Rockfall Protection System

TSV-2000-ZD H4

Classification

Model	TSV-2000-ZD H4	
Style	Hinged system	
Energy Class	5	
Certified/Tested MEL Energy Level [kJ]	2000	2299
SEL Energy Level [kJ]	822	
Approved Heights EOTA [m]	4.0 - 5.0	
Approved Heights BAFU [m]	-	
Verification	Full Scale Tested	
Consequence Class (max.)	CC3	

Application Area:
TRUMER rockfall protection systems were developed to protect infrastructure, buildings, and human life from rockfall and block impact. They are installed in the transit or deposition zone close to the object to be protected. The rockfall protection system TSV-2000-ZD H4 can be used for projects subject to consequence class CC3 in EN 1990 according to ONR 24810.

Material and Quality:
The steel components and steel wire ropes used by TRUMER meet the highest standards, which are ensured through a rigorous quality management system. The product has been assessed in accordance with EAD 340059-00-0106 and is manufactured in compliance with the issued ETA. In addition, TRUMER SCHUTZBAUTEN is an ISO 9001-certified company.

Execution and Anchoring:
The proposed design of the rockfall protection system is based on the construction specifications of ONR 24810. Support spacings between 8 m and 12 m are recommended. The positions and inclinations of the supports should be chosen so that maximum retention capacity is provided for potential rock and block impacts in the direction of the slope as well as at an angle to it, and so that the system is not bypassed. Post positions in areas with a high probability of direct impact on the post should be avoided. According to the recommendations of ONR 24810, fence sections should not be longer than 60 m or should be tensioned every 60 m.

Test Summary

Test Height [m]	4.0
Maximum Elongation [m]	6.9
Remaining usable height [%]	≥50 (A) [1]
Openings in the Net	No
Secondary Mesh	No

1 Class of remaining usable height according to EAD 340059-00-0106

European Technical Assessment

ETA Number	ETA-14/0357
Issuing Body	Austrian Institute of Construction Engineering (OIB)

Certificate of Constancy of Performance

Certificate Number	1379-CPR-022/14
Issuing Body	TVFA TU Graz, TVFA-ZERT

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Primary Net

Model	Omega-Netz 9.0/185
Type	Wire Rope Net
Type	1x7
Diameter [mm]	9.0
Corrosion Protection	Zn-galvanized / ZnAl-galvanized [1]
Mesh Size [mm]	185 x 185
Weight [kg/m²]	7.0
Connection to the suspension cable	Threaded
Connection of the mesh panels	Shackled

[1] in accordance with European standard EN 10244-2 (Class A or Class B)

Ropes

Bearing rope	Quantity	2
	Rope Diameter [mm]	22
	Corrosion Protection	Zn-galvanized / ZnAl-galvanized [1]
	Brake Elements per Rope	2
	Brake Element Model	GDV II 45-12-130 120/8-1500
Middle Rope	Quantity	3
	Rope Diameter [mm]	20
	Corrosion Protection	Zn-galvanized / ZnAl-galvanized [1]
	Brake Elements per Rope	2
	Brake Element Model	GDV II 45-12-130 120/8-3000/ 45-12-130 120/6-4000
Retaining Rope	Quantity	2
	Rope Diameter [mm]	24
	Corrosion Protection	Zn-galvanized / ZnAl-galvanized [1]
	Brake Elements per Rope	-
	Brake Element Model	- -
Lateral Anchorage	Quantity	1
	Rope Diameter [mm]	20
	Corrosion Protection	Zn-galvanized / ZnAl-galvanized [1]
	Brake Elements per Rope	-
	Brake Element Model	-

[1] in accordance with European standard EN 10244-2 (Class A or Class B)

Post Structure

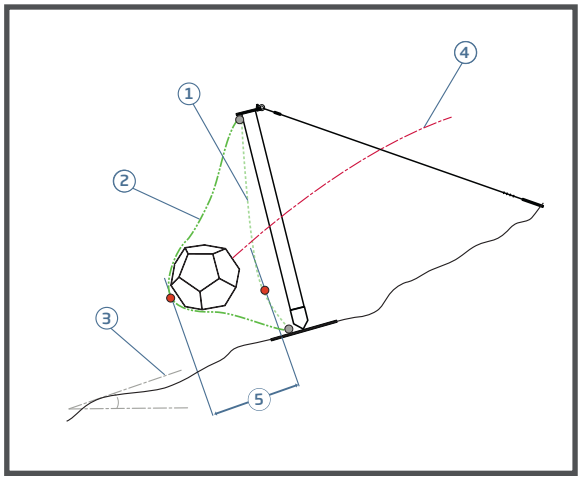
Post Type	HEA 220
Ladder	integrated
Rope Guidance	removable/integrated
Post weight at height 4m [kg]	287,5
Connection to Base Plate	Hinged with Pin
Dimensions base plate [mm]	790 x 250 x 20
Weight Baseplate [kg]	49,5
Number of Anchors per Base Plate	2

Characteristic anchor forces

	[1]	[2]
Lateral Anchor, max [$F_{k,lat}$] [kN]	302	-
Upslope Anchors [$F_{k,ret}$] [kN]	322	-
Base Plate [$F_{k,schub}$] [kN]	216,5	-
Bending Moment at Support Base [3] [kN/m]	-	-

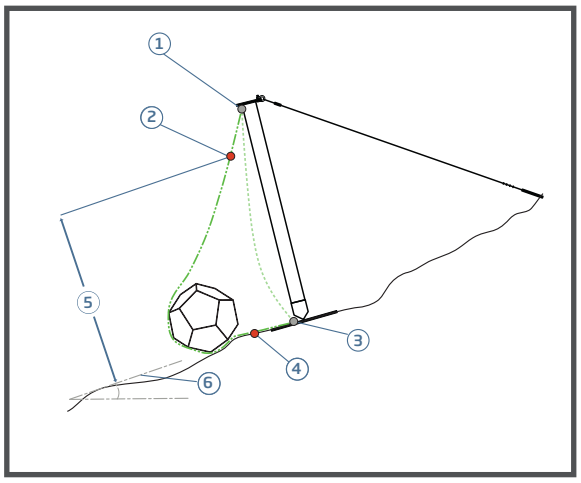
[1] Guideline values according to ONR 24810. Further design details available upon request.
[2] Guideline values in accordance with the specified BAFU guideline. For further design details, please refer to our anchor force data sheet.
[3] Test height

Maximum Elongation



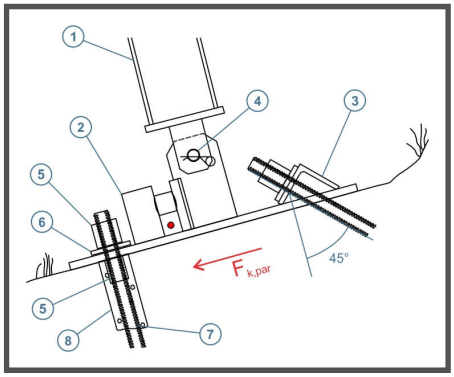
1.Primary Net before impact, 2.Primary Net after impact, 3.Reference slope, 4.Block trajectory, 5.Maximum Elongation

Remaining usable height



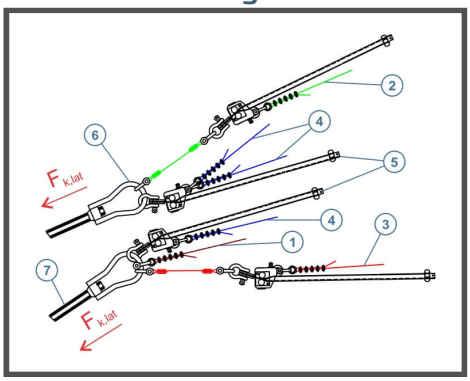
1.oberes Tragseil vor Impakt, 2.oberes Tragseil nach Impakt, 3.unteres Tragseil vor Impakt, 4.unteres Tragseil nach Impakt, 5.Restnutzhöhe, 6.Referenzböschung

Base Plate/Foundation



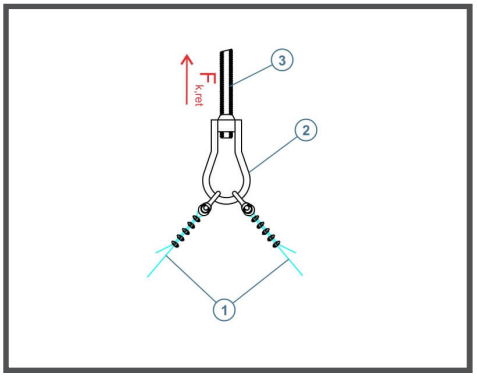
1.Post, 2.Rope Guidance, 3.Base Plate, 4.Bolt, 5.Anchor Nut, 6.Washer, 7.Anchor, 8.Micropile Tube

Lateral Anchoring



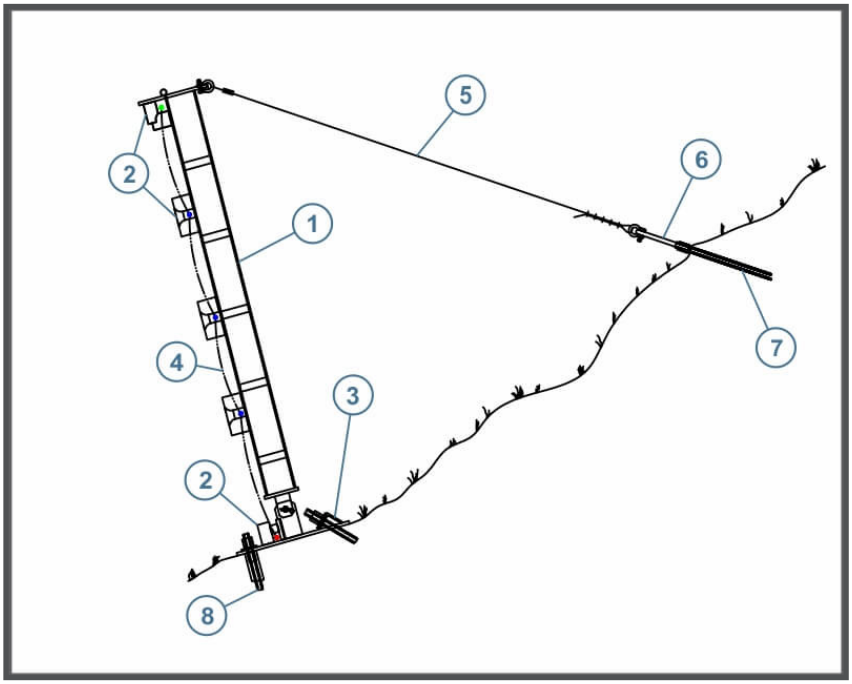
1.Lateral Anchoring, 2.Upper Bearing Rope, 3.Lower Bearing Rope, 4.Middle Bearing Rope, 5.Brake Element, 6.Anchor Bracket, 7.Anchor

Upslope Anchoring



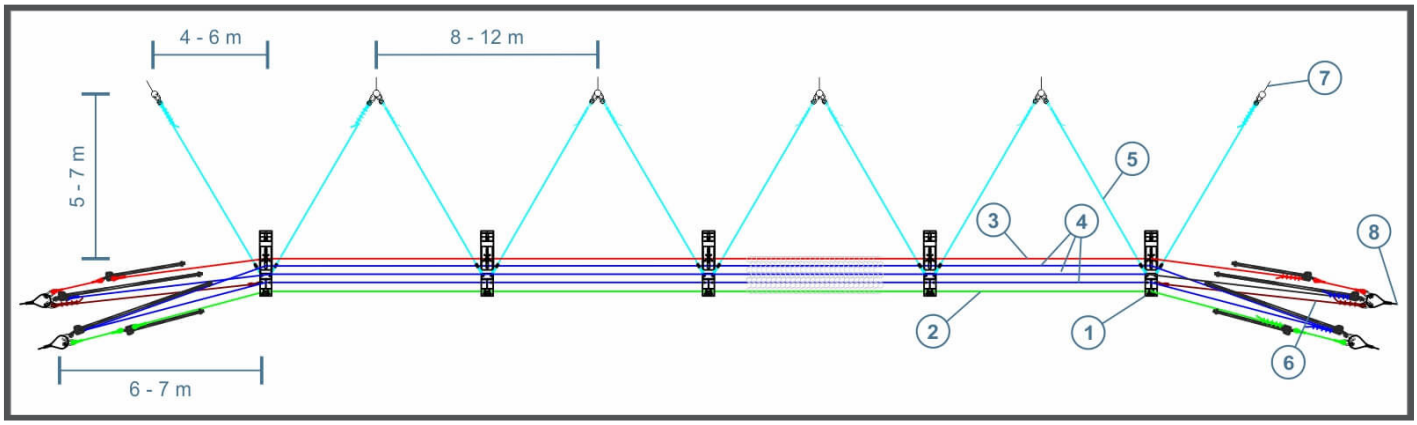
1.Retaining Rope, 2.Anchor Bracket, 3.Anchor

Detail Side View



1.Post, 2.Rope Guidance, 3.Base Plate, 4.Primary Net, 5.Retaining Rope, 6.Anchor Bracket, 7.Upslope Anchoring, 8.Anchor

Plan



1.Post, 2.Upper Bearing Rope, 3.Lower Bearing Rope, 4.Middle Bearing Rope, 5.Retaining Rope, 6.Lateral Anchoring, 7.Upslope Anchoring, 8.Lateral Anchoring

We reserve the right to update or change specifications, technical information, and product-related adjustments at any time and without prior notice based on new test results or further testing. In addition, our General Terms and Conditions (GTC) in their latest version shall apply.