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Federal Department of the Environment,
Transport, Energy and Communications DETEC

Federal Office for the Environment FOEN

Type approval of safety nets for protection against rockfall

Test Certificate No. S 13-2

System description

• **System designation**		**RXE-2000**
• **Address of manufacturer**		Geobrugg AG, Aachstrasse 11, 8592 Romanshorn
• **System description**		
– Energy class		2000 kJ
– Posts:	profile	HEA 200
	length a_l	5.46 m
	interval a_s	10 m
– Support ropes:	type	6x36 W-S + SE, 1770 N/mm^2
	diameter	22 mm
– Stop ropes:	type	6x36 W-S + SE, 1770 N/mm^2
	diameter	22 mm
– Net:	type	ROCCO 12/3/350 ring net (12 windings)
	diameter	Ring diameter 350 mm, wire diameter 3 mm
	mesh	-
	height h_v	5 m

– System drawings

Description	No.	Date
System handbook RXE-2000	EKLS/01	19.07.2013
Maintenance handbook RXE-1000 to RXE-8000	EKLS/01	10.04.2013
Technical documentation RXE-2000	EKLS/02	03.09.2013

Basic documentation

• **Field test**

WSL test report (EOTA)	Date 20.08.2013	Report no. 13-09

• **Overall assessment**

Overall assessment of the EKLS (FECAR)	Date 15.10.2013	Report no. S 13-2

Test results

• **Preliminary test of outer part**

– Penetration of test body — yes ☐ / no ☒

– Additional observations — See test 03-4 (same type)

• **Preliminary energy test (50%)**	1000 kJ
– Penetration of test body	yes ☐ / no ☒
– Braking time t_s	0.30 s
– Braking distance b_s	5.2 m
– Sum of the tensile forces in the 5 upper cables	430 kN
– Sum of the tensile forces in the 4 lower cables	260 kN
– Maximum of the tensile forces in a stay cable	150 kN
– List of damaged elements	
-	
– Assessment of repairs	
The net was completely replaced. The work took 100 man hours.	
• **Main energy test (100%)**	2000 kJ
– Penetration of test body	yes ☐ / no ☒
– Braking time t_s	0.36 s
– *Maximum permissible braking distance b_s*	*10.0 m*
– Measured braking distance b_s	6.5 m
– *Minimum permissible residual braking height h_n*	*2.5 m*
– Measured residual braking height h_n	3.11 m
– Sum of the tensile forces in the upper cables	540 kN
– Sum of the tensile forces in the lower cables	265 kN
– Maximum of the tensile forces in a stay cable	285 kN
– List of damaged elements	
-	
• **Assessment of special criteria**	
– Comments on assembly and on the assembly instructions	
The assembly cost is standard 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 has two stop ropes in addition to the support ropes. An intermediate retaining rope is required every 60 m in accordance with the regulations. 9 ropes must be anchored there.	
– 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	Name, position	Signatures
22.10.2013	Dr. Josef Hess, Vice-Director	

Federal Office for the Environment FOEN
Risk Prevention Division
3003 BERNE
http:// www.bafu.admin.ch/typenpruefung