Shallow landslide protection system

TS-HM-150-ZD - Data Sheet

Classification

Model	TS-HM-150-ZD
Style	Hinged System
Impact Pressure $kN/m^2 (lbf/ft^2)$	up to 275 (5740)
Approved Heights *m (ft)*	3.5 (11.5)
Verification	Full Scale Test

Area of Application:
TRUMER shallow landslide protection systems were developed to protect infrastructure, utilities, buildings and lives from sliding or flowing debris. Typical shallow landslide barriers are installed in run-out or deposition zones, close to the elements at risk that they protect. The TS-HM-150-ZD can absorb energy greater of 5000 kJ created by shallow landslides.

Material:
TRUMER uses steel components and steel wire rope made from high quality materials, following a stringent quality assurance program. TRUMER is ISO9001:2008 certified.

Installation:
Structures by TRUMER are designed with as few components as possible to simplify installation and reduce maintenance. In addition, the systems can be installed by hand, with heavy machinery or with the use of a helicopter. Foundation design and construction is dependant on site conditions and are the responsibility of the project engineer.

Advantages:
Every shallow landslide protection fence has been tested with no failures of primary components. As such, TRUMER shallow landslide protection systems carry the highest safety ratings.

Test Report Summary

Test Height *m (ft)*	3.5 (11.5)
Number of Impacts	3
Material Stream *USCS*	GW-GM
Energy Absorption *kJ (ft-tons)*	> 5000 (1843)
Residual Height Class	A (≥50%)
Component Failure	None
Primary Net Opening	None
Secondary Mesh	Yes

Test Report

Report Number	70 12 0165
Issuing Body	TSUS Slovakia Building, Testing and Research Institute
Date of Issue	August 18, 2012

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Primary Net

Model	Omega-Net 9.0/185
Type	Steel Wire Cable
Rope Diameter *mm (in.)*	9.0 (0.354)
Rope Construction	1 x 7 Spiral
Single Wire Diameter *mm (in.)*	3.0 (0.118)
Corrosion Protection	Zn or ZnAl (Class A)
Mesh Size *mm (in.)*	~ 185 x 185 (7.3 x 7.3)
Unit Weight kg/m² (lb/ft²)	~ 6.8 (1.39)
Mesh Tensile Strength calculated *kN/m (lbf/ft)*	465 (31862)
Connection to Main Ropes	Threaded
Connection to Adjacent Panel	7/16" Shackle

Secondary Mesh

Mesh Type*	Rectangular Netting
Mesh Size *mm (in.)*	60 x 60 (2.36 x 2.36)
Wire Diameter *mm (in.)*	3.1 (0.12)

* in accordance with European Standard EN 10223-6

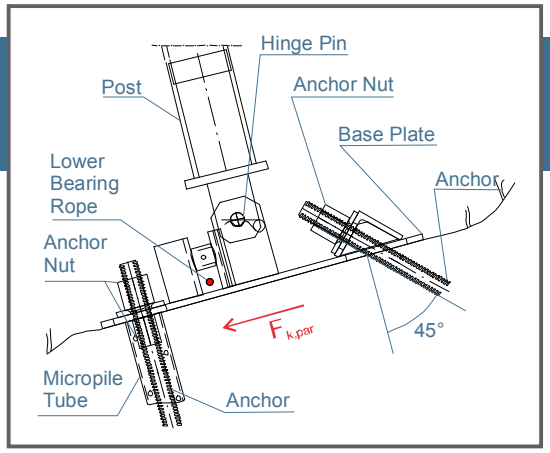
Ropes

Bearing	Quantity per fence segment	2
	Rope Diameter *mm (in.)*	24 (0.945)
	Corrosion Protection	Zn or ZnAl (Class A or B)
	Brake Elements per rope	2
	Brake Element Model	GDVI 45-12-130, 120x8-1500
Middle	Quantity per fence segment	2
	Rope Diameter *mm (in.)*	22 (0.866)
	Corrosion Protection	Zn or ZnAl (Class A or B)
	Brake Elements per rope	1
	Brake Element Model	GDVI 45-12-130, 120x8-3000
Retaining	Quantity per post	2
	Rope Diameter *mm (in.)*	24 (0.945)
	Corrosion Protection	Zn or ZnAl (Class A or B)
	Brake Elements per rope	N/A
	Brake Element Model	N/A

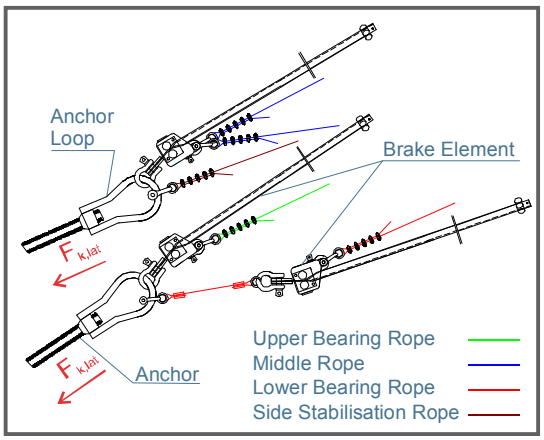
Support Structure

Post Type	HEA 280
Integrated Ladder	Rungs every 0.5 m
Rope Guides	Integrated
Base Plate Connection	Tongue and Pin
Base Plate Footprint *mm (in.)*	872 x 400 (34.3 x 15.7)
Anchors per base plate	3

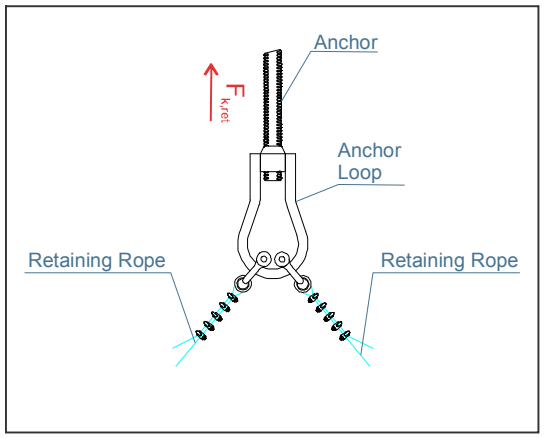
Base Plate/Foundation



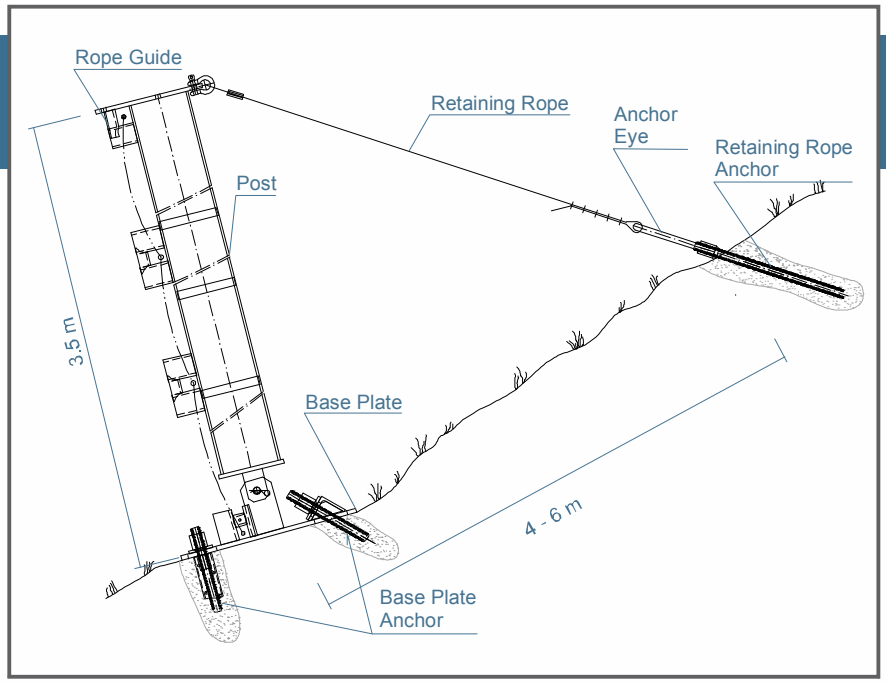
Lateral Anchorage



Retaining Rope Anchorage



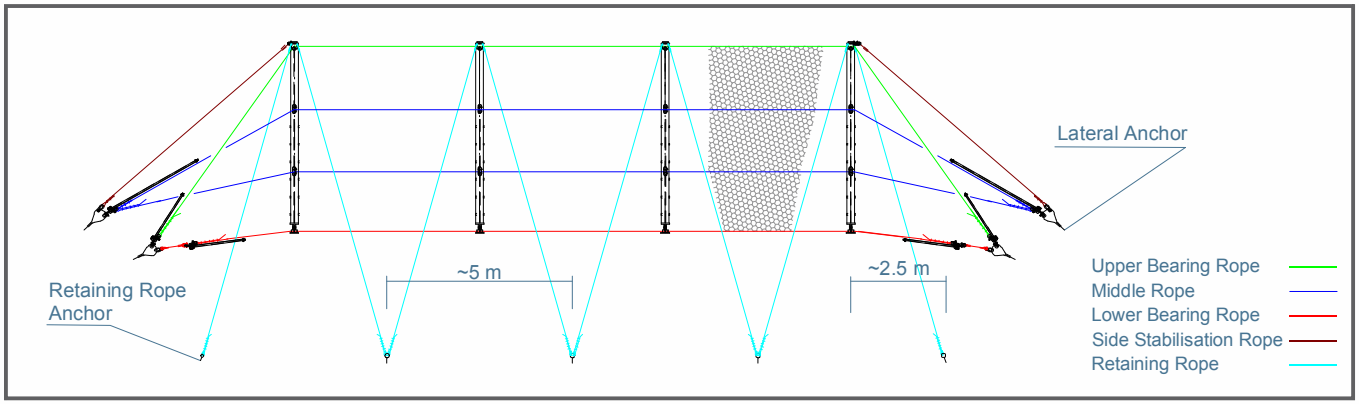
Typical Cross Section



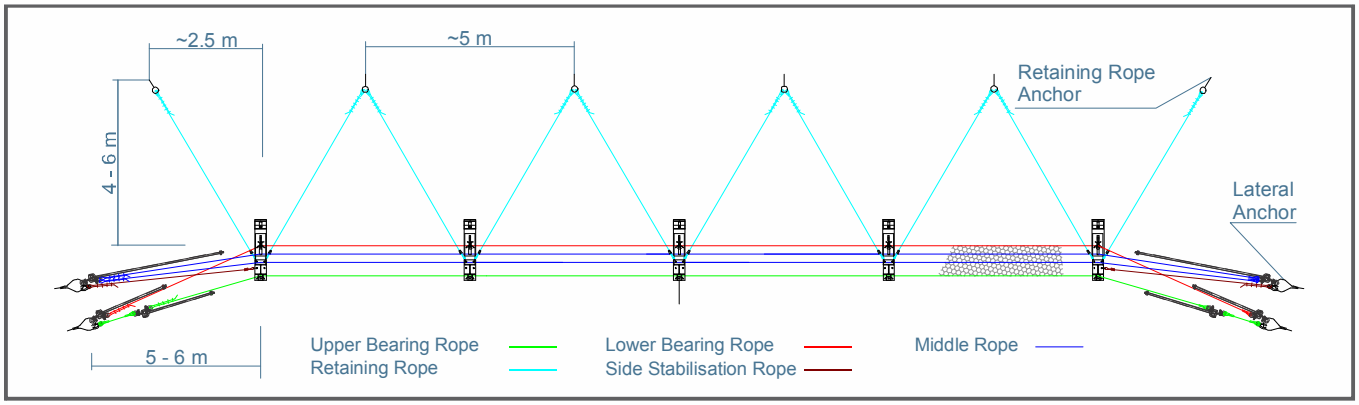
General Layout and Anchorage:
The given layout for the debris catcher is based on a full scale test approved by TSUS. In general, post spacing is about 5 m.

Anchor layout should follow the geometry provided in the installation manual with the anchor oriented as close as possible to the direction of the anticipated rope forces. It is acknowledged that due to site characteristics deviations from the ideal are unavoidable. In this case, the project engineer should use their best judgement to find a suitable location and orientation.

Typical Layout (Frontview)



Typical Layout (Planview)



Pre-test Photo

Full Scale Test Approved by TSUS:
The shallow landslide barrier TS-HM-150-ZD was tested in Hasliberg/Switzerland in a full scale test that was supervised by experts of TSUS Approval Body.

The flexible barrier with a total length of 15 m and a nominal height of 3.5 m was placed at the tow of a 55 m long and 40° steep slope. A natural mixture of debris and water was suddenly released and accelerated downslope to a speed of more than 50 km/h.

The barrier TS-HM-150-ZD stopped the debris of three impacts successfully. The maximum impact pressure was 275 kN/m^2. The three impacts filled the barrier to 2/3 the nominal height. For each of the first two impacts material of one container with about 25 m^3 was released at the top of the slope and caught by the barrier. At the third test the material of two containers (approx. 50 m^3) was released.

None of the components ruptured or showed relevant deformations.

Post-test Photo