

Abstract of test report no. 0407

System TS-1000-oA
Test V0807 / Eisenerz / 28.09.2007

General information

Energy class:	1.000kJ
Manufacturer:	Trumer Schutzbauten GmbH Maria Bühel Strasse 7 A-5110 Oberndorf bei Salzburg
System name:	TS-1000-oA
Test report number:	0407
Report creation date:	08.10.2007

Specification of rock-fall protection kit TS-1000-oA

The tested rock-fall protection kit TS-1000-oA of TRUMER SCHUTZBAUTEN GMBH was a flexible rock-fall protection system for energy impacts up to 1.000kJ. The rock-fall protection kit TS-1000-oA was characterised by a supporting structure which was fixed to the underground by three anchors per ground plate. The posts were connected to the ground plates by welding. The system did not comprise uphill retaining cables. 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. The system was supported by two integrated longitudinal ropes, which were connected to the side foundations using one energy dissipating device per connection.

Main components of rock-fall protection kit TS-1000-oA

Interception structure

PRIMARY NET

Type:	OMEGA/7,5mm/MW135
Number of net packages:	6
Dimensions of single net package:	3,15m 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 – IPB 240 – S235JRG2 (HE 240 B according to EURONORM 53-62)
Material:	S235JRG2
Surface conditioning:	blank
Length:	3.235mm, reinforced with steel elements

GROUNDPLATE

Material:	S235JRG2
Dimensions:	1135mmx345mmx30mm
Dimensions of shims:	100mmx100mmx10mm
Drill diameter of shims:	42mm
Surface conditioning:	blank

The posts are connected to the ground plates by welding.

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)

SUPPORTING ROPES

Upper supporting rope:	rope 18 vz 6x19 DIN 3060 SE sZ 1.770 N/mm ² (RBL: 238kN) (cp. DIN EN 12385-4)
Lower supporting rope:	rope 18 vz 6x19 DIN 3060 SE sZ 1.770 N/mm ² (RBL: 238kN) (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)
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Energy dissipating devices

ENERGY DISSIPATING DEVICES IN BEARING ROPES

Type:	AVT phx/FLA30x60/2,5W
Material:	St 37-2 (S235JR)
Diameter:	200 mm
Position:	at the right and left foundations
Connection to rope:	7/8 inch shackle
Connection to anchor:	7/8 inch shackle
Number/Surface conditioning:	1 element per connection/blank

ENERGY DISSIPATING DEVICES IN SUPPORTING ROPES

Type:	AVT phx/FLA25x60/5,5W
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-1000-oA of TRUMER SCHUTZBAUTEN GMBH was hit by a block of reinforced concrete with a mass of 3.164kg and a velocity of 26,97m/s. The impact was placed in a height of 1,77m. The angle of block trajectory was determined with 30,96°. The impact energy was determined with 1.151kJ. The maximum horizontal system elongation was 6,03m. 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 ground plates 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 and supporting ropes were stretched, but still showed some deformation capacity remaining after the test. As a consequence of the impact the nominal height of the rock-fall protection kit was reduced from 3,080m to 1,592m, which means a residual height of the tested system of 51,68% of its nominal height.

Affirmation of test report no. 0407

The chair of Mining Engineering and Mineral Economics at the University of Leoben confirms that test report no. 0407 about the testing of rock-fall protection kit TS-1000-oA is correct in respect of content and matter of fact.

The rock-fall protection kit TS-1000-oA 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

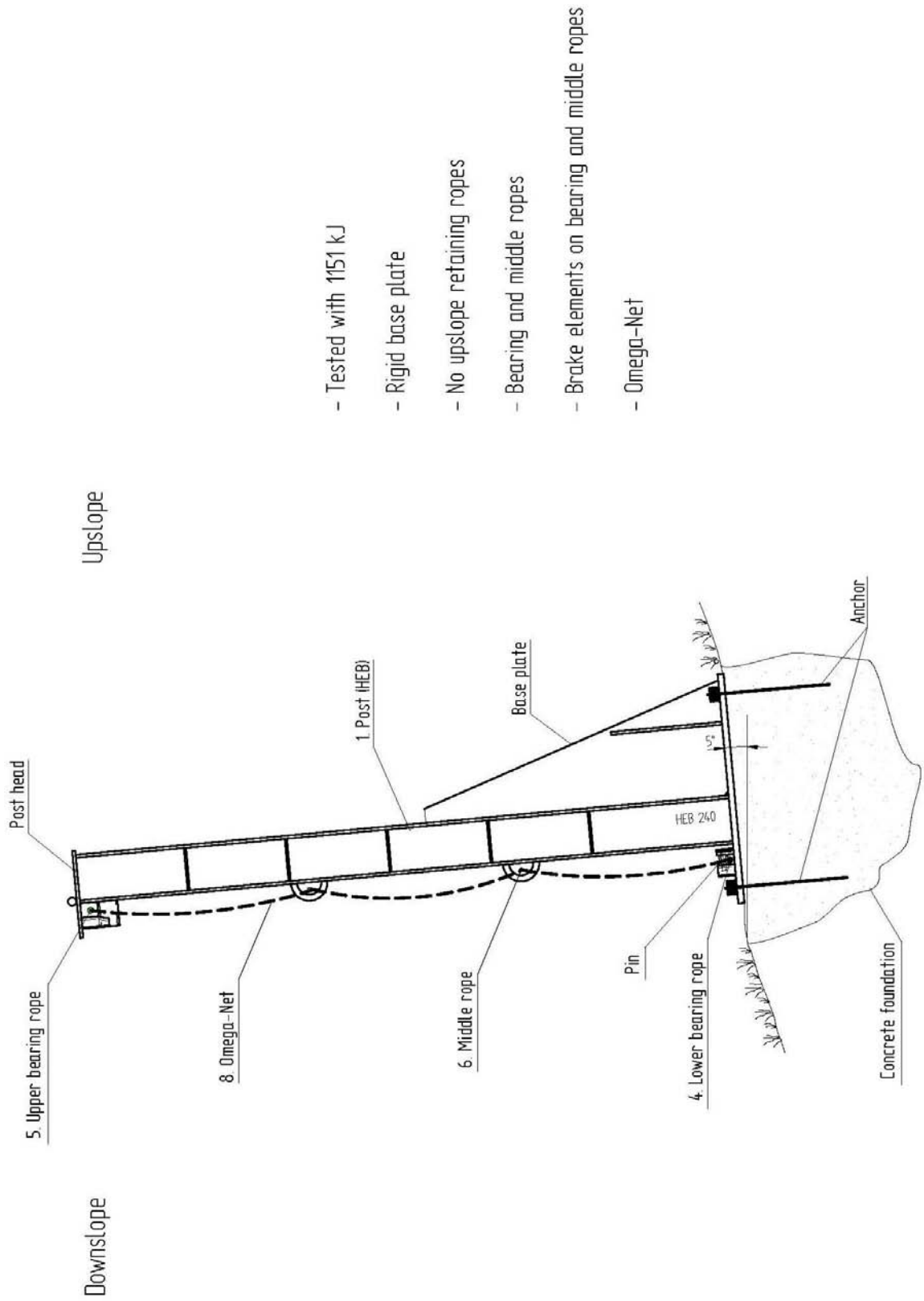
(Dipl.-Ing. Christian Heiss)



Peter Moser

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

Rockfall Protection System TS-1000-oA - Lateral View



- Tested with 1151 kJ

- Rigid base plate

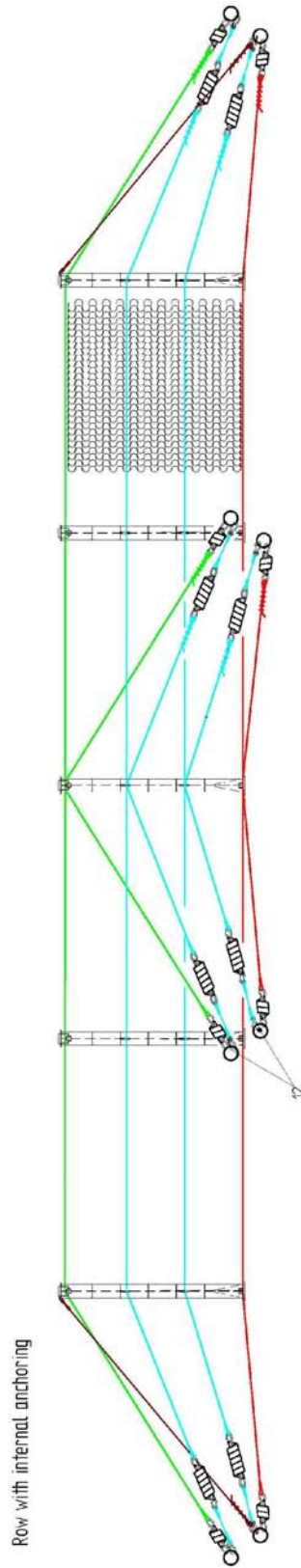
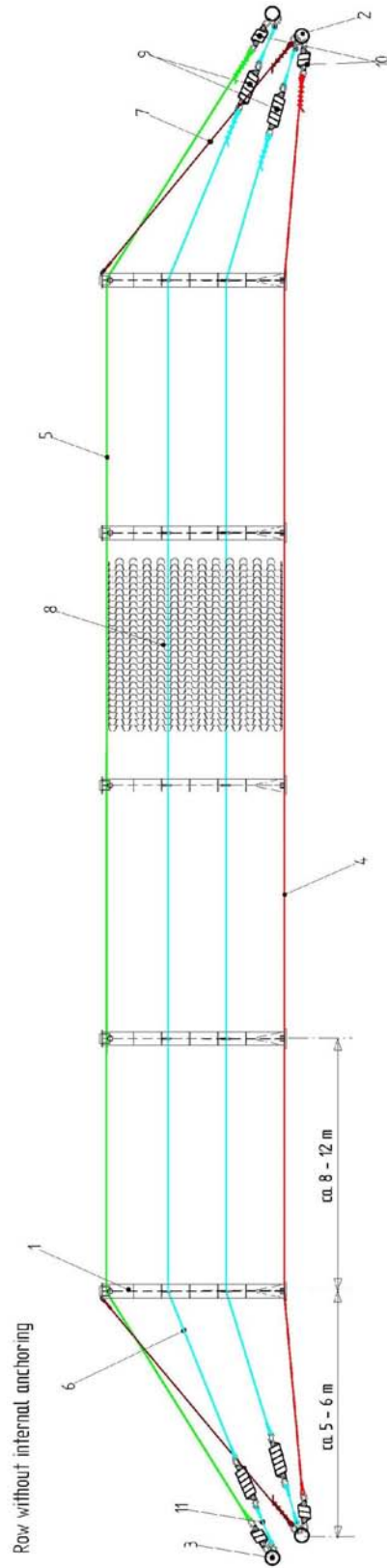
- No upslope retaining ropes

- Bearing and middle ropes

- Brake elements on bearing and middle ropes

- Omega-Net

Rockfall Protection System TS-1000-oA - Frontal View



Legend

- 1. Post
- 2. Lateral anchor for lower bearing, lower middle ropes and side stabilisation ropes
- 3. Lateral anchor for upper bearing and upper middle
- 4. Lower bearing rope (along ground)
- 5. Upper bearing rope (at post head)
- 6. Middle rope
- 7. Side stabilisation rope
- 8. Omega-Net
- 9. Brake element AVT pnx 60/25-55
- 10. Brake element AVT pnx 60/30-25
- 11. Extension rope
- 12. Internal lateral anchor