

CTR 10/04/B - 1000 kJ HIGH RESISTANCE ROCKFALL BARRIER

The CTR 10/04/B rockfall barrier is capable of withstanding the impact of a rock block with energy levels in excess of 1000 kJ.

Standards and Reference Guide:

- European Guidelines ETAG 027: "ETAG – Guideline for European Technical Approval of Falling Rock Protection Kits" - complete certification — Rev. 2006.
- Special specifications ANAS "Technical Group on Roads Safety" April 2001.

Standards on materials:

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

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

EN 12385-4 "Steel wire ropes Safety Part 4: Stranded ropes for general lifting applications";

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

CNR-UNI 10011 "Steel structures. Instructions of design, construction, testing and maintenance".

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 a 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 steel cable mesh panel, and 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 dissipaters 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 following are the main features of the rockfall barrier:

- 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.



Figure 1

Tab.1 - TYPICAL SIZE OF CTR 20/04/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 50 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, ask for the correct type of base connection (compacted ground, or loose soil, with or without micropile).

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 3.50 m post height. The test program was drawn up and carried out following the instructions provided in the draft document "ETAG 027 – Guideline for European Technical Approval of Falling Rock Protection Kits" (Certificate by Bologna's University DISTART Department, on March 08, 2007).

Maximum Energy Level Test results:

Energy : 1100 kJ

Barrier Nominal Height: 3.50 m

Maximum Barrier Elongation : 3.50 m

Barrier Residual Height > 70% - Class "A" of ETAG 027

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