

Abstract of test report no. 0203

System TS-500-0A
Test V0703 / Eisenzeit / 11.07.2003

General information

Energy class: 500kJ
Manufacturer: Trumer Schutzbauten GmbH
Marta-Bühel Straße 7
51110 Oederdorf bei Salzburg
Austria

Product name: TS-500-0A
Test report number: 0203
Test report creation date: 12.08.2003

Specification of rock-fall protection kit TS-500-0A

The tested rock-fall protection kit TS-500-0A of TRUMER SCHUTZBAUTEN GMBH is a flexible rock-fall protection system for energy impacts up to 500kJ.
The rock-fall protection kit TS-500-0A is characterised by a support structure which is fixed to the underground by anchored ground plates. Because of a welded connection between post and ground plate uphill retaining cables are not necessary.
The interception structure of the tested rock-fall protection kit consists of an OMEGA-Net and an additional layer in the middle functional module. The structure is supported by two integrated longitudinal ropes, which are connected to the side foundations using energy dissipating devices.
The upper and lower longitudinal bearing rope are arranged as single ropes and also connected to the side foundations using energy dissipating devices.

Main components of rock-fall protection kit TS-500-0A

INTERCEPTION STRUCTURE

PRIMARY NET	Type	OMEGA-Net
Rope diameter	7.5mm	
Mesh-size	135.0mm	
Dimensions	5,00m x 3,20m	
Connection to bearing ropes	threaded steel cable (Ø 10.0mm)	
Connection to side posts	3/8" shackles	
Net to net connection	rectangular netting	
Wire diameter	3.1mm	
Mesh-size	60mm x 60mm	
Tensile strength of wires	400 to 500 N/mm ²	
Dimensions	2,00m x 3,20m	

SUPPORT STRUCTURE

POST	Type	HEB-200 (IPB-200)
Material	S 235 JR	
Length	3,15m	
Dimensions	780mm x 300mm x 25mm	
Material	S 235 JR	
Connection to post	welded	
Connection to underground	fixed by three anchors	
Bearing ropes	rounded guiding devices	
Integrated supporting ropes	3/4" shackles	

CONNECTING COMPONENTS

UPPER AND LOWER LONGITUDINAL BEARING ROPES (cp. DIN 3060, ISO 2408 and EN 12385-4)
Rope 20 / 6x19 Standard / DIN 3060 / steel core / galvanised / 1770 N/mm²
Nominal rope diameter 20mm
Calculated breaking load 293kN

INTEGRATED LONGITUDINAL SUPPORTING ROPES (cp. DIN 3060, ISO 2408 and EN 12385-4)

Rope 16 / 6x19 Standard / DIN 3060 / steel core / galvanised / 1770N/mm²
Nominal rope diameter 16mm
Calculated breaking load 188kN
Rope 16 / 6x19 Standard / DIN 3060 / steel core / galvanised / 1770N/mm²
Nominal rope diameter 16mm
Calculated breaking load 188kN

ENERGY DISSIPATING DEVICES

ENERGY DISSIPATING DEVICES IN LONGITUDINAL BEARING ROPES

Type	Position	left and right rope foundation
AVT-phx	Connection to rope	3/4" shackle
FLA 60x25mm	Connection to anchor	3/4" shackle
2.5 windings		

ENERGY DISSIPATING DEVICES IN INTEGRATED LONGITUDINAL SUPPORTING ROPES

Type	Position	left and right rope foundation
TS-100kJ	Space for reaction	3/4" shackle
	Connection to rope	3/4" shackle
	Connection to anchor	3/4" shackle

Summary of test results

The tested rock-fall protection kit TS-500-0A of TRUMER SCHUTZBAUTEN GMBH was hit by a block of reinforced concrete with a mass of 1678kg and a velocity of 26.88m/s. The impact was placed in a height of 1.50m. The angle of block trajectory was determined with 25.19°. The impact energy was determined with 608kJ. The maximum horizontal system elongation was 4.42m.
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.
There were no visible damages in connecting components. The posts of the middle functional module showed slight plastic deformation. In the place of impact the primary net was deformed irreversibly and the additional layer was destroyed.
The energy dissipating devices in the longitudinal bearing and supporting ropes were stretched, but still showed remaining deformation capacity after the test.
As a consequence of the impact the vertical height of the rock-fall protection kit was reduced from 2.99m to 1.65m, which means a remaining height of the tested system of 55.0% of the original vertical height.

THE ROCK-FALL PROTECTION KIT TS-500-0A OF TRUMER SCHUTZBAUTEN GMBH WAS TESTED SUCCESSFULLY.

Affirmation of test report no. 0203 by the University of Leoben

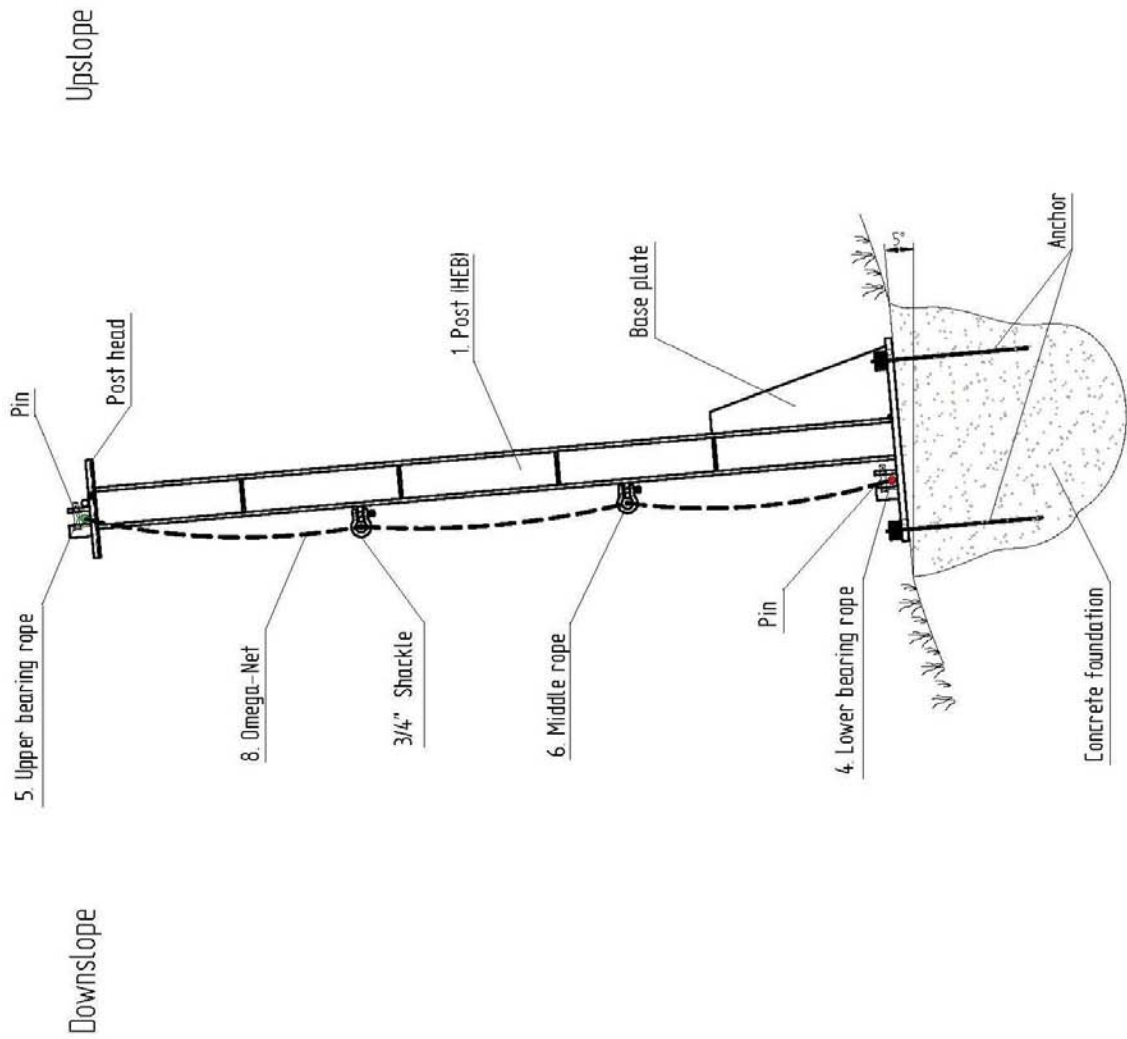
The department of Mining & Tunneling of the University of Leoben approves that test report no. 0203 created by Christian Heiss is correct in respect of content and matter of fact.

Leoben, 25.07.2005


(a.o. Univ. Prof. Dr.-Ing. Dr. Dr. Peter Messer)

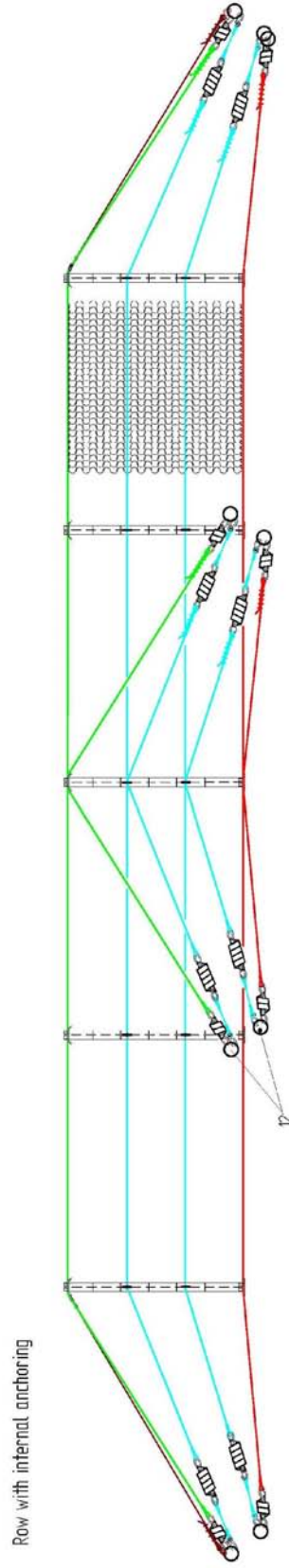
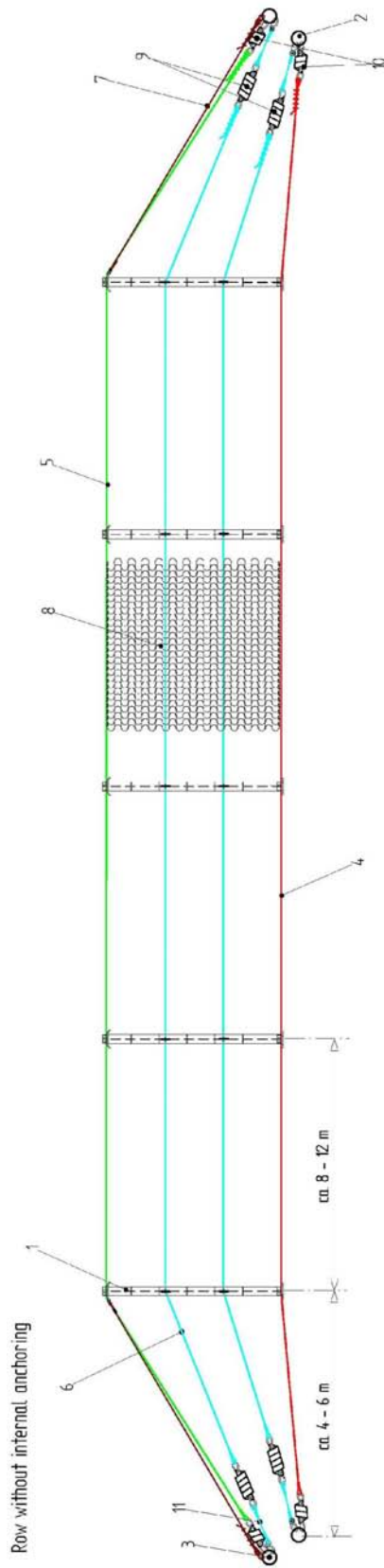
Dipl.-Ing. Hannes Biana

Rockfall Protection System TS-500-oA - Lateral View



- Tested with 606 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-500-oA - Frontal View



Legend

- | | |
|--|-------------------------------------|
| 1. Post | 7. Side stabilisation rope |
| 2. Lateral anchor for lower bearing and lower middle ropes | 8. Omega-Net |
| 3. Lateral anchor for upper bearing, upper middle and side stabilisation ropes | 9. Brake element AVT plx 60/20-4.5 |
| 4. Lower bearing rope (along ground) | 10. Brake element AVT plx 60/25-2.5 |
| 5. Upper bearing rope (at post head) | 11. Extension rope |
| 6. Middle rope | 12. Internal, lateral anchor |