.e., equipment lifetime—especially on ropes—is reduced), and this needs to be budgeted for. Always bear in mind that it is easier (and probably less expensive) to budget in advance for rescue training that it is to pay for incompetent bungling on a rescue.

It should also be noted that in rescue situations it can be hard to know if a client is in trouble, as you can’t hear them. Again, the use of radios and the necessity of maintaining visual contact (whether from above and/or from below) with the client at all times must be stressed. One could arrange a signal for the client to use if they have any trouble that they can’t deal with by themselves, although this is difficult: e.g., a series of short, hard jerks on the belay rope will probably not be noticeable on such a long rope. Also, waving arms might not work if the client is far from, or out of sight of, the belaying guide. A strong enough whistle can be used, although the client should be practised in its use, and this system is also not foolproof, as the client may be unconscious, or simply too stressed to use the whistle. A time limit can be imposed after which the guide automatically initiates a rescue (e.g., if the client has not moved for 10 min, the guide will initiate a pick-off). But in extreme situations this time delay may be too long (e.g., the client hanging unconscious in the harness for 10 min).

In contrast with short abseils, the general order of most probable problem solving techniques in a long or extreme abseil will be:

- Near the start: 1) Hauling; 2) Pick-off; 3) Lowering
- In the middle: 1) Pick-off; 2) Lowering; 3) Hauling
- Near the end: 1) Lowering; 2) Pick-off; 3) Hauling

The reasoning for this is as follows:

Near the start of an abseil, the distance to be hauled is little, and the weight of the belay line is also little. However, because of the nature of high cliffs, lowering the client to the ground from near the tope will almost always be impossible. Thus pick-offs gain precedence over lowering (with short abseils, pick-offs are always the last resort).

In the middle of a long or extreme abseil, hauling becomes impractical. The belay line has become weighty, in and of itself, and the distance to haul has just become too great. Lowering to the ground might still not be practical, because of ledges, etc. Pick-offs thus become very likely.

Near the end of the abseil, where all the major obstacles have already been passed, and a clear path exists to the ground, lowering becomes the first choice. Pick-offs are still more sensible than hauling.

It should be noted that, in certain instances, combinations might also be used—e.g., a client can be lowered to a ledge, and then a pick-off initiated from there.

Note that this ordering of rescue procedures will vary, depending on the exact circumstances requiring assistance. The choice of rescue technique, and even the order listed here, will of course vary from site to site, and will be influenced by the considerations relevant to that site: The guide needs to be
competent enough to make the right choice and to carry through his choice. Lastly, err on the side of caution and safety in terms of whether to do a pick-off or not.

3.6.2 Lowers

The common configuration of the releasable abseil used in short abseil systems is not suited to long or extreme abseils. The chief concern is that in a rescue situation one will probably not have enough extra rope on the abseil line to lower the client all the way to the ground with both the belay line and the abseil line. This would mean that the abseil rope would have to be thrown down past the client as they are lowered, but this could cause all sorts of problems, due to the length and weight of the rope—imagine the weight of 150m of rope dropping on the client’s head, or, even worse, imagine the rope tangling around the client’s neck and then exerting that weight as it falls; the possibility of the abseil rope tangling on something on the way down and preventing the successful lower also increases with the length of the abseil. Finally, if the guide should feel that it is not warranted to drop the abseil rope, but there is not enough rope to perform the lower without doing so, then the lower is excluded, and the guide is forced to do a pick-off.

The rope setup recommended in 3.3.4.4 will allow lowers to be performed on the entire length of the abseil without having to release the abseil rope at all. The guide can simply perform the lower on the belay line, and pay out the abseil line using the third rope. There is a small chance that the knot could snag on the way down, although the old coke-bottle trick used by trad climbers can help reduce this as well.

3.6.3 Pick-offs

Using the harness system recommended for long and extreme abseils (cf. 3.3.5.2), pick-offs can be made quite simple. The procedure is much the same, barring that now the pick-off sling’s client attachment is clipped into the Demi-rond on the chest harness. Because of the linkage with the sit harness, this takes the client’s full body weight safely, and in the correct posture. The belay rope is then detached from the Demi-rond and the rest of the procedure is as per normal. Note that the Demi-rond offers lots of working space (in contrast to fiddling to get multiple karabiners clipped into and out of the sit harness’ belay loop), and actually makes the whole procedure a lot quicker, easier and more efficient. Also, while the chest harness will help save the client’s life, it is by no means a comfortable set-up. When the belay line is tied off and slack given on the abseil line, the client’s weight is taken on the attachment point—the Demi-rond. This causes the chest harness to ride up, chafing the client’s shoulders, and possibly even causing discomfort around the neck. This is especially a problem if the sling connecting the sit and chest harnesses is too long, or the chest harness is too loose.

3.6.4 Hauling Systems and Hoists

Hauling systems may be required for long drops—it’s easier to haul the client up a metre or so (thereby removing their weight from the abseil line) to solve a problem before lowering them back onto the rope than to go into a pick-off. Note that this hauling system may again require the introduction of a third rope.

Even with a third rope, an assisted hoist will only be feasible in the first third (or less) of the abseil (and definitely will only be practical in much less than a third), although a haul could be executed at greater lengths. However, the weight of the rope and friction with the rock makes hauls less and less appealing the further down the client is.

4 Training for long and extreme abseils

Instructors (i.e., people who train abseil guides) and long and extreme abseil guides themselves (who must prepare novice clients for these abseils) have a common circular problem: How do you train

18 It goes without saying that giving slack on the abseil line with the releasable abseil system is to be preferred to hauling the client up to reduce tension on the abseil line, but situations may occur where this is not feasible, but a short haul is. If the client is then able to solve the problem, this will then still have been preferable to having performed a pick-off.
someone to do (or run) a long abseil, without putting them on the abseil? And how can you put them on the abseil without training them first? For instructors, the problem is especially acute. As was shown in Table 1, there are only nine known commercial abseils above 100m. Some of these operate on a very infrequent basis (which means that seeing them in operation as part of training is unlikely, although it does mean that their facilities might be hired for the purposes of training). Others operate on such a turnstile basis, that even just visiting them for a training demonstration of how they are run is difficult. Also, it is very costly and highly impractical to take trainee guides to these sites for training. Should training in long and extreme abseils then be given as a standard option at all, or only by the select few who have easy access to a suitable site, and who devoted aspirant trainees will be willing to travel to, in order to receive their training?

Fortunately, as pilot training has shown, there is a solution: Simulation. I have found that guides can be trained quite thoroughly in a simulation environment, and can then very successfully translate those skills to the real world situation of long or extreme abseils. Also, clients, if not for long then at least for extreme abseils, can be pre-trained by simulation on short abseils, and then cope very well with the demands of the real thing. It should be noted that most long abseils can actually be tackled by complete novice abseilers, provided they are run well by experienced guides, and the correct equipment is used. However, extreme abseils (which require clients to add Rack bars) need pre-training. I would say that even experienced climbers should undergo pre-training (they may take to it quicker than the novice client), as the experience of adding Rack bars will be new to 99.9% of all climbers.

4.1 Simulation of extreme abseils

Only one simulation scenario will be discussed: That of pre-training for clients. Obviously, instruction for guides will use exactly the same principles. Basically, all one wants to do is simulate two conditions: Those at the start of the abseil, when the rope is very heavy, and those at the end of the abseil, when the rope is very light. This can be done on any suitable short crag. The first thing to do is calculate the weight of the rope, which is quite easy. For example, the Maletsunyane abseil is 205m, so at 80g/m, this would give us 16.4Kg of rope. Although people with white coats and thick glasses could work out all kinds of formulae to estimate these more accurately, the guide should also anticipate other environmental considerations. For example, on any crag, the amount of friction of rope on rock would be considerable, and would add probably in the vicinity of 50% to the weight of the rope (I would venture that this would even be the case on a not-overhanging short abseil—if the rope only weighs 1Kg, most of us wouldn’t notice the extra 500g added by friction). Also, water might be a consideration (the Maletsunyane abseil’s bottom third is typically soaked in the spray of the waterfall). And even wind can change things considerably (e.g., on the exposed buttress used for the Rooikrans abseil). I have found that adding about 20Kg of weight in a rope bucket suspended just above the ground works very well. What guides at the Maletsunyane abseil do is suspend one full rope in a rope bag just above the ground. This excludes the “weight” added by friction and water, but still trains clients very well. The rope bucket should be suspended no more than ½ metre above the ground (so that the clients can get off the rope when they reach the bottom) but should also not touch the ground, even when the clients’ weight is added to the rope, so that the clients can experience the full weight of the rope. Simulation of the second condition is then very easy—the weight is simply removed.

Training of the client then follows this pattern:

- Clients begin the abseil with the full weight, and the appropriate number of bars for the start of the abseil (typically 4) engaged.
- Clients should practice speeding up and slowing down their descent by adjusting the spacing of the bars.
- Next clients should practice raising the rope (and thus scrunching up the bars) to bring themselves to a standstill.
- The weight can then be removed. Clients need to do at least one abseil with the same number of bars (gloves and a good belay are mandatory!) as started out with, so that they can experience and understand the effect of the reduction of the weight of the rope as the approach the end of the abseil on their speed of descent.

- Finally, clients need to learn to engage the remaining bars, and, for heavy clients, even introducing more friction using the top karabiner (which needs to be installed), or at least again adjusting their friction by spacing the bars tightly. Clients can actually learn to install the extra bars quite easily.

This whole process may take four or five abseils per client, depending on how quickly they acquire the skills, and this is quite sufficient to allow them to tackle a well run commercial extreme abseil.

4.2 Additional guiding skills for extreme abseils

One additional piece of training (which is not included in the typical pre-training for clients) remains for instructors training guides: The guide’s own use of the Rack on an extreme abseil. This takes the form of two additional skills which need to be mastered (over and above just learning to use the Rack very well): Firstly, the guide needs to learn to self-belay the Rack (guides cannot always rely on another guide and/or another rope being available for an independent belay). Secondly, the guide needs to learn to perform most rescue operations with the Rack as the abseil device (e.g., the guide should be able to do a knot pass and a pick-off using the Rack).

4.2.1 Self-belaying with the Rack

Much debate has gone into a very elementary principle of self-belay, which suddenly becomes quite complicated when the Rack is the belay device: Should the prussik (or other self-belay tool) be placed above or below the Rack? Arguments for both positions exist. Those arguing against putting the prussik above the Rack point out that the prussik may slip out of the guide’s reach when it engages. Furthermore, the prussik is much harder to control and keep free when it is above the Rack, which could result in frequent snagging (inadvertent engaging of the prussik) and also burning of the prussik sheath. Those arguing against putting the prussik below the Rack point out that the free end of the rope needs to be lifted up in order to lock the Rack, a process which is very difficult to do—to lock it, the guide first has to stop the Rack by lifting the rope, but cannot do this because the rope is running straight down to the prussik, and any attempt to pull slack up through the prussik without the rope being lifted results in the abseiler (guide) just slipping further down the rope. Also, locking the Rack by taking the rope below the prussik up over the Rack is a sham, as it does not really scrunch up the Rack bars, which is essential for a sound lock. Finally, if the spacing between the prussik and the Rack is not big enough (e.g., when, on most harnesses, the prussik and Rack are attached to the belay loop—many climbers have a not unjustified aversion to attaching prussiks to their harness leg loops), engaging the prussik could cause it to creep up and get pinched in the bars of the Rack—a real and true mess. My own point is that it is best to have the prussik below, as just engaging the prussik is already equivalent to introducing a soft lock on the Rack, and if a hard lock is really desired, a tandem prussik (such as is common practice amongst rope rescue workers) can be used. This works especially well when two prussiks of different lengths are carried.

Two further points need to be made: Firstly, using prussik to lock the Rack does not mean that trainee guides no longer need to learn the proper technique for soft- and hard locking the Rack. These definitely need to be taught, together with a proper explanation of why they are difficult to use when the self-belay prussik is below the Rack. Secondly, I have found that many people do not understand the principle of self-belaying with a prussik, and make a common error which also leads to snagging and sheath burn: They attempt to keep the prussik open by keeping it in their hands. This is incorrect. The hand should be just above the prussik, gripping the rope, not the prussik. The hand will then also be pushing (keeping) the prussik down, and thus open—nothing more is needed. And if something goes wrong, and the hand is removed, the prussik will engage immediately.
I have also seen one error performed by rescue teams with training only in rescue and little climbing experience: They attached themselves to the prussik by means of a dynamic cow’s tail (the problem is not the dynamic vs. static rope, but the length between the prussik and the harness). This meant that when one of them did take a fall, a very dynamic load was placed on the prussik, which burned right through its sheath.

In summary, then, the best self-belay configuration, I believe, is for the Rack to be extended only slightly from the belay loop, and a French prussik to be attached directly to the belay loop, which is then kept open by the controlling hand gripping the rope directly above the prussik. The guide should also carry at least one more prussik (I prefer two more), preferably of a different length.

4.2.2 Doing a pick-off with a Rack

Abseil guides are particularly fond of doing pick-offs with Grigris, as the autolock of the Grigri is just brilliant in this situation. However, Grigris simply get shut down on long and especially extreme abseils, when the weight of the rope is too much for the Grigri to even be able to descend. The chief problem with doing a pick-off using a Rack is that it is a very long abseil device. As such, it is too long for most standard pick-off slings—the guide cannot reach above the Rack to install a prussik or other device for a pulley for hoisting the client. Guides should either learn to perform counterweight pick-offs with the Rack, or adapt their equipment (e.g., using a daisy chain) so that they have very short pick-off slings.

Having said that, the ability of the Rack to introduce more friction (e.g., with a top karabiner installed), is brilliant for all abseils (short, long or extreme), as guides often struggle to control the doubled weight once the client is also attached. I believe that the use of the Rack for pick-offs should be standard training, regardless of abseil length, although I do realise that many short abseil guides do not have Racks as part of their standard equipment.

In order to understand what is means by a counterbalance pickoff, a short description of the standard and counterbalance techniques will be given. Generally, the counterbalance is to be preferred. Also, the discussion below does not consider the assisted abseil, which is also a useful technique to know, but is generally only possible when the client is capable of co-operating in the procedure (i.e., in conditions which, in abseil guiding, are unlikely to necessitate a rescue in the first place).

4.2.2.1 Standard pickoffs

It should be noted that pure rescue manuals such as the CMC Rope Rescue Manual do not even consider hoisting clients, apart from using an assisted hoist technique know as the vector pull. They simply advocate connecting the client to the pickoff sling, and then cutting the rope (preferably with utility scissors or a safety knife). It has, however, been standard practice (at least amongst the MDT instructors I have worked with) to advocate a hoisting of the client so as to disconnect the belay line. This may be because instructors hate having their ropes cut off bit-by-bit just for the sake of training, and it may be from a healthy aversion to working with sharp objects near ropes (we have all scoffed at Vertical Limit, haven’t we?). Nevertheless, I will give a summarised explanation of the standard technique here, and will give a more extensive discussion of the counterweight technique below, so as to avoid points which they have in common.

In the standard procedure, the guide abseils to the client, locks off the abseil device, connects a prussik to the abseil line (on which the guide has just abseiled), then connects a sling to the client’s harness and loops it through a karabiner or pulley (the DMM Revolver works nicely here) connected to the prussik (it is at this point where the long Rack becomes a liability). The guide then stands up in this while pulling up the client, which hopefully lifts the client enough to be able to disconnect. It is an uncomfortable procedure, at best, and is often difficult to execute successfully.

4.2.2.2 Counterbalance pickoffs

Slide 9  Connecting guide to client in a counterweight pickoff (Photo: J. Raubenheimer/A. Friedemann)
A fuller explanation of a pickoff is given here. Once the guide has made the decision to do a pickoff, the first step is to tie off the belay line. Then the necessary arrangements (e.g., instructions to the remaining group of clients on top of the cliff, instructions to other guides, possibly calls for medical assistance, etc.) are made, after which the guide can prepare to go to the client. Once the necessary
equipment has been gathered—basically, a pickoff sling, an extra prussik (over and above a normal set, which is used for self-belay) and a long sling (preferably a length of stout accessory cord in which a Mariner’s hitch can be made) with an extra karabiner—the guide gives slack on the abseil line sufficient for the Rack to be connected and the guide to abseil on. When reaching the client, the guide should make certain that all the bars of the Rack are engaged (to handle the extra weight), unless the client is very close to the top on a long or extreme abseil (and thus still has substantial rope weight below). The guide then locks off the Rack (in the slides below, simply by engaging the French prussik self-belay). The guide should be a little higher than the client, but just able to connect the pickoff sling to the client’s harness. The client is then doubly protected. Next the guide attaches the prussik to the tensioned belay line (note the difference from the standard procedure), and connects the sling to the client’s harness, through the karabiner/pulley, and then to the guide’s own harness (again note the difference). However, a crucial point is that the sling should not be simply clipped into the guide’s harness, but should be attached with a releasable knot (e.g., the Mariner’s hitch). This will give the configuration shown in Slide 9. Note the extra karabiner clipped into the top of the Rack, which will assist the guide in slowing the descent when they reach the bottom of the abseil. Also note the Mariner’s hitch tied to a HMS karabiner on the guide’s harness.

Once this connection has been made, the guide releases the Rack, and slowly abseils down the rope (Slide 10). This utilizes the guide’s own body weight to raise the client. The further advantage is that the belay line is now tensioned, via the prussik, with the body weight of both the guide and the client. The guide thus no longer needs to overcome the (possibly substantial) stretch in the rope. The downside to this, of course, is that once the weight has been transferred, the guide will be abandoning the prussik and karabiner, as the stretch will take these items quickly out of reach. Once the belay line below the prussik is slack enough, the client can be detached, the sling untied (e.g., the Mariner’s hitch), and then the client’s weight gently lowered onto the pickoff sling. The guide can then abseil down with the client.

5 A day in the life of an extreme abseil guide

In order to make everything practical, a quick summary of the typical operation of an extreme abseil will be given. Since this is based on the recounting given to me by Simon Bernhardt of his work at the Maletsunyane abseil, I will use him as protagonist. We need to consider that as this is the Drakensberg and the weather can play a critical role, therefore all the timing has been calculated accordingly.

At 4h30, Simon gets up, drives to the drop-off point alone and does the 2km hike into the abseil site (with 650m of rope, some trad anchors, and other gear!). At 05h30 he rigs the abseil by setting up two belays, and setting up the first rope as a belay line through a Rack. Then he ties the second and third ropes together, and ties a releasable knot in the third rope, attaching it to the abseil belay. He throws the second rope over the edge in a rope bag, as the abseil line. He then does the abseil, using a self-belay, to check that the setup is ok and there are no knots in the main line (due to the length of the abseil this cannot be a visual check!). Then he hikes out of the gorge, and returns to the lodge at approximately 06h45, where he meets the clients for a quick coffee before an early departure. The clients have all done the pre-training with him the previous day, and know what to expect. After coffee and maybe a quick snack (taking into consideration that the clients are all taking a packed breakfast/lunch along with them), they head out to the gorge (around 07h30), and after a 20 minute drive and a short hike they arrive at the abseil point at about 08h00.

At this point all the clients get to absorb the view and the extent of the abseil from the safety zone. The bottom site guide is rigged up into the system as the first person to abseil. This way the clients have the opportunity of witnessing the setup and someone else abseiling without anyone of the clients being the first person to abseil—this helps to overcome the mental obstacle of being the first client off the edge. It also gives all the clients the opportunity to observe the full procedure. The bottom site guide then abseils to the bottom where he will wait in the designated safety zone to assist all the clients through the slippery rocks and to the safety zone as they reach the bottom. Simon then pulls the safety line.
back up to have the rig setup for the first client. If the timing has all gone well the first client will be starting his abseil around 09h00.

Simon ties the first client into the belay line, attaches the Rack to the abseil line, clips the client in, and gives the ok to the client (this is when all the encouragement is needed, and this sometimes takes up a little time). The client does the abseil, and at the bottom is collected by the bottom site guide. He helps the clients through the sea of loose and wet rocks at the bottom of the abseil, and takes them to the bottom holding zone, from where they can watch their friends do the abseil. Simon pulls up the rope, and repeats the exercise. Due to the length of the abseil and the exposure of the environment this tends to average at around 45 min complete turnaround time per client. It will be about 13h00 before the fifth client finishes. This gives Simon about two hours to break up the abseil (after the last client, he has to pull up the belay rope and the abseil rope), and return to the client collection point at the top of the gorge, the clients hike out of the gorge where Simon is waiting with the vehicles to take the client back to the lodge. The hike out can take up to 2 hours so the last client will reach the vehicles at around 15h00. The time frame for the whole operation means that Simon has very little time left for executing rescues, if something should go wrong. Five is the maximum number of clients he can typically take out in a day. This is taking into consideration that on a typical summers day in the Drakensberg the afternoon storms start to brew around 15H00 and in the typical winters day the start is a little later due to the limiting light conditions and extreme cold, it also tends to get darker quicker. The environment must always be taken into consideration.

6 Conclusion
A lot of ground has been covered. Setting up and running an extreme abseil has required a rethink of many of the accepted wisdoms of abseiling and climbing. What works in a standard single-rope length environment, simply does not continue working when the abseil distance becomes significantly more than 100m. The irony is that the principles I have learned in working with extreme abseils I have taken through to short abseils too. Granted, I do not let clients on short abseils wear chest harnesses, and I still run short abseils with only two ropes, but on the other hand, I belay with a Rack and I am moving towards letting my clients abseil with Racks. I also only present the Abseil Supervisor course as an integrated unit, teaching new guides the techniques for both short and long and extreme abseils, and this also means that the gap has bridged, to a large extent, not from the short abseil side, but precisely from the long and extreme abseil side. I believe that the result is guides who are better equipped to handle all abseils of any length. Extreme abseils have not made the span of knowledge needed to run abseil wider, but deeper.