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Key words: EN 354, EN 355, horizontal use; lanyards with energy absorber, edge test		
Question: What tests are necessary for lanyards with an energy absorber intended for horizontal use over an edge?		
Solution: Preliminary remarks: Remark for forked lanyard: Forked lanyard with one energy absorbing element: horizontal test with one leg. (to be repeated if the two legs are different) Forked lanyard with energy absorbing element at each leg: horizontal test with one leg (to be repeated if the two legs are different) and on both legs The test principles relate to the testing of the partial system lanyard <u>including</u> energy absorber. This means that the energy absorber must form a non-detachable unit with the lanyard, whereby one initially assumes a random position of the energy absorber in the system. The anchor point of this partial system may not be lower than the stand level of the user. An angle (measured between the two legs of the fastener / mobile guide) of at least 90° is assumed for the deflection on an edge. General requirements: EN 354:2010 EN 355:2002 Additional requirements: 1. Dynamic performance with horizontal arrangement and stress over an edge 2. Dynamic and static strength with horizontal arrangement and stress over an edge Additional test to be performed: Preliminary remarks: A drawn square steel bar pursuant to EN 10278:1999 (Material C 45 K / E 335 GC (ST60) pursuant to EN 10025) is to be used as a rest edge for the dynamic tests. The minimum dimensions of the steel bar must be 10 x 70 mm, the edge radius 0.5 mm. The drop weight (steel weight analogous to EN 364:1992) must correspond to the nominal load, though at least 100 kg. The nominal load to be used shall be the same as that claimed according to RfU 11.062 if applicable		

To 1: dynamic performance

The lanyard including energy absorber is dynamically stressed in a horizontal arrangement, as specified by the manufacturer, analogous to the test plan (Enclosure) through two drop tests. If the partial system is too short it may be connected to the anchor point by means of a chain or wire rope. A new test sample may be used for each drop test.

One drop test is carried out at right angles to the edge, another with a lateral offset of 1.50m. The falling weight is dropped from a height of 1.50m and at a horizontal distance of 50cm from the edge. The braking force is measured at the mass and the arresting section determined.

- The braking force determined at the mass may not exceed 6 kN
- The lanyard/energy absorber must withstand the load

Note: If the manufacturer specifies that the energy absorber may be connected to the anchor point instead of the D-ring of the full body harness, you should clarify whether this could mean higher impact forces on the user. The test house then specifies together with the manufacturer which further drop tests on edges, e.g. with a different edge radius or material, are to be carried out.

To 2: dynamic/static strength

Two drop tests each are performed with same test set-up as described in 1.). The drop height of the falling mass is, however, 2 m above the fall edge. A new test sample may be used for each drop test. The arresting distance and braking force are not measured.

- The lanyard/energy absorber must withstand the load

The minimum breaking force is then tested for the same test piece immediately after the drop test. This is carried out through a static test over a period of 3 minutes with a force corresponding to 3-times the nominal load, though at least 4.5 kN.

- The lanyard/energy absorber must withstand the load

Additional information on marking:

- Note that a horizontal use of the lanyard with energy absorber is possible (possibly pictogram).
- Note that the lanyard/energy absorber should not be stressed over sharp edges.

Additional information in the instructions for use:

- Note: the lanyard/energy absorber has been successfully tested for horizontal use and a resulting simulated fall over an edge.
A steel bar with a radius of $r = 0.5$ mm with no burrs was used in these tests. On the basis of this test, the lanyard with energy absorber is suitable for use over similar edges such as rolled steel profiles, wooden beams or a clad, rounded proof parapet. Notwithstanding this test, the following must be taken into account with a horizontal or oblique use where there is a risk of falling over an edge.
 1. If the risk assessment carried out before the start of work shows that the fall edge is a particularly "sharp" and/or "not free from burrs" edge (e.g. unclad proof parapet or sharp concrete edge), then
 - corresponding precautions must be taken before the start of work to rule out the risk of falling over the edge or
 - an edge protection should be mounted before the start of work or
 - you should contact the manufacturer.
 2. The anchor point for the lanyard/energy absorber may not be below the user's stand level (e.g. platform, flat roof).
 3. The deflection at the edge (measured between the two legs of the fastener / mobile guide) must be at least 90°.
 4. The necessary free space beneath the edge.
 5. The lanyard must always be used in such a way that there is no slack rope. If the lanyard is equipped with a length adjustment device, this may only be used if the user is not moving in the direction of the fall edge.

6. To prevent a pendulum fall, the working area and lateral movements from the median axis on both sides should be limited in each case to a max. of 1.50m. In other cases, no individual anchor points should be used but rather a Class C or D anchor device pursuant to EN 795:2012.
7. Note: If the lanyard/energy absorber is used with a Class C anchor device pursuant to EN 795:2012 with a horizontal flexible anchor line, the deflection of the anchor device must also be taken into account when determining the necessary clearance beneath the user. Pay attention to the details in the instructions of use of the anchor device.
8. Note: After a fall over an edge there is a risk of injuries during capture if the falling person knocks against parts of the building or construction.
9. Special rescue measures are to be stipulated and trained in the event of a fall over an edge.

