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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 04-6

System description

• **System designation**		**ISOSTOP 1000 kJ**
• **Address of designer**		isofer ag, Industriequartier, 8934 Knonau, Switzerland
• **System description**		
– Energy class		1000 kJ
– Posts:	profile	HEA 140
	length a_l	4.10 m
	interval a_s	10 m
– Support ropes:	type	6 x 19 Seale + SE DIN 3058
	diameter	20 mm
– Net:	type	twisted wire cable net 6 x 7 SE DIN 3055
	diameter	9 mm, peripheral cable 10 mm
	mesh	200 x 200 mm
	height h_v	3.88 m

– System drawings

Description	No.	Date
System of protection against rockfall; Energy class 5: 1000 kJ (general documentation)	-	May 2004

Basic documentation

• **Field test**

WSL test report	Date 30 June 2004	Report no. 04-6

• **Overall assessment**

Overall assessment of the EKLS	Date 1 and 2 September 2004	Report no. S 04-6

Test results

• **Preliminary test of outer part**

– Penetration of test body	yes ☐ / no ☒
– Additional observations	none

• **Preliminary energy test (50%)**	500 kJ
– Penetration of test body	yes ☐ / no ☒
– Braking time t_s	0.30 s
– Braking distance b_s	4.2 m
– Sum of the tensile forces in the 2 upper cables	185 kN
– Sum of the tensile forces in the 2 lower cables	90 kN
– Maximum of the tensile forces in a stay cable	51 kN
– List of damaged elements	
No damage to load-bearing structural members. Seventeen of the 20 braking elements were deformed and five of them were extended to the maximum possible distance.	
– Assessment of repairs	
15 braking elements were replaced. One additional braking element was inserted into each of the upper and lower support cables in fields 1 and 3.The time required was 24 man-hours. The extent of repairs necessary following the test is ascertained to be slight.	
• **Main energy test (100%)**	1000 kJ
– Penetration of test body	yes ☐ / no ☒
– Braking time t_s	0.50 s
– *Maximum permissible braking distance b_s*	*8.0 m*
– Measured braking distance b_s	7.0 m
– *Minimum permissible residual braking height h_n*	*2.0 m*
– Measured residual braking height h_n	2.21 m
– Sum of the tensile forces in the 2 upper cables	195 kN
– Sum of the tensile forces in the 2 lower cables	154 kN
– Maximum of the tensile forces in a stay cable	120 kN
– List of damaged elements	
No damage to load-bearing structural members. The seam cable at the supports was frayed, and two cable strands parallel to the brakes were ruptured in the lower support cable of the central field. The hinged bolt (design breaking point) was sheared at the base of one support. All 24 braking elements were deformed, 10 of these to the maximum.	
• **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 elements are easy to replace.	
– Comments on anticipated life cycle	

The entire material is galvanised (SN EN ISO 1461). The anticipated life cycle 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	**Name, position**	**Signatures**
19.05.2006	**Andreas Götz, Vice Director**	

Replaces the Certificate No. S 04-6 of 22 November 2004

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