



# Type approval of safety nets for protection against rockfall

Test Certificate No. S 14-6

## System description

• <b>System designation</b>	<b>GBE-100A-R</b>		
• <b>Address of manufacturer</b>	Geobrug AG, Aachstrasse 11, 8590 Romanshorn		
• <b>System description</b>			
– Energy class		100 kJ	
– Posts:	profile	RRW 90/90/3.5 (S355)	
	length $a_l$	2.20 mm	
	interval $a_s$	10 mm	
– Support ropes:	type	6x19 S-WC ,1770 N/mm <sup>2</sup>	
	diameter	14 mm	
– Vertical ropes:	type	6x19 S-WC ,1770 N/mm <sup>2</sup>	
	diameter	12 mm	
– Net:	type	TECCO G80/4	
	mesh height	102 mm	
	mesh width	177 mm	
	height $h_v$	2.14 m	
– System drawings			
	Description	No.	Date
	Maintenance handbook GBE-series	EKLS/01	30.01.2013
	Technical documentation GBE-100A-R	EKLS/01	05.11.2014

## Basic documentation

• <b>Field test</b>		
WSL test report (EOTA)	Date 12.12.2014	Report no. 14-15
• <b>Overall assessment</b>		
Overall assessment of the FECAR	Date 19.12.2014	Report no. S 14-6

## Test results

• <b>Preliminary test of outer part</b>	For this net type not necessary (Decision of the FECAR / 7.3.2013)	
– Penetration of test body	yes <input type="checkbox"/> / no <input type="checkbox"/>	
– Additional observations		



• **Preliminary energy test (50%)**

	kJ
– Penetration of test body	yes <input type="checkbox"/> / no <input type="checkbox"/>
– Braking time $t_s$	s
– Braking distance $b_s$	m
– Sum of the tensile forces in the upper cables	kN
– Sum of the tensile forces in the lower cables	kN
– Maximum of the tensile forces in a stay cable	kN
– List of damaged elements	
– Assessment of repairs	

• **Main energy test (100%)**

– Penetration of test body	100 kJ yes <input type="checkbox"/> / no <input checked="" type="checkbox"/>
– Braking time $t_s$	0.13 s
– <i>Maximum permissible braking distance <math>b_s</math></i>	4.0 m
– Measured braking distance $b_s$	2.6 m
– <i>Minimum permissible residual height <math>h_n</math></i>	1.0 m
– Measured residual height $h_n$	1.52 m
– Sum of the tensile forces in the 2 upper cables	116 kN
– Sum of the tensile forces in the lower cables	81 kN
– List of damaged elements	-

• **Assessment of special criteria**

- Comments on assembly and on the assembly instructions  
The time required to assemble the system was 22 hours. This is very low for a system of this energy class.
- Comments on adaptability to the terrain  
Adaptability to the terrain is normal.
- Comments on design complexity  
The system is simple. The support ropes include no braking elements. An intermediate retaining rope is required every 60 m.
- Comments on anticipated service life  
The anticipated service life is ascertained as 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. 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**

23.2.2015

**Name, position**

Dr. Josef Hess, Vice-Director

**Signatures**