

## Rockfall protection system ETAG 027 - 5000 kJ Energy

### General Information

- Energy level [kJ]:		<b>5000</b>
- Height [m]:	e.g.	6.0-7.0
- Total length [m]:	e.g.	250
- Number of rows:	e.g.	5
- Average distance between posts [m]:	e.g.	10

The rockfall protection system needs to be tested successfully in a 1:1 field for a Maximum Energy Level greater or equal to **5000kJ**, following the test procedure conforming to ETAG 027, which is based on two successive tests: two launches at the Service Energy Level (SEL) and one launch at the Maximum Energy Level (MEL). The MEL value shall be greater or equal to 3 x SEL. The impact test should be supervised and certified by an independent authorized technical institute. The characteristics of the assembled system which are relevant for the fitness for use are:

#### Energy absorption at the **Service Energy Level (SEL)**:

- o the test block must be stopped completely by the system without touching the ground until the net fence has reached the maximum elongation;
- o the residual height of the kit after the first SEL test  $\geq$  70% of the nominal height;

#### Energy absorption at the **Maximum Energy Level (MEL)**:

- o the test block must be stopped completely by the system without touching the ground until the net fence has reached the maximum elongation;
- o the residual height of the kit after the test  $\geq$  50% of the nominal height;
- o the maximal elongation of the net fence shall be reported in the certificate.

As part of the certification, no ruptures in the connection components (which remain connected to foundations), posts and ropes shall occur. The opening of the mesh of the net shall not be two times bigger than the initial size of the mesh. Are excluded from the assessment those elements which are designed to break under impact conditions. They shall be specifically listed in the installation document Test report, as well as test summary and the list of monitored anchor forces must be provided for the acceptance of materials before installation.

### Note

The height of the barrier cannot be reduced in comparison with the tested kit and its height can not be raised up of more than 1.0 meter for tested height greater than 4 meters.

## Design of the Main Structure and Individual Components

The design of main structures and of single components must be such as described below (or equal / better). Individual components not cited herein must correspond to the appropriate technical standards.

### Interception structure

- Principal net:
  - Type: Omega Net
  - Maximum mesh size: 185 mm
  - Ø wire strand: 10.5 mm
  - Connection to bearing ropes: threaded
  - Corrosion prevention: Zinc Coating EN 10244-2 class A
  
- Additional layer:
  - Type: rectangular netting
  - Corrosion prevention: Zinc Coating EN 10264-2 class A
  - Maximum mesh size: 60 mm
  - Minimum wire diameter: 3.1 mm

### Support structure

- Post
  - Profile HEB 400
  - Corrosion prevention: Zinc coating EN ISO 1461
  - Design: Pendulum support (hinge base plate)
  
- Base plate
  - Corrosion prevention: Zinc coating EN ISO 1461
  - Connection to underground: anchored installation

### Connection components

- Bearing ropes
  - Type: WSC+6x36 wires - 1770 N/mm<sup>2</sup>
  - Safety Standard: according to EN 12385-4
  - Ø ropes: from 16 mm
  - Corrosion prevention: Zinc Coating EN 10244-2
  
- Retaining ropes:
  - Type: WSC+6x36 wires - 1770 N/mm<sup>2</sup>
  - Safety Standard: according to EN 12385-4
  - Ø ropes: from 14 mm
  - Corrosion prevention: Zinc Coating EN 10244-2

### Energy absorbing elements

- Operating mode: plastic deformation
- Position: close to anchors
- Corrosion prevention: Zinc coating EN ISO 1461

### Anchoring

- Ropes:
  - Wire Rope Anchor (type WSC + 1x19 or 1x37 wires)
  - Ø upslope ropes: 18 mm
  - Ø lateral ropes: 16-22 mm
  
- Posts:
  - Thread bolt anchor Ø 40 mm

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