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UIAA STANDARD 104 / SLINGS
Recommendations for Inspection and Retirement

Foreword

The UIAA equipment standard provides a baseline for equipment performance in a test lab under controlled conditions on new equipment. Although these test conditions are relevant to the conditions encountered climbing, conditions encountered at the crags and the condition of the equipment are equally important. This recommendation from the UIAA member federation The British Mountaineering Council (BMC) provides vital equipment information that is NOT explicitly addressed in the standard, particularly failure modes of the equipment and recommendations for the use, inspection, maintenance, and retirement of equipment.

These recommendations are of necessity general. For any specific piece of equipment, the primary source for all equipment information is the manufacturer. Always read and heed the manufacturer's warnings and instructions for use, inspection, maintenance, and retirement of equipment. Taken together, the UIAA standard, the BMC recommendations, and the manufacturer's instructions provide a sound basis for understanding climbing equipment and its limitations. This understanding, in conjunction with best practices, is the basis for managing the risk associated with climbing and the use of climbing equipment.

THE FOLLOWING INFORMATION ON USE, CARE AND MAINTENANCE COMES FROM THE BMC BOOKLET: ***CARE and MAINTENANCE***

Cf. http://www.thebmc.co.uk/Feature.aspx?id=1170

SLINGS

by Dave Brook

Introduction

Slings are the most versatile component in modern climbing and mountaineering, and have a whole multitude of uses – the most important of which is to provide a link between the climber and the belay and also to connect the rope to a protection point. The first slings used in climbing were no more than knotted loops of rope or cord that were employed to thread chockstones, rock spikes etc. to provide running and static belays. These were sometimes even carried loose, and threaded and tied one-handed whilst on route! Later in the inter-war years, climbers experimented with loops of hawser-laid rope to provide increased security, and began to jam the actual knots into cracks, opening up further protection possibilities (see previous section on chocks). As with ropes, the advent of nylon provided a much-needed advance in technology being stronger and lighter, and the first factorystitched slings began to appear, having appreciably greater strength over the hand knotted variety. Nylon also allowed the safe use of thin loops of accessory cord (3–8mm in diameter) for everything from slinging chocks to ascending ropes and abseiling.

Modern stitched slings are made of nylon, which gives softness and flexibility or spectra (dyneema), which is less bulky and more abrasion resistant than nylon – important in some situations. In particular, the production of very thin dyneema slings (12–15mm diameter) allows their use in places where nylon slings would not pass – for example, if threading thin rock spikes or small slots, being 20–25mm in diameter for comparable strength.
Nylon slings are manufactured of 'flat' woven tape (cheap, light and flexible) or a tubular construction, which is stronger and more durable, but more expensive and bulky. Dyneema slings combine the advantages of both kinds of nylon tapes, with the additional benefit that it is easier to see when the fibres are damaged or cut, and are less susceptible to UV damage than nylon. However, the melting point of Dyneema is lower than nylon and it is less elastic and so does not absorb as much energy under a shock load.

Relevant standards

Cord for use in climbing and mountaineering must conform to EN 564; tape must conform to EN 565; and sewn slings, whether made from cord or tape, must conform to EN 566.

Since 1994 the European standard for sewn slings has specified a minimum strength of 22kN, which is more than adequate for every conceivable loading in climbing use. Sewn slings are amongst the strongest items of safety equipment, and given the light weight and small bulk of dyneema/spectra slings, they represent excellent value for money. There is really no longer any reason for carrying knotted tape slings, other than to use in an emergency and leave behind.

Observed faults and failures

No incidents involving the direct failure of a sling have been reported to the Equipment Investigation Panel – another component in the safety chain normally fails first, and seriously weakened slings are easily identified and discarded by the user. However, many incidents of sling failure have been observed worldwide, with the majority involving failure of badly weathered (abraded, frozen and thawed, UV degraded etc.) *in situ* slings – generally this occurs in regions with stronger UV than the UK! The other common mode of failure involves melting of a nylon sling resulting from a loaded rope being passed directly through a sling, the friction generated being enough to melt the sling (remember the low melting point of nylon and dyneema).The EIP has also been advised of one incident where a hand tied sling in use as a top-rope anchor came undone, with predictably disastrous consequences. In one instance in the Alps, it has been reported that the knot of a hand tied sling has caught on a rock edge and been pulled open.

How to prevent failure in use

Several important points arise from the modes of failure reported to the BMC. *Never pass a rope directly through a sling for lowering off* – the friction generated can easily become sufficient to melt a nylon sling, perhaps in as little as 3 metres of lowering. This is very different from abseiling with the rope through a sling, because the rope does not move under load. Nevertheless, *when pulling rope through a sling after an abseil, do it slowly and without using a lot of force*, otherwise glazing damage can occur to the rope (in addition to the abandoned sling).

Do not use hand-tied slings except for emergency use. Modern sewn slings to EN 566 are stronger, there is no risk of them coming undone, and they are now relatively cheap.

As for ropes, when using slings to extend running belays, take care to position them such that they will not be dragged over sharp or rough rocks in the event of a fall. Read the manufacturer's instructions provided with the

sling as part of the CE system, and understand how to arrange slings in the proper configurations at anchor points in order to obtain maximum strength.

Finally, and very importantly – *always treat* in situ *tape slings with extreme caution! Never rely on them totally* and always use a back-up anchor wherever possible. *In situ* cord or rope slings are more reliable – only the sheath is susceptible to UV damage and the core is usually unaffected.

Routine care and maintenance

The same general principles as care and maintenance of other textile equipment apply:

· Avoid contamination with any substances other than water – be especially careful of oils, cleaners and corrosives in places such as garages, car boots and kitchens.

· Slings are best stored in a cool, dark, dry place and in use it is advisable to avoid exposure to strong light and UV rays as much as possible – these will both affect the strength of a tape sling over time. Accessory cord is less susceptible to UV damage – see above.

· Frequently inspect webbing for signs of damage to the tape or stitching. The edges of flat (as opposed to tubular) tapes are particularly prone to cuts and abrasions, especially whilst under load. If there is a small nick in the side of the sling then not only is the number of yarns taking the strain reduced, but stress concentrations are set up on the damaged part of the tape – you should consider discarding any webbing in this state. Fortunately, it is generally very easy to spot this type of damage to slings and tapes – see Figure 12.2.

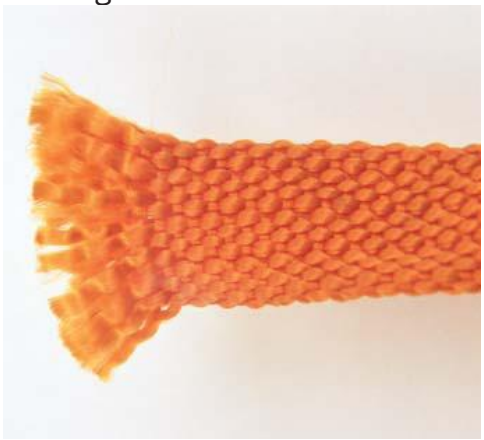

Figure 12.2 Cut, damaged yarn

· Slings should be discarded following a severe fall, even if there is no visible damage – the sling may have been damaged internally. Tapes that have suffered shock loading may become elongated, and if over stretching has occurred it causes the individual fibres to break, forming small lumps

within the weave and weakening the sling. This type of damage can be detected by inspecting the tape both with the fingertips and visually.
· If exposed to seawater or salt water spray, clean thoroughly in fresh water, and dry naturally in a cool dark place. (Dry salt crystals have a similar abrasive effect to fine grit.)

Degradation and discard criteria

This has been mostly covered in the above section, but to re-iterate: discard slings that have become faded and/or furry and stiff due to deterioration in use. Any slings with obvious abrasions, cuts or broken yarns should be retired. You can be fairly rigorous when retiring webbing items, as they are inexpensive and simple to replace.