

## MAC.RO. SYSTEM - RB 100 UAF - 100 kJ

HIGH RESISTANCE ROCKFALL BARRIER WITHOUT UPSLOPE BRACING CABLES

The RB 100 UAF rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 100 kJ.

### Standards and Reference Guidelines:

**ETAG 027** "Guideline for European Technical Approval of Falling Rock Protection Kits";

**SPECIAL SPECIFICATION ANAS** "Technical Group on Road Safety" - April 2010.

Standard on materials:

**EN 10219** "Cold formed welded structural hollow sections of non-alloy and fine grain steels";

**EN 10025-2** "Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels";

**EN ISO 1461** "Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test";

**EN 12385** "Steel wire ropes - Safety";

**EN 10264-2** "Steel wire and wire products - Steel wire for ropes - Part 2: cold drawn non alloy steel wire for ropes for general applications";

**EN 10223-3** "Steel wire and wire products for fences - Hexagonal steel wire netting for engineering purposes"

**EN 10244-2** "Steel wire and wire products - Non ferrous metallic coatings on steel wire - Zinc or zinc-alloy coatings".

### System technology

The retaining mesh panel is placed on the downslope side of the barrier. Posts acts independently of the net. If a post is hit by falling block and damaged, the adjacent posts take the additional forces, ensuring that the catching performance of the system is not compromised.

The retaining layer is made by double twisted wire mesh reinforced with steel cables, and it is continuous. During an impact, the system ensures that the energy of the falling rock is dissipated, and the rock is prevented from moving any further.

**No upslope bracing cables required.** No downslope bracing cables required.

The rockfall barrier meets quality certification standard UNI EN ISO 9001, at each step of design, manufacturing and marketing.

### Main barrier features

No upslope bracing cables required. The barrier can be installed on any rock and soil type and profile. The barrier layout makes it ideal for use on rugged slope.

Due to the system geometry and layout, the lateral bracing cables require smaller pull out resistance, therefore shorter anchor lengths are needed at the base of the cables.

Posts plinths have only a ground-smoothing purpose. The applied forces are transferred to the ground through steel bars or micropiles. The system is easy to install, even under severe environmental conditions; the installation can be accomplished in a short time. The system requires minimal maintenance.

The interception structure consists of hexagonal double twisted wire mesh type 8x10, woven with steel wire having a diameter of 3.40 mm, reinforced with steel cables having a diameter of 5 mm.



### Design

The optimum barrier length is between 30 m and 100 m. If the slope geometry produces an offset in the barrier alignment, causing an upslope angle measuring less than 180° (e.g. 160°), a downslope anchor is required. Foundation design is dependent on the forces acting at the base and the soil type.

When ordering, declare the type of foundation (for rocky soil or loose soil).

### Carried out tests and main data

Dynamic impact test on a full scale barrier kit sample of 3 spans, 10 m post-to-post distance, and approximately 2 m height. The test program was drawn up and carried out following the instructions provided in the document "ETAG 027 - Guideline for European Technical Approval of Falling Rock Protection Kits".

MEL (Maximum Energy Level) test results:

Energy : 111 kJ

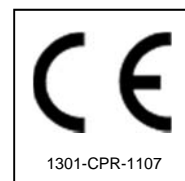
Barrier Nominal Height: 2.13 m

Maximum Barrier Elongation: 2.10 m

Barrier Residual Height > 80% of the nominal height

Category A of ETAG 027

ETA n. 15/0171



WARNING: Install the product in accordance with National Security Requirements! If the job is done with suspension or security ropes, personal protective equipment against fall risk must be connected with anchor points in agreement with EN 795.

Maccaferri reserves the right to amend product specifications without notice and specifiers are requested to check the validity of the specifications they are using.

### Office Maccaferri S.p.A.

Via Kennedy, 10 - 40069 Zola Predosa (BO) - Italy

Tel. (+39) 051-6436000 - Fax (+39) 051-6436201

E-mail: comes@maccaferri.com - Web site:

Bureau Veritas Certified Quality System Company  
with SINCERT's and UKAS' s accreditation.

## MAC.RO. SYSTEM - RB 750 - 750 kJ

### HIGH RESISTANCE ROCKFALL BARRIER

The RB 750 rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 750 kJ.

#### Standards and Reference Guidelines:

**ETAG 027** "Guideline for European Technical Approval of Falling Rock Protection Kits";

**SPECIAL SPECIFICATION ANAS** "Technical Group on Road Safety" - April 2010.

Standard on materials:

**EN 10219** "Cold formed welded structural hollow sections of non-alloy and fine grain steels";

**EN 10025-2** "Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels";

**EN ISO 1461** "Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test";

**EN 12385** "Steel wire ropes - Safety";

**EN 10264-2** "Steel wire and wire products - Steel wire for ropes - Part 2: cold drawn non alloy steel wire for ropes for general applications";

**EN 10244-2** "Steel wire and wire products - Non ferrous metallic coatings on steel wire - Zinc or zinc-alloy coatings".

#### System technology

The retaining mesh panel is placed on the downslope side of the barrier. Posts acts independently of the net. If a post is hit by falling block and damaged, the adjacent posts take the additional forces, ensuring that the catching performance of the system is not compromised.

The retaining layer is made by steel rings panels, and it is continuous. During an impact, the system ensures that the energy of the falling rock is dissipated, and the rock is prevented from moving any further.

The energy dissipating devices absorb the applied energy by deformation and not by friction, thereby guaranteeing a better and longer lasting performance.

No downslope bracing cables required.

The rockfall barrier meets quality certification standard EN ISO 9001, at each step of design, manufacturing and marketing.

#### Main barrier features

The barrier can be installed on any rock and soil type and profile. The barrier layout makes it ideal for use on rugged slope.

Due to the system geometry and layout, the bracing cables require smaller pull out resistance, therefore shorter anchor lengths are needed at the base of the cables.

Posts plinths have only a ground-smoothing purpose. The applied forces are transferred to the ground through steel bars or micropiles.

The system is easy to install, even under severe environmental conditions; the installation can be accomplished in a short time.

The system requires minimal maintenance.

The interception structure consists of steel cable net panels with a square mesh 300x300 mm, made of steel wire ropes  $\Phi$  7.00 mm.



#### Design

The optimum barrier length is between 30 m and 100 m.

Foundation design is dependent on the forces acting at the base, and on the soil type. If the slope geometry produces an offset in the barrier alignment, causing an upslope angle measuring less than 180° (e.g. 160°), a downslope anchor is required. Foundation design depends on the forces acting at the base of the posts and on the cables, and the soil type.

When ordering, declare the type of foundation (for rocky soil or loose soil).

#### Carried out tests and main data

Dynamic impact test on a full scale barrier sample of 3 spans, 10 m post-to-post distance, and 3 m height. The test program was drawn up and carried out following the instructions provided in the document "ETAG 027 – Guideline for European Technical Approval of Falling Rock Protection Kits".

MEL (Maximum Energy Level) test results:

Energy: 774 kJ

Barrier Nominal Height: 3.16 m

Maximum Barrier Elongation: 4.21 m

Barrier Residual Height > 58% of the nominal height

Category A of ETAG 027

WARNING: Install the product in accordance with National Security Requirements! If the job is done with suspension or security ropes, personal protective equipment against fall risk must be connected with anchor points in agreement with EN 795.

Maccaferri reserves the right to amend product specifications without notice and specifiers are requested to check the validity of the specifications they

#### Officine Maccaferri S.p.A.

Via Kennedy, 10 - 40069 Zola Predosa (BO) - Italy

Tel. (+39) 051-6436000 - Fax (+39) 051-6436201

E-mail: comes@maccaferri.com - Web site: www.officinemaccaferri.com

Bureau Veritas Certified Quality System Company  
with ACCREDIA's and UKAS' s accreditation.

## MAC.RO. SYSTEM - RB 1500 Plus - 1500 kJ HIGH RESISTANCE ROCKFALL BARRIER

The **RB 1500 Plus** rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 1500 kJ, made with components provided with particular coatings able to increase the corrosion resistance when the kit is installed in particularly aggressive (marine, industrial) environments. The barriers 'Plus' type are supplied with steel meshes and cables coated in Zn-Al5% class A (EN 10244-2, EN 10264-2). The barriers 'Plus' type are furthermore provided with hot-dip galvanized anchor bars and shackles according to EN ISO 1461, fasteners (bolts and nuts) according to EN ISO 10684 and hot-dip galvanized or non electrolytic zinc flake coated U-bolt wire rope grips.

### Standards and Reference Guidelines:

**ETAG 027** "Guideline for European Technical Approval of Falling Rock Protection Kits"

**SPECIAL SPECIFICATION ANAS** "Technical Group on Road Safety" - April 2010

Standard on materials:

**EN 10219** "Cold formed welded structural hollow sections of non-alloy and fine grain steels"

**EN 10025-2** "Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels"

**EN ISO 1461** "Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test"

**EN 12385** "Steel wire ropes - Safety"

**EN 10264-2** "Steel wire and wire products - Steel wire for ropes - Part 2: Cold drawn non alloy steel wire for ropes for general applications"

**EN 10244-2** "Steel wire and wire products - Non ferrous metallic coatings on steel wire - Zinc or zinc-alloy coatings"

### System technology

The retaining mesh panel is placed on the downslope side of the barrier. Posts act independently of the net. If a post is hit by falling block and is damaged, the adjacent posts take the additional forces, ensuring that the catching performance of the system is not compromised.

The retaining layer is made of continuous steel ring panels. During an impact, the system ensures that the energy of the falling rock is dissipated and the rock is prevented from moving any further.

The energy dissipating devices absorb the applied energy by deformation and not by friction, thereby guaranteeing a better and longer lasting performance.

No downslope bracing cables required.

The rockfall barrier meets quality certification standard EN ISO 9001, at each step of design, manufacturing and marketing.

### Main barrier features

The barrier can be installed on any rock and soil type and profile. The barrier layout makes it ideal for use on rugged slope.

Due to the system geometry and layout, the bracing cables require smaller pull out resistance, therefore shorter anchor lengths are needed at the base of the cables.

Post plinths have only a ground-smoothing purpose. The applied forces are transferred to the ground through steel bars or micropiles.



The system is easy to install, even under severe environmental conditions; the installation can be completed in a short time span.

The system requires minimal maintenance.

The main interception structure consists of steel ring panels.

### Design

The optimum barrier length is between 30 m and 100 m.

Foundation design is dependent on the forces acting at the base, and on the soil type. If the slope geometry produces an offset in the barrier alignment, causing an upslope angle measuring less than 180° (e.g. 160°), a downslope anchor is required. Foundation design depends on the forces acting at the base of the posts and on the cables, and the soil type.

When ordering, declare the type of foundation (for rocky soil or loose soil).

### Carried out tests and main data

Dynamic impact test on a full scale barrier sample of 3 spans, 10 m post-to-post distance, and 4 m height. The test program was drawn up and carried out following the instructions provided in the document "ETAG 027 – Guideline for European Technical Approval of Falling Rock Protection Kits".

MEL (Maximum Energy Level) test results:

Energy: 1637 kJ

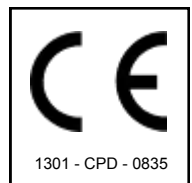
Barrier Nominal Height: 4.0 m

Maximum Barrier Elongation: 5.80 m

Barrier Residual Height > 61% of the nominal height

Category A of ETAG 027

ETA n. 12/0396



WARNING: Install the product in accordance with National Security Requirements! If the job is done with suspension or security ropes, personal protective equipment against fall risk must be connected with anchor points in agreement with EN 795.

Maccaferri reserves the right to amend product specifications without notice and specifiers are requested to check the validity of the specifications they are using.

Officine Maccaferri S.p.A.

Via Kennedy, 10 - 40069 Zola Predosa (BO) - Italy

Tel. (+39) 051-6436000 - Fax (+39) 051-6436201

E-mail: comes@maccaferri.com [www.officinemaccaferri.com](http://www.officinemaccaferri.com)

Bureau Veritas Certified Quality System Company  
with ACCREDIA's and UKAS's accreditation.