

## Karabiner safety-check

In order to calculate whether a karabiner is sufficiently fatigue endurable or not, every pilot should ascertain the loading ( $F_k$ ) necessary to ensure that the play in the karabiner catch fastener completely disappears. This point of actuation by gravity can differ widely even within one model of karabiner. For example the point of actuation ( $F_k$ ) for the Austrialpin Parafly karabiner was measured to be between 15,5 kg and 147 kg .

Particularly vulnerable are those karabiners by which the actuation by gravity occurs with a loading ( $F_k$ ) that is greater than the value for the oscillation strength  $F_{ou}$  (reduced by 20%) of the karabiner with the catch open (in other words  $F_k$  larger than  $F_{k\text{ eff}}$ ).

Going by the present state of knowledge, one must assume the following required  $F_k$  limits.



Austrialpin Parafly Alu anodised  
Paraglider karabiner  
 $F_{ou} = 25$  kg,  $F_{k\text{ eff}} = 21$  kg



Austrialpin Powerfly Steel  
Paraglider karabiner  
 $F_{ou} = 60$  kg,  $F_{k\text{ eff}} = 50$  kg



Supair Twistlock Alu  
Paraglider karabiner  
 $F_{ou} = 70$  kg,  $F_{k\text{ eff}} = 58$  kg



Supair Twistlock Steel  
Paraglider karabiner  
 $F_{ou} = 45$  kg,  $F_{k\text{ eff}} = 37,5$  kg



Camp Twistlock Alu  
Paraglider karabiner  
 $F_{ou} = 50$  kg,  $F_{k\text{ eff}} = 41$  kg



Austrialpin 3200 Delta Steel  
Hanggliding karabiner  
 $F_{ou} = 160$  kg,  $F_{k\text{ eff}} = 133$  kg



Stubai Super 5000 Steel  
Hanggliding karabiner  
 $F_{ou} = 245$  kg,  $F_{k\text{ eff}} = 204$  kg

Due to its high carrying capacity with an open catch, it can be calculated that the Stubai Super 5000 is rated for endurance strength for a hang-in weight of up to 98,5 kg for the stresses frequently occurring during flight **irrespective of the amount of gate play**. We have as yet no data for other models of karabiner.

The existing fatigue strength values ( $F_{ou}$ ) of the listed karabiners were only ascertained approximately by the DHV, and partially roughly calculated. The karabiner manufacturers and the DHV are called upon to ascertain and disclose exact values. However, the only values that are of any use are those established with an open catch, and where a comparable test arrangement to that of the DHV is used. We shall correct the  $F_{k\text{ eff}}$  values just as soon as more exact insights are available from the karabiner manufacturers.

More information regarding karabiner fatigue strength under: <http://www.finsterwalder-charly.de>

### **How can one practically establish the point of actuation by gravity for the karabiner?**

A karabiner is actuated by gravity when the burdened fastening can no longer be easily opened. The point of actuation by gravity is the load ( $F_k$ ) by which the fastener starts to become tight. In order to ascertain the point of actuation by gravity, the karabiner must be progressively burdened and the fastener tested by every increment. In as much as the fastener can no longer be moved, the burden must be reduced to the point at which the fastener can again be opened with some friction.

For testing purposes one requires:

1. 1 riser or loop of 25 mm webbing onto which the karabiner can be hung up.
2. 1 paraglider backpack or similar, that can be hung onto the karabiner and into one can load ballast.
3. Ballast, that can be loaded into the backpack in smallish increments. In this respect, books have proven useful.
4. 1 set of bathroom scales that can be used to weigh the backpack with ballast after the point of actuation by gravity has been established (picture 5).



picture 1



picture 2



picture 3



picture 4



picture 5

In order to obtain comparable values, it is important that the webbing straps or ropes are attached as shown in pictures 2 and 3, i.e. the middle of the strap or rope approximately 1 cm from the catch side of the karabiner. This transmission of force on the karabiner amounts approximately to the force transmission used in the DHV continuous oscillation tests.

Please inspect both of the karabiners in your paraglider harness, as the point of actuation by gravity may well differ.

We shall correct values of  $F_{0u}$  just as soon as more exact fatigue strength values (with open catch) are disclosed by the DHV or the karabiner manufacturer.