

# A REVIEW OF PARAGLIDING EQUIPMENT FOR CLIMBING AND OTHER SUSPENDED ACTIVITIES.

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## Background

In 1991 paragliding harnesses started to be used as climbing harnesses for people with disabilities as these were better suited to people with circulation issues or poor abdominal strength as opposed to the climbing alternatives of a sit-harness, full-body or combined sit and chest harnesses. The construction of climbing and paragliding harnesses and the forces involved in the two sports (in a non-lead-fall situation) were considered to be similar enough to make their cross-use appropriate. The benefits of comfort, weight distribution (reducing pressure points) and the support offered by paragliding harnesses made these more appropriate for climbing (and other suspended activities) than standard harnesses for many participants with a range of disabilities. In 1998 concerns were raised about the use of paragliding harnesses that were not designed for climbing purposes so the BMC technical officer was approached for advice in their use. In a letter dated 14 April 1999, the then technical officer recognised that paragliding harnesses “may be the best practical solution” and that “reasonable measures had been taken to ensure the security of the harness” through use of safety ropes. In addition, legislation did not require adaptive equipment used for rehabilitation to be certified for use. Since then, many providers have been using this type of equipment for climbing and other similar activities.

An enquiry in February 2015 to the Association of Heads of Outdoor Education Centres (AHOEC) email forum, raised the question as to whether a standard climbing harnesses should be worn in conjunction with a paragliding harness, as the paragliding harness was not designed or tested for climbing activities. A survey was conducted with members of Adventure for All (AfA), the Institute for Outdoor Learning (IOL) Special Interest Group (SIG) on disability inclusion. This survey was extended to include all members of the IOL, AHOEC or any other provider who wished to contribute.

## Survey of users

The survey consisted of a short email questionnaire sent out to all AfA members and other providers who were aware of the survey, either through personal contacts or through the IOL newsletter.

Sixteen responses were received of which 11 were from AfA members. One respondent answered for the 15 centres in their organisation. Of the respondents, 13 used or had used paragliding harness for various activities. Those who did not use paragliding harnesses used either the Equal Adventure Kite harness or an industrial full-body fall-arrest harness.

The range of activities undertaken centred on climbing-type activities, as commonly undertaken at outdoor centres such as rock climbing (top rope) and abseiling, but also included: climbing a single free-hanging rope (SRT or jumaring), zip-wires, high G-force swings and as a fall arrest system for problem solving activities, such as crate stacks or high ropes courses.



Figure 1: Inappropriate body position / pressure from a standard



Figure 2: Typical paragliding harness



Figure 3: Paragliding harness in use

Three respondents used a standard climbing harness in addition to the paragliding harness or Kite harness. These providers used a “back-up” harness for one or more of the following 3 reasons.

1. **The age of the equipment.** Due to low usage, the harnesses were in good condition, however, they had either exceeded their recommended life or were significantly older than the other climbing equipment used by the centre. Due to the high-cost of these harnesses a replacement regime as frequent as standard climbing harnesses did not make economic sense. Hence the additional climbing harness provided reassurance that in the event of failure of the older equipment, the participant would remain safe, as they were secured to equipment that was within its recommended life span, had been regularly inspected by a competent person and had been designed for that purpose.
2. **Lack of familiarity of adaptive equipment.** Due to infrequent use and different fitting or adjustment methods of the adaptive harnesses, managers considered the system would be more robust if a standard climbing harness was used as the critical safety equipment because instructors were familiar with these.
3. **Equipment not being used for its intended purpose.** One provider was concerned that, in addition to both the above, that the paragliding equipment was not being used for its intended purpose.

None of the other 13 providers used a “back-up” harness (one occasionally used an additional climbing harness for improved fitting for certain participants). Two providers considered that the CE/EN markings on the Kite harness negated the need for any back-up, believing that Kite harnesses had been designed and tested for climbing activities. The remainder considered there was sufficient similarity between the stresses placed on the harnesses between paragliding and the type of activity undertaken at the centre for the paragliding harness to be fit for purpose. All had gained the approval for this use from their ‘technical advisors’ (holding Mountain Instructor (MIA/C) and/or Caving Instructor (CIC) awards). Although a number of providers were aware of the BMC (1999) letter, none referred to this as justification for the use of paragliding harnesses.

All providers had the non-standard climbing equipment inspected by a member of staff who was deemed competent to inspect standard climbing harnesses. No additional training had been given to this person. None of the respondents had inspections undertaken by an outside specialist although some providers consulted a paragliding equipment repair centre if they were in any doubt as to the repair / functionality of their harnesses.

The main concerns raised by the respondents regarding the use of adaptive harnesses were:

- a. The quick release buckles on later paragliding harnesses (3 respondents).
- b. The possible risk of inversion using a paragliding harness (1 respondent).
- c. The comfort of someone with a muscle spasm in a Kite harness (2 respondents).
- d. The chaffing on the neck in a poorly fitting harness (1 respondent).

To prevent unintentional opening of the quick release buckles, some providers had manufactured simple guards to cover these, so as to prevent them being tampered with by participants. The pictures below show such a cover which slides across the buckles preventing opening. The cover is made from a cut off piece of

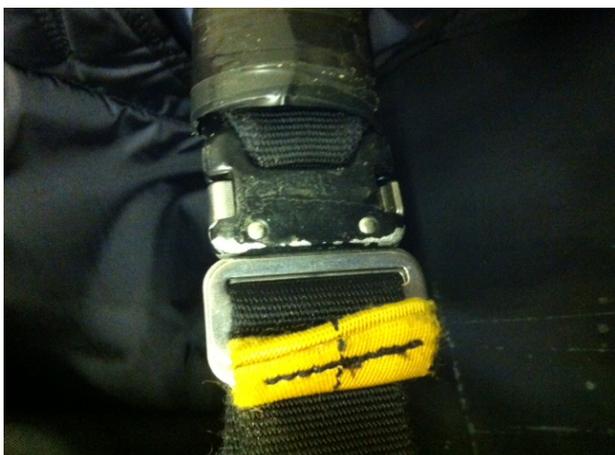


Figure 5: Locally made cover "off"



Figure 4: Locally made cover "on"

plastic milk bottle, covered in gaffer tape and tight enough that it needs a good grip and a bit of force to slide across. Best practice would dictate that a final check is made of the buckles immediately before the activity to ensure they are correctly fastened and are not open under the covers.

No other provider had concerns over inversions if the paragliding harness was correctly fitted (the paragliding harness is designed and tested to self-right from an inversion in flight). Further discussion highlighted the issue of non-standard body shapes, notably a double leg amputee having a raised Centre of gravity above the suspension points. In such a case there were the options of using the reserve parachute attachment loops on the shoulders of the paragliding harness to prevent an inversion, or to use a paramotor harness with high attachment points (some have both high and low attachment points e.g. APCO universal).

### The BMC opinion

In 2015, the British Mountaineering Council (BMC) Technical Officer / Committee was asked to comment on the above survey and given the opportunity to update the BMC's position on adaptive equipment used for climbing that was not specifically designed for purpose.

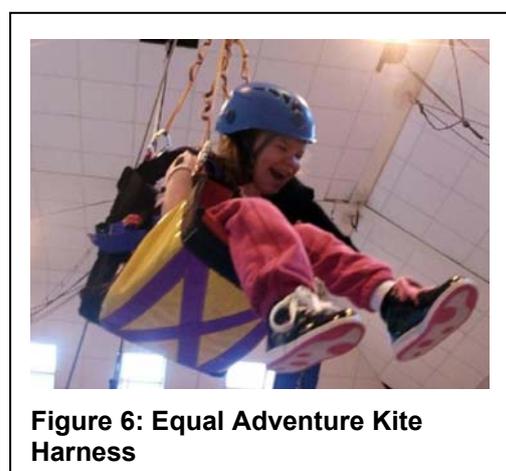
The committee compared the EN standards for climbing (EN 12277, currently being reviewed and revised), paragliding (EN 1651: 1999), and industrial fall arrest harnesses (EN 361: 2002). They summarised that:

*"It is clear that mountaineering, paragliding and industrial fall arrest harnesses are broadly equivalent in their strength requirements."*

Unfortunately, their comparison did not include the Equal Adventure Kite harnesses as they stated:

*"No technical details were available, but it appears that they may conform to a withdrawn Rescue harness standard".*

Equal Adventure has confirmed that Kite harnesses are built to EN 1497:1996 standard. Web research (<http://www.hse.gov.uk>) revealed that this is indeed a rescue harness standard which was superseded in 2007. Lyon Equipment have stated (verbally) that it is permissible to continue to build to previously approved standards.



**Figure 6: Equal Adventure Kite Harness**

The BMC Technical Officer raised a concern over the use of a back-up climbing harness. This was based around *IF* in a fall situation the adaptive harness was *ESSENTIAL* for the safety of the participant then the adaptive equipment should be fit for purpose as a standard climbing harness would not perform in the same manner. However, he did agree that *IF* the adaptive harness was not part of the critical safety equipment but used for comfort only then a back-up climbing harness may be an appropriate safeguard. Experienced practitioners also pointed out that, care should be exercised to ensure its presence (notably buckles) do not increase the risk of injury to the participants particularly those susceptible to pressure sores if using a back-up harness.

The BMC also suggested gathering empirical data regarding use of adaptive harnesses as this would be valuable in establishing the appropriateness of the equipment and the likelihood of injury. This data would help operators make an appropriate risk assessment. Consequently, a second survey was sent out to all AfA members and respondents from the first survey. Eleven questionnaires were returned. The respondents reported use of the adaptive harnesses from 3 to 24 years and between 15 and 500 uses per year. The total uses of adaptive harnesses reported by all respondents amounted to a minimum of 21,600. There were no reported accidents or near misses using the adaptive equipment and in the only known incident involving an adaptive harness, its use did not contribute to the incident.

The BMC concluded that:

*"The responsibility for choosing an appropriate harness must lie with the activity provider based on their risk assessment for the activity, taking into account the needs of the participants".*

To expand on this, the disability / functional ability of the individual, the nature of the activity and the attributes of the specific harness must be considered when selecting a harness for a participant with

disabilities. The needs of certain participants may be better addressed by using an adaptive harness of the type discussed in this report. The risk of using any harness must take into consideration the likelihood of an injury occurring and the severity of the injury if it did occur. Mitigation of that risk may include the use of a harness appropriate to the needs of the individual and their disability. The above information may help in understanding the practice of others in this field and through the use of adaptive harnesses over 24 years, the likelihood of an accident occurring when using this equipment.

## **AALS comments**

The Head of Licencing services made a number of observations with the following not having been incorporated elsewhere. Firstly, that a benefit-risk argument should be used to determine whether or not a back-up climbing harness is more trouble than it is worth. Secondly that there is a differentiation between an article being “made for purpose” and being “fit for purpose”. Finally, that there is also a differentiation between manufacturers’ “recommended product life” and that article remaining “fit for purpose”.

## **Conclusion**

Paragliding harnesses have been used to enable people with disabilities to be involved in climbing and similar activities by a number of providers for nearly 25 years. Advice from the BMC and climbing technical advisors have supported the fact that there is similarity in the construction of the harnesses and the low loading of the harnesses experienced in the climbing type activities undertaken in many centres with people with disabilities, make these an alternative to a climbing harness in the right circumstances. A well-fitting adaptive harness that is fit for purpose does not require a climbing harness to be used in addition to the paragliding harness. However, some providers chose to do this as either they felt their staff were more familiar with standard climbing equipment and thus reducing the probability of a fitting error, or because of the age of the paragliding (or other adaptive) harness raised questions as to whether it was still fit for purpose and hence a second harness was used to ensure the safety of the participant.

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## **Appendix 1: Guidance on inspection of paragliding harnesses from Aerofix, specialist paragliding testing centre.**

At the 2015 Adventure for All conference a paraglider harness inspection and repair specialist was asked to discuss the safety and wear and inspection issues with paragliding harnesses.

The following observations were made:

1. That although the not all the critical webbing was always visible due to being hidden by pockets and other material, that the material coving the webbing also protected it so he had never experienced wear behind these coverings.
2. The hard seat plates occasionally caused wear of the webbing where these made contact, hence it was important to check this area.
3. The following were the key inspection points for paragliding harnesses in outdoor centre activity use:



**Webbing** – check for wear on:

- a. suspension points (especially inside)
- b. shoulder (reserve parachute) suspension points (if to be used)
- c. waist strap
- d. leg straps
- e. shoulder straps
- f. chest strap (if fitted)
- g. webbing in contact with the seat plate

**Hardware** – check for functioning / integrity of:

- h. carabiners
- i. buckles (waist, leg, shoulder, chest, reclining)
- j. seat plate (not damaged)

**General**

- k. condition of critical fabric



**Figure 8: Karen Darke climbing El Cap, Yosemite in 2006 using a paragliding harness.**