



Type approval of safety nets for protection against rockfall

Test Certificate No. S 05-10

System description

• System designation	ISOSTOP 2000 kJ		
• Address of designer	isofer ag, Industriequartier, 8934 Knonau, Switzerland		
• System description			
– Energy class	2000 kJ		
– Posts:	profile	HEB 160 (S235JRG2)	
	length a_l	5.31 m	
	interval a_s	10 m	
– Support ropes:	type	wire cable	
	diameter	24 mm, retention cable 22 mm, braking cable 18 mm	
– Net:	type	twisted wire cable net (DIN 2078, SN EN 10244-2)	
	diameter	10 mm (peripheral cable 12 mm)	
	mesh	140 x 140 mm (wire netting cover 50 x 50 mm)	
	height h_v	4.80 m	
– System drawings			
	Description	No.	Date
	System and assembly handbook	-	May 2005
	System drawing of cable guide 2000 kJ (3 copies)	-	24.05.2005
	Technical documentation	-	06.04.2005

Basic documentation

• Field test			
WSL test report	Date: 30 June 2005	Report no. 05-10	
• Overall assessment			
Overall assessment of the EKLS	Date: 13 September 2005	Report no. S 05-10	

Test results

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



• Preliminary energy test (50%)	1000 kJ
– Penetration of test body	yes <input type="checkbox"/> / no <input checked="" type="checkbox"/>
– Braking time t_s	0.34 s
– Braking distance b_s	5.10 m
– Sum of the tensile forces in the 3 upper cables	315 kN
– Sum of the tensile forces in the 3 lower cables	260 kN
– Maximum tensile force in stay cables	91 kN
– List of damaged elements	No significant damage to any structural members. Eighteen of the 30 breaking elements were deformed.
– Assessment of repairs	Fourteen braking elements were replaced. The required working time was 27 man-hours. The extent of repairs necessary following the test is ascertained to be normal.
• Main energy test (100%)	2000 kJ
– Penetration of test body	yes <input type="checkbox"/> / no <input checked="" type="checkbox"/>
– Braking time t_s	0.46 s
– <i>Maximum permissible braking distance b_s</i>	10.0 m
– Measured braking distance b_s	6.8 m
– <i>Minimum permissible residual braking height h_n</i>	2.5 m
– Measured residual braking height h_n	2.63 m
– Sum of the tensile forces in the 3 upper cables	350 kN
– Sum of the tensile forces in the 3 lower cables	255 kN
– Maximum tensile force in stay cables	117 kN
– List of damaged elements	No significant damage to any structural members. Twenty-four of the 30 breaking elements were deformed.
• Assessment of special criteria	
– Comments on assembly and on the assembly instructions	The existing documentation is adequate for carrying out the assembly work and can be stated to be satisfactory. The assembly time is within the normal range. No particular difficulties were encountered with assembly.
– Comments on adaptability to the terrain	The adaptability to the terrain can be stated to be normal.
– Comments on design complexity	The design can be stated to be satisfactory. The accompanying documentation facilitates safe assembly. Work in the terrain generally proves difficult with cables of 24 mm diameter.



Comments on anticipated life cycle

The posts are galvanised according to standard practice. The net is galvanised according to standard practice: a variant is offered with plating comprising 95% Zn und 5% Al. The components are delivered in versions adequate for the required life cycle of the installation.

The anticipated life cycle is ascertained to be adequate.

Overall assessment

Test passed

Test not passed

Examined based on the following guidelines: GERBER, W. 2001: Guideline for the approval of rockfall protection kits, Environment in practice, Federal Office for the Environment (FOEN) and 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, Deputy
Director

Signatures

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