BRITISH MOUNTAINEERING COUNCIL

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TECHNICAL COMMITTEE MEMORANDUM TCM 14/01

Wild Country Alpine Shield Helmet
Incident Ref. 02/14/F.SMI

SUMMARY

This helmet was struck a glancing blow by a piece of falling ice. The climber was unhurt but the headband broke at the point of attachment to the shell. Since the helmet standard EN 12492 does not specify a minimum strength for the headband this cannot be considered a design fault. The helmet performed its function in preventing injury to the wearer.

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Draft:	Final 10/11/14
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1. INTRODUCTION

This Alpine Shield helmet was sent to the BMC by [redacted] for examination following an incident while he was climbing in Norway. He took a glancing blow to the head from falling ice but fortunately the helmet prevented him being hurt. However the cradle on the helmet snapped, on the same side as the impact. The helmet was purchased approximately 18 months previously.

[redacted] reports that he had been climbing in Rjukan but it had been unseasonably warm, averaging -1°C during the day. They had climbed for six days and the helmet was left to dry inside the chalet every night.

2. EXAMINATION

This helmet from Wild Country is an EPS shell with an EVA foam lining. It incorporates a removable polycarbonate outer cover (the shield) which converts the lightweight rock climbing helmet into a mountaineering/alpine helmet. The shield is held in place with three coin operated screws. It is certified to CE EN 12492:2000 and UIAA 106. The manufacturer states that tests down to -40°C show no permanent change in performance and they give a conservative estimate of 3 years lifespan from first use.

The outer surface of the EPS shell shows several scratches and small dents, consistent with 18 months use. None of these are considered to be grounds for retirement. The inner foam is undamaged. The polycarbonate shield shows small scratches but no dents corresponding to those on the main shell, indicating that the shield was not normally used. In the direct centre of the shield there is a dimple approx. 5mm dia. on the inside. This locates in a groove on the helmet so it is assumed that this is to position the shield when fitting (Fig 1).

Fig 1
The shield

The webbing straps, buckles and fixing points are all in good condition. The covering on the headband padding has become detached in places but this is not considered to be significant.

The headband itself has broken on the left side of the helmet at the point where the flexible plastic strap joins the more rigid fitting attached to the inside of the shell (Fig 2).

Fig 2
Broken headband fitting

The strap on the other side of the helmet is still attached but is partly separated from its fitting on the outside (Fig 3).

Fig 3
Partly damaged fitting

3. DISCUSSION

It seems likely that the glancing blow on the helmet caused it to slide forward on the wearer's head thereby loading the headband in tension which then caused the strap to be pulled from its fitting. These two parts connect together as shown in Figs 4 & 5 with the fitting inside the strap which is hollow at the end. The other strap is shown in Fig 6 for comparison.

Fig 4
Left side broken fitting

Fig 5
Left side fitting (partly re-assembled)

Fig 6
Right side fitting

It appears that the strap and fitting are held together by either adhesive or by plastic welding but as can be seen on Fig 4 the contact area is rather small.

The mountaineering helmet standard EN 12492:2000 and the new standard EN 12492:2012 do not contain a test for the strength of the headband, only a test of the effectiveness of the retention system. This is shown in pictorial form in Fig 7. The helmet passes this test if it does not come off the headform.

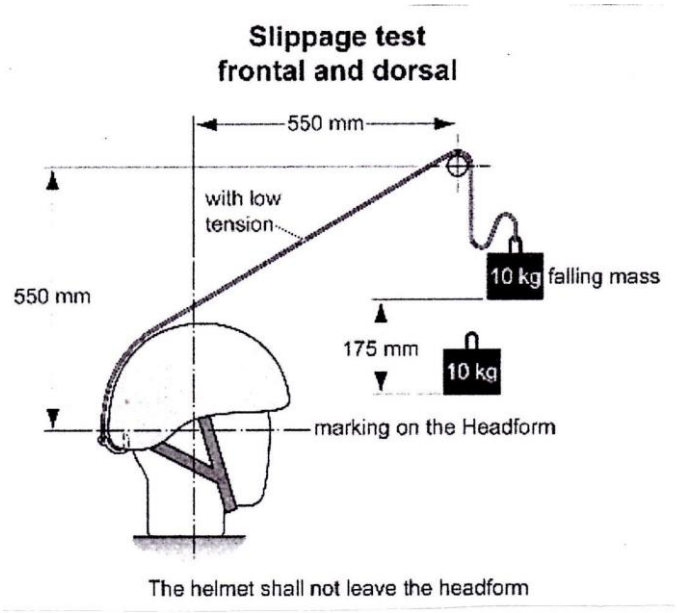

Fig 7
EN 12492 Slippage test

Although this test does not does not directly check the headband strength obviously if it broke it would fail the test. Comparing the incident with the above test, a glancing blow from

a falling object would have the same effect as the rope and the falling weight. In the test the retention system must be able to absorb the energy produced by a 10kg mass falling 175mm (1.75 kgf.m) . The same amount of energy would be produced by a 1kg block of ice falling 1.75m or a 100gm piece falling 17.5m. It seems feasible that something more than this occurred which would exceed the design requirements. However, since neither the weight of ice nor the distance it fell are known there can be no positive conclusion.

There is one positive conclusion that can be drawn and that is the helmet did its job - the climber was unhurt.

4. CONCLUSIONS

i) The headband strap failed at the point where it attaches to the side of the helmet.
ii) The helmet standard EN 12492 does not require the strength of the headband to be tested therefore this cannot be considered to be a design fault.
iii) The helmet performed its function in preventing injury to the wearer.

5. RECOMMENDATIONS

1. Climbers should be advised to check their helmet before use including the headband fittings to the shell.
2. It is suggested that this incident should be brought to the attention of the British Standards Technical Committee PH/6/6, Protective helmets for sport and leisure with the request that they consider incorporating a test of the actual strength of the headband into the standard. It is the opinion of the BMC Technical Committee that mountaineering helmets should remain on the climbers head if possible since even a damaged helmet would provide some protection.

6. REFERENCES

1. BS EN 12492:2000 Mountaineering equipment - Helmets for mountaineers - Safety requirements and test methods.

2. BS EN 12492:2012 Mountaineering equipment - Helmets for mountaineers - Safety requirements and test methods.