

Abstract of test report no. 0307

System TS-500-ZD
Test V0707 / Eisenerz / 20.09.2007

General information

Energy class:	500kJ
Manufacturer:	Trumer Schutzbauten GmbH Maria Bühel Strasse 7 A-5110 Oberndorf bei Salzburg
System name:	TS-500-ZD
Test report number:	0307
Report creation date:	02.10.2007

Specification of rock-fall protection kit TS-500-ZD

The tested rock-fall protection kit TS-500-ZD of TRUMER SCHUTZBAUTEN GMBH was a flexible rock-fall protection system for energy impacts up to 500kJ. The rock-fall protection kit TS-500-ZD was characterised by ground plates which were fixed to the underground by two anchors per plate. The posts were connected to the ground plates by tumbler bearings and they were held in position by uphill retaining cables at their top. The interception structure of the tested rock-fall protection kit comprised an OMEGA-net. An additional layer was not implemented at the test. The upper and lower longitudinal bearing ropes were arranged as single ropes and connected to the side foundations using energy dissipating devices.

Main components of rock-fall protection kit TS-500-ZD

Interception structure

PRIMARY NET

Type:	OMEGA/7,5mm/MW135
Number of net packages:	6
Dimensions of single net package:	3,35m x 5,00m
Connection to bearing ropes:	threaded
Connection to side posts:	rope 10 vz 6x19 DIN 3060 FE sZ 1.770 N/mm ² (RBL: 63,3kN) (cp. DIN EN 12385-4)
Connection between net packages:	by 3/8 inch shackles (28 per face)

The system was tested without additional layer.

Support structure

POSTS WITH WELDED TOPPLATE

Type:	I-Profil DIN 1025 – IPBL 120 – S235JRG2 (HE 120 A according to EURONORM 53-62)
Material:	S235JRG2
Surface conditioning:	blank
Length:	2.986mm

GROUNDPLATE

Material:	S235JRG2
Dimensions:	650mmx200mmx15mm
Dimensions of shims:	100mmx100mmx10mm
Drill diameter of shims:	42mm
Surface conditioning:	blank
Joint pin:	Rd 20 EN10025-S355J2G3

The posts are connected to the ground plates by tumbler bearings.

Connecting components

BEARING ROPES

Upper bearing rope:	rope 20 vz 6x19 DIN 3060 SE sZ 1.770 N/mm ² (RBL: 293kN) (cp. DIN EN 12385-4)
Lower bearing rope:	rope 20 vz 6x19 DIN 3060 SE sZ 1.770 N/mm ² (RBL: 293kN) (cp. DIN EN 12385-4)

RETAINING AND SIDE ROPES

Side cables:	rope 16 vz 6x19 DIN 3060 SE sZ 1.770 N/mm ² (RBL: 188kN) (cp. DIN EN 12385-4)
Uphill retaining cables:	rope 16 vz 6x19 DIN 3060 SE sZ 1.770 N/mm ² (RBL: 188kN) (cp. DIN EN 12385-4)

Energy dissipating devices

ENERGY DISSIPATING DEVICES IN BEARING ROPES

Type:	AVT phx/FLA25x60/2,5W
Material:	St 37-2 (S235JR)
Diameter:	200 mm
Position:	at the right and left foundations
Connection to rope:	¾ inch shackle
Connection to anchor:	¾ inch shackle
Number/Surface conditioning:	1 element per connection/blank

Summary of test results

The tested rock-fall protection kit TS-500-ZD of TRUMER SCHUTZBAUTEN GMBH was hit by a block of reinforced concrete with a mass of 1.573kg and a velocity of 26,90m/s. The impact was placed in a height of 1,32m. The angle of block trajectory was determined with 35,86°. The impact energy was determined with 569kJ. The maximum horizontal system elongation was 5,98m. The block was stopped and caught by the rock-fall protection kit and did not touch the ground during the test until the system reached the maximum elongation. The whole impact energy was absorbed by the tested rock-fall protection kit. The energy impact did not cause visible damages of main components, but a few wires of the longitudinal bearing ropes were shopworn at the guiding devices of the inner posts and the joint pins of the inner posts were moderately deformed. In the place of impact the primary net was deformed irreversibly. The energy dissipating devices in the longitudinal bearing ropes were stretched but still had about 10% of their deformation capacity after the test. As a consequence of the impact the nominal height of the rock-fall protection kit was reduced from 3,03m to 1,53m, which means a residual height of the tested system of 50,35% of its nominal height.

Affirmation of test report no. 0307

The chair of Mining Engineering and Mineral Economics at the University of Leoben confirms that test report no. 0307 about the testing of rock-fall protection kit TS-500-ZD is correct in respect of content and matter of fact.

The rock-fall protection kit TS-500-ZD of Trumer Schutzbauten GmbH was tested according to the future "Guideline For European Technical Approval of Falling Rock Protection Kits" and **has passed the Maximum Energy Level (MEL) test.**

According to the test criterion "residual height" the system is classified as **System of Category A** (residual height > 50% nominal height).

Leoben, the 30/10/2007

Christian Heiss

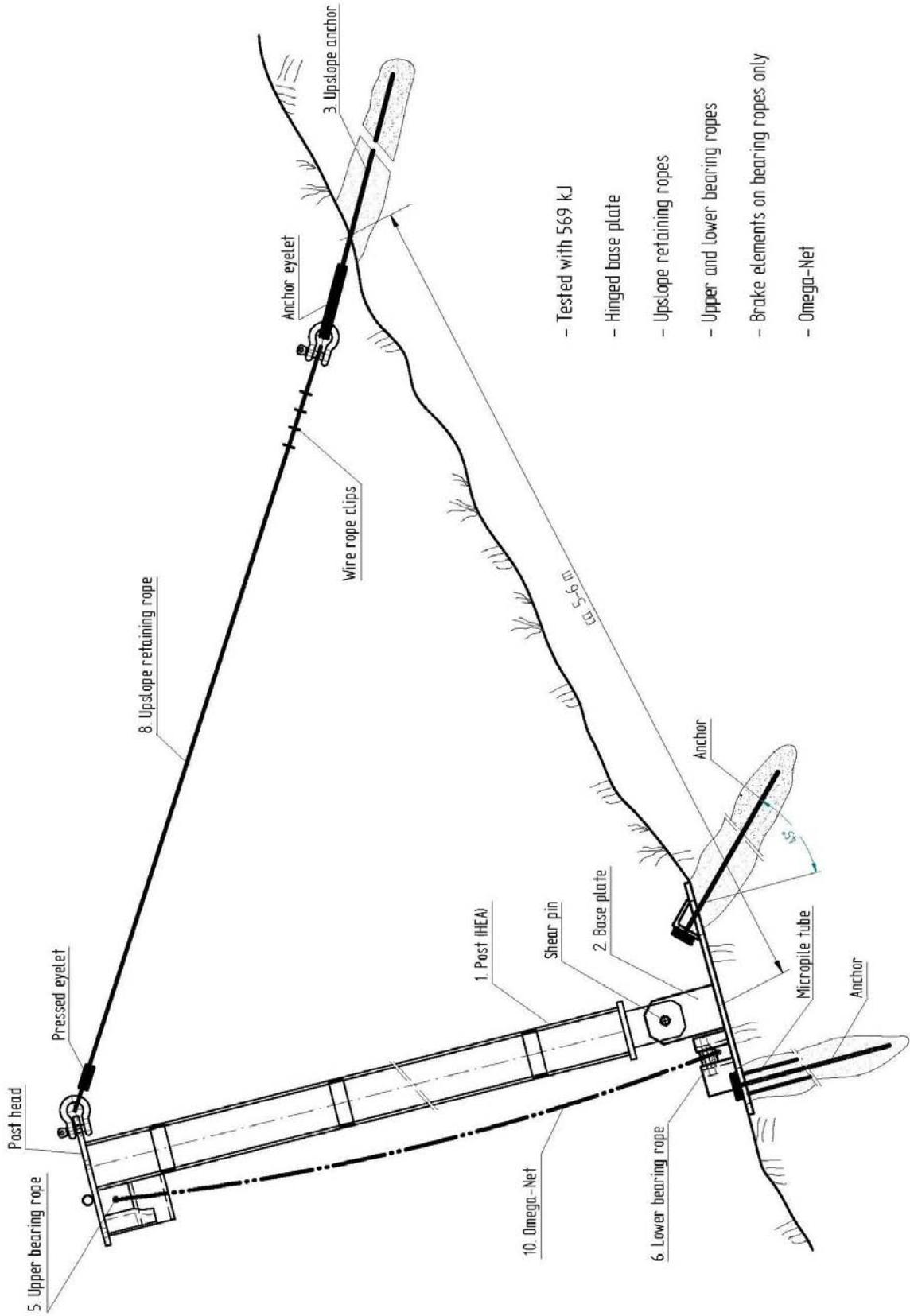
(Dipl.-Ing. Christian Heiss)



Peter Moser

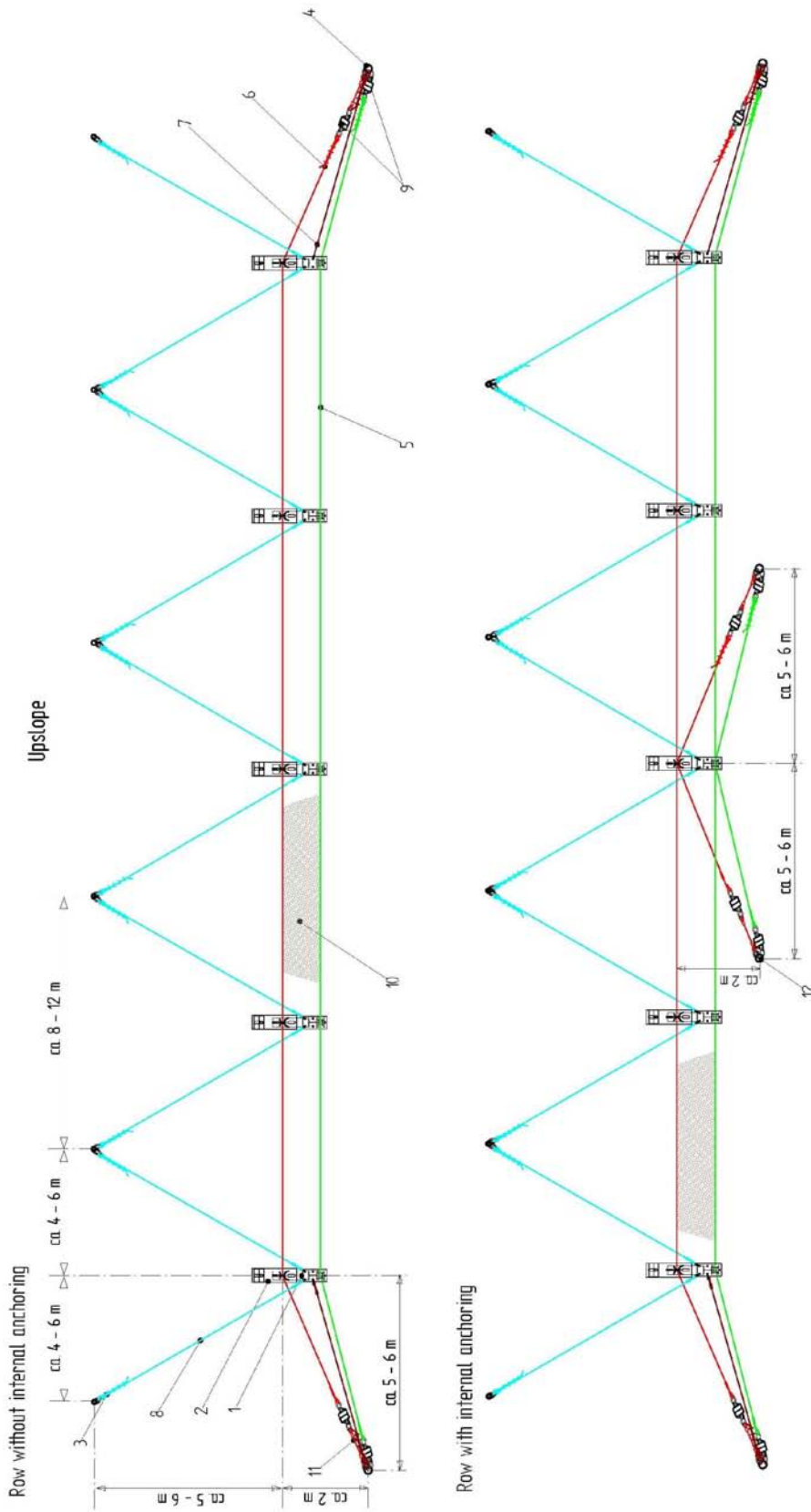
(Ao.Univ.-Prof. Dipl.-Ing. Dr.mont. Peter Moser)

Rockfall Protection System TS-500 - Lateral View



- Tested with 569 kJ
- Hinged base plate
- Upslope retaining ropes
- Upper and lower bearing ropes
- Brake elements on bearing ropes only
- Omega-Net

Rockfall Protection System TS-500 - Plan View



Legend

- 1. Post
- 2. Base plate
- 3. Upslope anchor
- 4. Lateral anchor
- 5. Upper bearing rope (at post head)
- 6. Lower bearing rope (along ground)
- 7. Side stabilisation rope
- 8. Upslope retaining rope
- 9. Brake element AVT pix 60/25-25
- 10. Omega-Net
- 11. Extension rope
- 12. Internal lateral anchor