



# Type approval of safety nets for protection against rockfall

Test Certificate No. S 06-19

## System description

• <b>System designation</b>	<b>RXI-500</b>		
• <b>Adresse of manufacturer</b>	GEOBRUGG Fatzer AG Schutzsysteme, Hofstrasse 55, 8590 Romanshorn		
• <b>System description</b>			
– Energy class	5000 kJ		
– Posts:	profile	HEB 260 (S235JRG2)	
	length a <sub>l</sub>	6.2 m	
	interval a <sub>s</sub>	10 m	
– Support ropes:	type	6x31+SE, Geobinex	
	diameter	22 mm	
– Net:	type	ROCCO ring net (19 windings)	
	diameter	Ring diameter 300 mm, wire diameter 3 mm	
	mesh	-	
	height h <sub>v</sub>	6.02 m	
– System drawings			
	Description	No.	Date
	System handbook RXI-500	144-N-FO / 04	05.03.2007
	Maintenance handbook	146-N-FO / 01	15.09.2006
	Technical documentation	10/2006	09.10.2006

## Basic documentation

• <b>Field test</b>			
WSL test report	Date 31 January 2007	Report no. 06-19	
• <b>Overall assessment</b>			
Overall assessment of the EKLS (FECAR)	Date 27 June 2007	Report no. S 06-19	

## Test results

• <b>Preliminary test of outer part</b>			
– Penetration of test body	yes <input type="checkbox"/> / no <input checked="" type="checkbox"/>		
– Additional observations	none		



• <b>Preliminary energy test (50%)</b>	2500 kJ
– Penetration of test body	yes <input type="checkbox"/> / no <input checked="" type="checkbox"/>
– Braking time $t_s$	0.38 s
– Braking distance $b_s$	6.2 m
– Sum of the tensile forces in the 5 upper ropes	394 kN
– Sum of the tensile forces in the 4 lower ropes	342 kN
– Sum of the tensile forces in the 2 stay ropes	315 kN
– List of damaged elements	No damage to the installation as a whole. 95 of the 110 braking elements were deformed.
– Assessment of repairs	The middle part of the net was replaced. All upper and lower ropes were replaced with their brakes. In addition, 2 guy ropes each with 2 brakes, the vertical rope at 2 supports and 4 Dimo braking elements in the middle part were all replaced. The work took 99 person-hours.
• <b>Main energy test (100%)</b>	5000 kJ
– Penetration of test body	yes <input type="checkbox"/> / no <input checked="" type="checkbox"/>
– Braking time $t_s$	0.51 s
– <i>Maximum permissible braking distance <math>b_s</math></i>	15.0 m
– Measured braking distance $b_s$	7.8 m
– <i>Minimum permissible residual braking height <math>h_n</math></i>	3.0 m
– Measured residual braking height $h_n$	3.54 m
– Sum of the tensile forces in the 5 upper ropes	433 kN
– Sum of the tensile forces in the 4 lower ropes	445 kN
– Sum of the tensile forces in the 2 stay ropes	423 kN
– List of damaged elements	4 braking elements in the middle part tore. At support S2 the lower rope tore. At ground plate S2 the rope bollard bent. 96 of the 110 braking elements were deformed.
• <b>Assessment of special criteria</b>	
– Comments on assembly and on the assembly instructions	The assembly is described accurately in the system handbook. The effort required for assembly is great, corresponding to the energy absorption capacity. The weights of the components to be assembled are considerable.
– Comments on adaptability to the terrain	The adaptability to the terrain is normal.



---

– **Comments on design complexity**

The construction has very many individual parts. However, constructing it is clear and comprehensible. Damaged elements can be replaced individually.

---

– **Comments on anticipated life cycle**

Anchor bolts and posts are not galvanised as standard. The manufacturer recommends galvanisation in particular for ground plates. In the basic version the spiral rope anchors are galvanised. The ring nets are coated with an aluminium-zinc alloy. The brake rings consist of galvanised steel tubes and aluminium press sleeves.

The anticipated service life is ascertained to be adequate.

---

## Overall assessment

**Test passed**

**Test passed with reservations**

Tested according to the following guidelines: GERBER, W. 2001: Guideline for the approval of rockfall protection kits. Federal Office for the Environment (FOEN) and Swiss Federal Research Institute for Forest, Snow and Landscape (WSL). Bern, 39 pages, revised June 2006.

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

**Date**

21.8.07

**Name, position**

Andreas Götz, Vizedirektor

**Signatures**

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