MACCAFERRI

TECHNICAL DATA SHEET
Rev. 00, Date 22.03.2011

MAC.RO. SYSTEM - RMC050/A - 500 kJ

HIGH RESISTANCE ROCKFALL BARRIER

The RMC050/A rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 500 kJ.

Standards and Reference Guidelines:
ETAG 027 ñGuideline for European Technical Approval of Falling Rock Protection Kitsò
SPECIAL SPECIFICATION ANAS ñTechnical Group on Road Safetyò- April 2010.
Standard on materials:
EN 10219 ñCold formed welded structural hollow sections of non-alloy and fine grain steelsò
EN 10025-2 ñHot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steelsò
EN ISO 1461 ñHot dip galvanized coatings on fabricated iron and steel articles - Specifications and testò
EN 12385 ñSteel wire ropes - Safety;
EN 10264-2 ñSteel wire and wire products - Steel wire for ropes - Part 2:cold drawn non alloy steel wire for ropes for general applicationsò
EN 10223-3 ñSteel wire and wire products for fences - Hexagonal steel wire netting for engineering purposesò
EN 10244-2 ñSteel wire and wire products - Non ferrous metallic coatings on steel wire - Zinc or zinc-alloy coatingsò

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 a double twisted wire mesh panel, 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.
Impact forces are shared among spans, therefore the stresses on the individual system components are minimized. The energy dissipators 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 has been continuously tested to improve its quality and performance.
The barrier can be installed on any rock and soil type and profile. The barrier layout makes it ideal for use on rugged slopes.
Due to the system geometry and layout, the bracing cables require smaller pullout 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 accomplished in a short time.
The system requires minimal maintenance.
The interception structure consists of a double twisted wire mesh panel, type 8x10, wire diameter equal to 3.40 mm (EN 10223-3).

Tab. 1 - TYPICAL SIZE OF RMC050/A BARRIER	
HEIGHT (m)	POST-TO-POST DISTANCE (m)
3.0 - 3.5	10

Design
The minimum rockfall barrier length is 30 m. The optimum barrier length is between 30 m and 70 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 3 m height. The test program was drawn up and carried out following the instructions provided in the document ñETAG 027 ï ñGuideline for European Technical Approval of Falling Rock Protection Kitsò (Certificate released by IUAV University of Venice, Construction Science Department - Protocol n. 428 date 21/03/2011, Certificate n. 288/2011).

MEL (Maximum Energy Level) test results:
Energy : 536 kJ
Barrier Nominal Height: 3.0 m
Maximum Barrier Elongation: 3.70 m
Barrier Residual Height > 70% - Category A of ETAG 027

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TECHNICAL DATA SHEET
Rev. 00, Date 22.03.2011

MAC.RO. SYSTEM - RMC100/A - 1000 kJ

HIGH RESISTANCE ROCKFALL BARRIER

The RMC100/A rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 1000 kJ.

Standards and Reference Guidelines:
ETAG 027 ñGuideline for European Technical Approval of Falling Rock Protection Kitsò
SPECIAL SPECIFICATION ANAS ñTechnical Group on Road Safetyò- April 2010.
Standard on materials:
EN 10219 ñCold formed welded structural hollow sections of non-alloy and fine grain steelsò
EN 10025-2 ñHot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steelsò
EN ISO 1461 ñHot dip galvanized coatings on fabricated iron and steel articles - Specifications and testò
EN 12385 ñSteel wire ropes - Safety;
EN 10264-2 ñSteel wire and wire products - Steel wire for ropes - Part 2:cold drawn non alloy steel wire for ropes for general applicationsò
EN 10223-3 ñSteel wire and wire products for fences - Hexagonal steel wire netting for engineering purposesò
EN 10244-2 ñSteel wire and wire products - Non ferrous metallic coatings on steel wire - Zinc or zinc-alloy coatingsò

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 a double twisted wire mesh panel reinforced with longitudinal 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.
Impact forces are shared among spans, therefore the stresses on the individual system components are minimized. The energy dissipators 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 UNI EN ISO 9001, at each step of design, manufacturing and marketing.

Main barrier features
The barrier has been continuously tested to improve its quality and performance.
The barrier can be installed on any rock and soil type and profile. The barrier layout makes it ideal for use on rugged slopes.
Due to the system geometry and layout, the bracing cables require smaller pullout 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 accomplished in a short time.
The system requires minimal maintenance.
The interception structure consists of a double twisted wire mesh panel, type 8x10, wire diameter equal to 3.00 mm (EN 10223-3), reinforced with longitudinal steel cables ū 7.00 mm.

Tab. 1 - TYPICAL SIZE OF RMC100/A BARRIER	
POST HEIGHT (m)	POST-TO-POST DISTANCE (m)
3.5 - 4.0	10

Design
The minimum rockfall barrier length is 30 m. The optimum barrier length is between 30 m and 70 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 3.5 m height. The test program was drawn up and carried out following the instructions provided in the document ñETAG 027 ï Guideline for European Technical Approval of Falling Rock Protection Kitsò (Certificate released by IUAV University of Venice, Construction Science Department - Protocol n. 259 date 18/02/2011, Certificate n. 200/2011).

MEL (Maximum Energy Level) test results:
Energy: 1073 kJ
Barrier Nominal Height: 3.5 m
Maximum Barrier Elongation: = 4.45m
Barrier Residual Height > 68% - 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.

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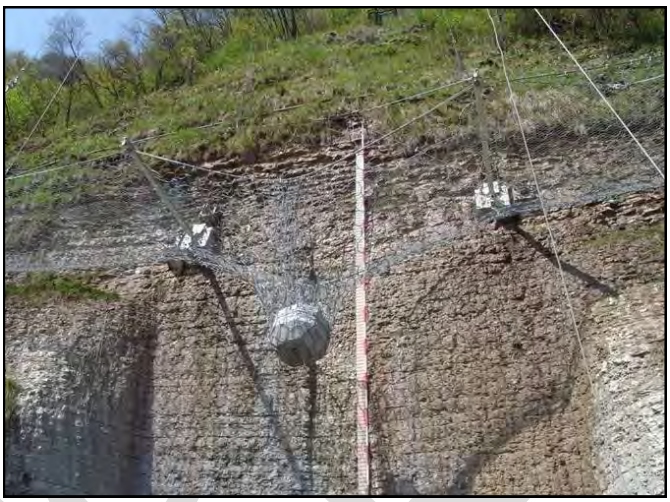
TECHNICAL DATA SHEET
Rev. 08, Date 20.06.2014

MAC.RO. SYSTEM - RMC200/A - 2000 kJ
HIGH RESISTANCE ROCKFALL BARRIER

The **RMC200/A** rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 2000 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 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 rings 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 UNI 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: 2083 kJ
Barrier Nominal Height: 4.0 m
Maximum Barrier Elongation: 5.25 m
Barrier Residual Height > 70% of the nominal height
Category A of ETAG 027

ETA n. 11/0294

CE
0969-CPD-003/12-BP

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.

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TECHNICAL DATA SHEET
Rev. 08, Date 20.06.2014

MAC.RO. SYSTEM - RMC300/A – 3000 kJ
HIGH RESISTANCE ROCKFALL BARRIER

The **RMC 300/A** rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 3000 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 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 UNI 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 5 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: 3163 kJ
Barrier Nominal Height: 5.0 m
Maximum Barrier Elongation: 6.05 m
Barrier Residual Height > 70% of the nominal height
Category A of ETAG 027

ETA n. 11/0026

CE
0969-CPD-001/11-BP

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.

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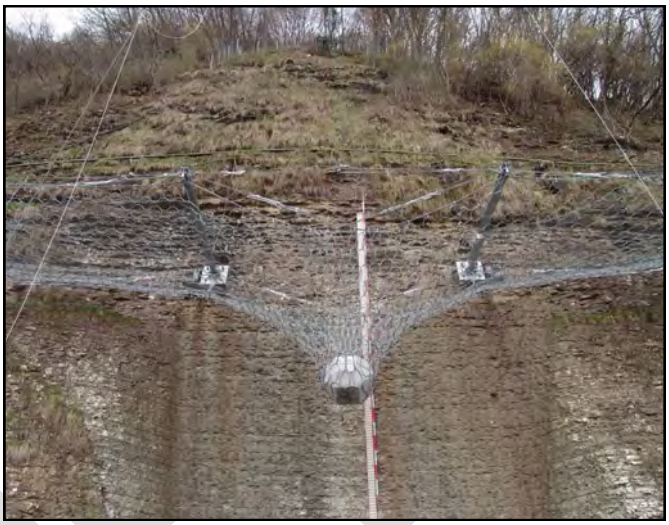
Rev. 08, Date 20.06.2014

MAC.RO. SYSTEM - RMC 500/A - 5000 kJ
HIGH RESISTANCE ROCKFALL BARRIER

The **RMC500/A** rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 5000 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
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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 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 UNI 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 6 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: 5254 kJ
Barrier Nominal Height: 6.0 m
Maximum Barrier Elongation: 6.50 m
Barrier Residual Height > 70% of the nominal height
Category A of ETAG 027

ETA n. 11/0293

CE
0969-CPD-004/12-BP

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.

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TECHNICAL DATA SHEET
Rev. 03, Date 20.06.2014

MAC.RO. SYSTEM - RMC 850/A - 8600 kJ
HIGH RESISTANCE ROCKFALL BARRIER

The **RMC850/A** rockfall barrier is currently the barrier, tested and certified in accordance with ETAG 027, with the highest performance in terms of energy absorption in the world!

The **RMC850/A** rockfall barrier is in fact capable of withstanding the impact of a rock block with energy levels in excess of 8600 kJ.

Standards and reference guidelines:
ETAG 027 "Guideline for European Technical Approval of Falling Rock Protection Kits"
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
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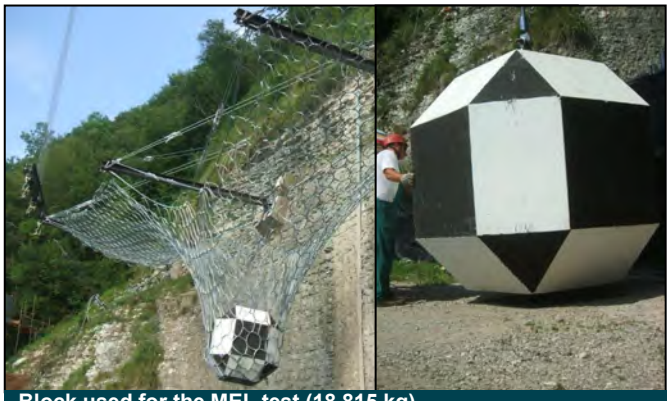
EN 10244-2 "Steel wire and wire products - Non ferrous metallic coatings on steel wire - Zinc or zinc-alloy coatings"

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 UNI 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.
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.



Block used for the MEL test (18,815 kg)

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.

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 7 m height. The test program was drawn up and carried out following the instructions provided in the document "ETAG 027".

MEL (Maximum Energy Level) test results:
Energy: 8644 kJ
Barrier Nominal Height: 7.0 m
Maximum Barrier Elongation: 8.10 m
Barrier Residual Height > 57% of the nominal height
Category A of ETAG 027

ETA n. 13/0017

CE
0969-CPD-002/13-BP

The rockfall barrier **RMC850/A** is the property of RISP s.r.l., and it is marketed under license by Officine Maccaferri Group.

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