



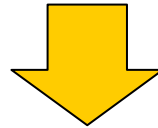
For rock slope  
stabilization  
specialists

# EOTA - ETAG 027

## OVERVIEW

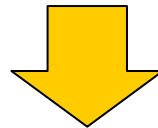
# Executive Summary

**CE Marking** certifies EU Conformity



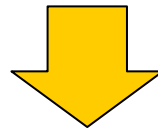
essential requirements for construction products

Construction Products **Directive**



favorable technical assessment of products conformity

**ETA**



guidelines to establish how bodies should evaluate product conformity

**ETAG**

# CE Marking

## CE is a conformity mark

- CE is not related to production country
- CE is not a quality mark

CE mark asserts that the product meets all the essential "Health and Safety" requirements of the relevant **European Directive(s)**

The **objective** is to **harmonize** all the national regulations



**Safety**

**Health**

**Environment**

# Construction Products **Directive**

Directive 89/106/CEE del 1989 (CPD) shall apply to **construction products** satisfying the following six essential requirements :

1. Mechanical resistance and stability
2. Safety in case of fire
3. Hygiene, health and the environment
4. Safety in use
5. Protection against noise
6. Energy economy and heat retention

# CE Mark and ETAG

A) If **no relevant Harmonised Standards** for the product exist

or

B) the product **deviates significantly** from the relevant Harmonized Standards;

then an **European Technical Approval (ETA)** is a favorable technical assessment of the product fitness for an intended use.

## This is the case of **rockfall barriers**

**EOTA** comprises the Approval Bodies nominated to issue **European Technical Approvals (ETAs)** by EU Member States

The role of EOTA is primarily to monitor and progress the drafting of **ETA Guidelines** (ETAGs). **ETAG** basic aim is to establish how Approval Bodies should evaluate the specific characteristics/requirements of a product or family of products.

# ETAG 027

- Guideline identified by **EOTA** for the conformity of  
*“falling rock protection kit”*
- Approved in January 2008 it is valid from the 1st of February 2008
- ETAG 027 defines
  - rockfall barrier components and structure
  - intended use of rockfall barriers
  - energy classification of the system
  - categories of residual height
  - crash test and certification procedures

# Rockfall Barrier **Components**

- Interception structure: **the net** which has the function of bearing the direct impact of the mass
- Support structure: **posts** which has the function of maintaining the interception structure unbent
- Connection components: **ropes and dissipators** which have the function of transmitting the stresses to the foundation

**The foundations** are not considered part of the rockfall protection system.

The **design of the foundation** is in the **responsibility** of the **designer**, taking account of national provisions.

# Rockfall Barrier **Intended Use**

- Protection systems starting from **100 kJ Energies**
- NO avalanches prevention
- NO nets on slope surface
- **Working life of 25 years** This working life is intended to be assumed without any rock impact and under normal environmental conditions.
- After each impact, the barrier should be checked and, eventually, subject to **normal maintenance** or substituted.
- The indications given as to the working life of the falling rock protection kit **cannot be interpreted as a guarantee** given by the kit manufacturer

# Energy Classification

The different classifications of falling rock protection kits are defined on the kinetic energy of a regular block impacting the considered net fence.

It is expressed in

- **SEL** Service Energy Level and
- **MEL** Maximum Energy Level

$$MEL \geq \gamma SEL \quad (\gamma=3)$$

The energy level is measured in kJ

Classi	0	1	2	3	4	5	6	7	8
<b>SEL</b>	-	85	170	330	500	660	1000	1500	>1500
<b>MEL</b>	100	250	500	1000	1500	2000	3000	4500	>4500

**IMPORTANT** – there are two different energy levels against which a rockfall barrier should be tested

1. **SEL** Test – 2 launches
2. **MEL** Test – 1 launch

# SEL Test

The SEL test is passed if:

1. The block is stopped by the kit after **the first launch**, without contacts with the ground, without ruptures in the connection components and maintaining a residual height of the kit after the test **higher or equal to 70% of the nominal height**;
2. The block is stopped by the kit after **the second launch**, without contacts with the ground until the kit has reached the maximum elongation.

**No maintenance is allowed** between the first and the second launch at SEL. **The maximal elongation** of the net fence during the SEL test shall be measured and provided in the test report

# MEL Test

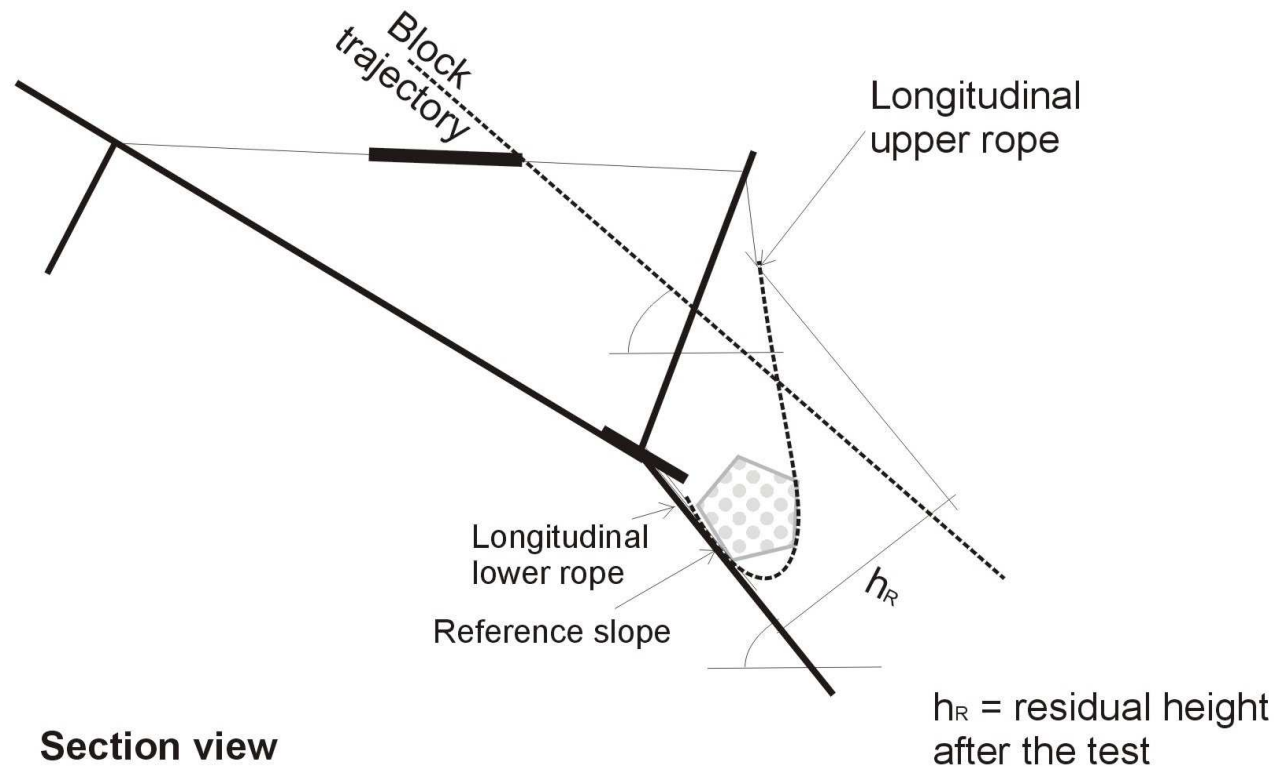
The MEL test is passed if:

1. The **block is stopped** by the net fence;
2. The block has not touched the ground until the kit has reached the maximum elongation during the test.

The **maximal elongation** of the net fence during the MEL test shall be **measured** and **declared**.

# Residual Height

The **residual height  $h_R$**  is the minimum distance between the lower and the upper rope, measured orthogonally to the reference slope after the test without removing the block.



Section view

# Residual Height Categories

A categorization for **residual height** for MEL is also foreseen as follows:

Category A

**residual height**  $\geq$  50% nominal height

Category B

30% nominal height < **residual height** < 50% nominal height

Category C

**residual height**  $\leq$  30% nominal height

# Some Examples

**1000 kJ Rockfall Barrier** tested with nominal height **3.5 m**

**1000 kJ MEL** equivalent to **3200 kg** with a speed of **25 m/s** (90 km/h)

**SEL OK** if residual height after first impact is  $\geq$  **2,45 m**

Category A after **MEL** residual height  $\geq$  **1,75 m**

**2000 kJ Rockfall Barrier** tested with nominal height **4 m**

**2000 kJ MEL** equivalent to **6000 kg** with a speed of **26 m/s** (94 km/h)

**SEL OK** if residual height after first impact is  $\geq$  **2,80 m**

Category A after **MEL** residual height  $\geq$  **2 m**

**3000 kJ Rockfall Barrier** tested with nominal height **5 m**

**3000 kJ MEL** equivalent to **7700 kg** with a speed of **28 m/s** (100 km/h)

**SEL OK** if residual height after first impact is  $\geq$  **3,50 m**

Category A after **MEL** residual height  $\geq$  **2,5 m**

**IMPORTANT:** The height of the commercial barrier cannot be reduced in comparison with the tested kit and its height can not be raised up of more than 1 metre for tested height superior or equal to 4 metres and 0.5 metre for tested height less than 4 meters.

**THANKS** for your attention



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