



Type approval of safety nets for protection against rockfall

Test Certificate No. S 03-4

System description

- **System designation**

ROCCO RXI-050

- **Address of designer**

GEOBRUGG Fatzer AG Schutzsysteme, Hofstrasse 55,
8590 Romanshorn

- **System description**

– Energy class 500 kJ

– Posts: profile HEB 120

length a_l 3.55 m

interval a_s 10 m

– Support ropes: type DIN 3064

diameter 20 mm

– Net: type ROCCO ring net (7 windings)

diameter Ring diameter 350 mm, wire diameter 3 mm

mesh -

height h_v 3.06 m

- System drawings

Description	No.	Date
System handbook RXI-050	112-N-FO/03	23.01.2004
Maintenance handbook RXI-050	114-N-FO/02	06.11.2003
Foot part of post HEB 120	GS-6054.1-2	30.03.2003
Middle part of post 3m	GS-6055	30.03.2003
Middle part of post 4m	GS-6056	30.03.2003
Head of post HEB 120	GS-6057.1-2	30.03.2003
Ground plate	GS-7035.1-3	30.03.2003
Universal joint	GS-7036	30.03.2003
Ground plate rope guide tube	GS-7037	30.03.2003
Hinge tube with pins	GS-7038	30.03.2003
GS-8002 (force path diagram for braking ring)	-	-

Basic documentation

- **Field test**

WSL test report

Date 30 October 2003

Report no. 03-4

- **Overall assessment**

Overall assessment of the
EKLS (FECAR)

Date 11 February 2004

Report no. S 03-4



Test results

• Preliminary test of outer part

- Penetration of test body yes / no
- Additional observations none

• Preliminary energy test (50%)

- Penetration of test body 250 kJ
yes / no
- Braking time t_s 0.24 s
- Braking distance b_s 4.18 m
- Sum of the tensile forces in the 2 upper cables 150 kN
- Sum of the tensile forces in the 1 lower cables 104 kN
- Maximum of the tensile forces in a stay cable 50 kN

– List of damaged elements

No damage to load-bearing parts of the structure. Three of the 8 braking components were extended to almost half the maximum distance.

– Assessment of repairs

The repairs necessary after the test were considered to be normal. This work took 11 man-hours.

• Main energy test (100%)

- Penetration of test body 500 kJ
yes / no
- Braking time t_s 0.30 s
- *Maximum permissible braking distance b_s* 6.0 m
- Measured braking distance b_s 5.07 m
- *Minimum permissible residual braking height h_n* 1.5 m
- Measured residual braking height h_n 1.82 m
- Sum of the tensile forces in the 2 upper cables 155 kN
- Sum of the tensile forces in the 1 lower cables 136 kN
- Maximum of the tensile forces in a stay cable 59 kN

– List of damaged elements

No damage to load-bearing parts of the structure. Six of the 8 braking components were extended to more than half of the possible distance.

• Assessment of special criteria

– Comments on assembly and on the assembly instructions

No particular difficulties were encountered with assembly.

– Comments on adaptability to the terrain

Adaptability to the terrain is normal.



– Comments on design complexity

The design is simple. Damaged components are easy to replace.

– Comments on anticipated life cycle

Poles, universal joint and ground plates are unaffected. Support ropes, guy ropes, anchoring ropes and the ring net are galvanised according to DIN 2078. The spiral anchor has an additional corrosion protection tube. To increase corrosion protection the manufacturer offers an aluminium-zinc alloy.

The anticipated service life is ascertained to be adequate.

Overall assessment

Test passed

Test passed with reservations

Examined based on the following guidelines: GERBER, W. 2001: Guideline for the approval of rockfall protection kits. Environment in practice. Swiss Agency for the Environment, Forests and Landscape (SAEFL), Swiss Federal Research Institute WSL. Berne, 39 pages. Revised June 2006.

RESERVATION: Should deficiencies arise following certification of the safety net, FOEN may revoke product release and delete it from the type approval list.

Date

19.05.2006

Name, position

Andreas Götz, Vice Director

Signatures

Replaces the Certificate No. S 03-4 of 26 February 2004

Federal Office for the Environment FOEN
Risk Prevention Division
3003 BERN
[http:// www.umwelt-schweiz.ch/typenpruefung](http://www.umwelt-schweiz.ch/typenpruefung)