

## **Black Diamond Halfdome Helmets**

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When the BMC helmet testing program, carried out at Leeds University, showed the BD halfdome performing relatively poorly in its top impact tests, concerns were understandably raised regarding the helmet's ability to meet the CEN standard. The helmet was originally certified by French notified body CRITT. In addition the massive difference between the Leeds results (12.7kN) and CRITT's original certification results (1.6kN) raised serious concerns about testing methods. Since the original article appeared in Summit much work has been done to try and clarify the situation. The following summarises the key developments:

The original tests were designed to give a comparison of helmets performance. A helmet from the original batch was re tested and the same result found. The Leeds testing was not meant to check explicitly for conformance and so was not carried out exactly to the standard. This meant that further work was required to examine the likelihood of the helmet passing the standard. Engineers from CRITT visited the Leeds lab to observe a range of tests. The calibration of the rig was confirmed. Tests were carried out to examine factors which could cause a variation in results.

One of the problems with the standard is that it allows a small variation in drop heights and a +/- 50g variation in the test weight. Tests showed that whilst keeping within the standard methodology a variation of approximately +/-1kN was still possible for results on a given helmet. More importantly tests also showed that in the case of the BD helmet the batch tested was very important and a spread in results of over 2kN was observed. The key factor here appeared to be the distance between the cradle and the crown. The upshot of this was a 3kN spread of results depending on methodology and batch, with the majority of the results from Leeds above 10kN. To try and understand why CRITT had measured 1.6kN during original certification representatives from Black Diamond, Leeds and the BMC visited the CRITT labs in France.

Eleven helmets were tested and an average result of 8.6kN was found with a standard deviation of 600N. Only one of the helmets appeared to fail but the CRITT recording system could not read above 9.881kN, which would seem to be a major weakness when failure is at 10kN and so a helmet can't be failed on the rig, as it is currently set up. It is difficult to compare these results with those found at Leeds because it was not possible to check the calibration of the rig or the exact weight of the falling mass. The relation between transmitted force and crown/cradle distance that was observed at Leeds was not found at CRITT.

Although the testing found results very different from the original low values of transmitted force, the reasons for this are not known. The situation as far as conformance is concerned remains unclear. From the Leeds results it would appear that the original helmet tested was from a batch with relatively poor performance. Tests on a wider range of Halfdomes show a lower average result with a spread above and below the 10kN threshold and as such the helmets performance is similar to that of other foam based helmets.

In order to finally lay the issue to rest and to re assure customers the BMC has recommended to Black Diamond that the helmet be retested and hopefully re certified at a third test house with appropriate experience in testing of mountaineering helmets. The BMC is also recommending that BD improve the quality control procedure to limit the variation in crown/cradle distance.

The BMC is not suggesting a recall or that the helmet is unsafe, but rather that users should take note of the top impact performance, of the HalfDome and other similar helmets, when considering appropriate use. The HalfDome is a helmet which fits well and looks good and as such makes users want to wear it. This has got to be a good thing as any helmet is an awful lot better than none.