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Rockfall catchment fences were developed to protect infrastructure, utilities, buildings, and lives from falling debris. Typical catchment fences are installed in run-out or deposition zones, close to the elements at risk that they protect.

Rockfall Protection

Safety by Competence - tried and true

Solutions are offered based on decades of experience - both from testing and practical application - protecting life, urban areas, and infrastructure from natural and anthropogenic induced hazards.

Our solutions are based on the result of years of 1:1 scale testing at some of the most modern facilities. Over the past two decades, we have installed our systems across Europe, Scandinavia, Asia, and Canada. Rockfall catchment fences have also been fine-tuned to be robust and reliable for various applications.

We take great pride in providing the best client support at all stages of the project, whether in the initial planning phases or on-site technical support. With our highly capable team of engineers, geologists, and technicians, you can be assured that full support will be available and the project has been designed for SAFETY BY COMPETENCE.

Tests following certification guidelines are carried out using standardized blocks to simulate impacts up to more than 5000 kJ.

This inclined test facility is one of the largest and most modern in the world. It can accommodate a large variety of types of fences as well as earth dams.

Two examples of hinged rockfall catchment fences impacted at and surrounding a post. These posts are robust and can withstand direct impacts without compromising the systems integrity.

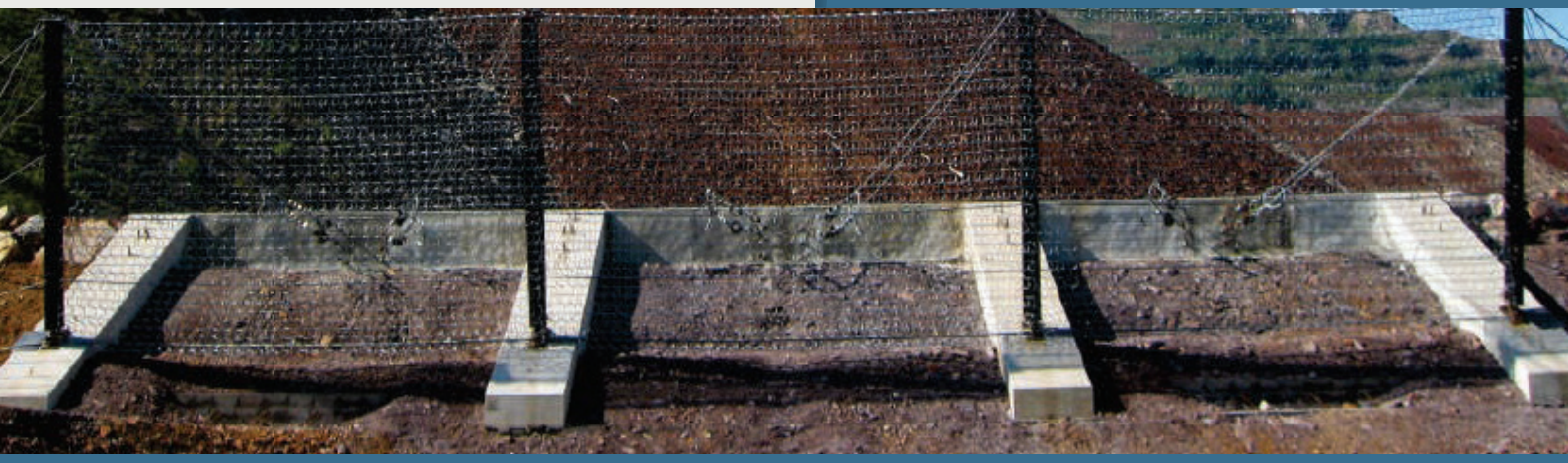
Safety by Competence - because anything else isn't acceptable

Every system is designed to perform with the highest level of safety during real-world events and not tailored just to meet certification guidelines.

Simply passing the certification process - where many components may be severely damaged - is not enough for us. Designing a system to pass an idealized event is not the same as designing a system to perform well under natural conditions. Hence, we expect more out of our systems and go above and beyond certification requirements to ensure that every primary component of the system is in a safe state following a Maximum Energy Level test, thus the motto: SAFETY WITHOUT COMPROMISE.

A completed Maximum Energy Level test for a 5000 kJ rockfall catchment fence.

An example of a tree stem impact on a rockfall catchment fence.



A pre-test photo of a 3000 kJ, hinged rockfall catchment fence. It is important to note these systems do not use bypass or break-away elements as some manufacturers do in order to compensate for the lack of flexibility of the primary nets in the vicinity of posts. With such elements incorporated into the system, large openings can form in this area. Instead, the high strength and flexibility of the Omega-Net is utilized to provide a safe and secure barrier.

A test photo of the same system after a Maximum Energy Level test for certification. In this test, as with all tests certifying these systems, there are no major damages to any components of the system, even though the certification guidelines allow certain damages. Also note that there are no openings of the nets near the post locations, not only in the primary field but also in the end fields. If one were to compare this to photos of systems using break-away elements or bypasses, large gaps adjacent to posts, sometimes in the order of more than 2 m would be apparent between the primary net and the bearing ropes.

Hinged Post Systems - flexibility through tradition

The hinged post system is based on the same concept since its inception: a robust post and base connected by a pin that allows easy installation even in the most difficult terrain with minimal foundations, and achieves the highest strength through flexibility.

Hinged post systems are the most common form of rockfall catchment fence. They can be easily installed in undulating or very steep terrain and require minimal foundations.

Two types of systems are available based on their certification: EAD 340059-00-0106 (former ETAG 027) or those tested in accordance with the WLV guidelines. Both are 1:1 scale tested but differ in their requirements for approval and construction.

Catchment fences with a hinged connection between the post and base plate require upslope anchors and retaining ropes. As such, large energies can be accommodated while minimizing forces on the foundation of the post.

Anchorage for base plates consist of one tension anchor and one compression anchor for ease of installation. Concrete foundations are not necessary though there is full support of the base plate. As such, sometimes small pads are used when in soils.

Due to their light weight and minimal foundation requirements, hinged systems are suitable for installation in even the most difficult terrain, including on vertical walls.

Available Systems Certified According to EAD 340059-00-0106 (former ETAG 027)

System	Energy Rating	Approved Heights
TSC-100-ZD	100 kJ	2.0 - 2.5 m
TSC-250-ZD	250 kJ	2.5 - 3.0 m
TSC-500-ZD	500 kJ	3.0 - 3.5 m
TSC-500-ZD H4	500 kJ	4.0 - 5.0 m
TSC-1000-ZD	1000 kJ	4.0 - 5.0 m
TSC-1500-ZD	1500 kJ	4.0 - 5.0 m
TSC-2000-ZD	2000 kJ	5.0 - 6.0 m
TSC-3000-ZD	3000 kJ	5.0 - 6.0 m
TS-5000-ZD	5000 kJ	6.0 - 7.0 m

Available Systems 1:1 Scale Tested Following WLV Guidelines

System	Energy Rating	Approved Heights
TS-150-ZD	150 kJ	2.0 - 3.0 m
TS-250-ZD	250 kJ	2.5 - 3.75 m
TS-500-ZD	500 kJ	3.0 - 4.5 m
TS-750-ZD	750 kJ	4.0 - 6.0 m
TS-1000-ZD 04	1000 kJ	4.0 - 6.0 m
TS-1000-ZD 07	1000 kJ	3.0 - 4.5 m
TS-1500-ZD	1500 kJ	3.0 - 4.5 m
TS-2000-ZD	2000 kJ	4.0 - 6.0 m
TS-3000-ZD	3000 kJ	5.0 - 7.5 m
TS-5000-ZD	5000 kJ	6.0 - 9.0 m

Fixed Rotation Systems - brute strength with flex

Places where upslope retaining ropes are not desired or possible, fixed rotation systems provide an excellent alternative to rigid structures such as dams or walls that require more space and which are much more costly.

Fixed rotation systems are rockfall catchment fences that have no upslope anchors or retaining ropes and hence must accommodate large forces in the post foundations. These systems are normally used where access to the back of the fence is required for either utility purposes or for cleaning out the system after an event. In general, the posts are heavier than the hinged systems of equivalent capacity but this system has fewer anchors, ropes, and brake elements.

Two types of systems are available based on their certification: EAD 340059-00-0106 (former ETAG 027) or those tested in accordance with the WLV guidelines. Both are 1:1 scale tested but differ in their requirements for approval and construction.

Fixed rotation systems are ideal for installing on walls or berms as well as in places where upslope anchors are either too difficult to install or where retaining ropes interfere with access requirements.

Because of the large forces acting on posts and bases, steel profiles are much larger than their hinged post equivalents, as are the foundation requirements.

The lack of retaining ropes makes access and general maintenance of fixed rotation systems much more simpler than traditional hinged post systems.

Available Systems Certified According to EAD 340059-00-0106 (former ETAG 027)

System	Energy Rating	Approved Heights
TSC-100-oA	100 kJ	2.0 - 2.5 m
TSV-500-oA	500 kJ	3.0 - 3.5 m
TSV-1000-oA	1000 kJ	4.0 - 5.0 m
TSV-2000-oA	2000 kJ	4.0 - 5.0 m

Available Systems 1:1 Scale Tested Following WLV Guidelines

System	Energy Rating	Approved Heights
TS-100-oA	100 kJ	2.0 - 3.0 m
TS-300-oA	300 kJ	3.0 - 4.5 m
TS-500-oA	500 kJ	3.0 - 4.5 m
TS-1000-oA	1000 kJ	3.0 - 4.5 m
TS-2000-oA	2000 kJ	4.0 - 6.0 m

Hybrid Rockfall Fences - it's all about control

Hybrid and attenuator rockfall systems are those that absorb some or all of the energy of a rockfall event, but they allow the debris to move from an upper position to a lower position of the fence, thereby reducing the amount of effort for maintenance following an event.

Lower energy hybrid systems as well as high energy hybrid system are available. Two systems have been tested based on EAD 340059-00-0106 (former ETAG 027) guidelines: a 1000 kJ and 3000 kJ hybrid.

Available Systems 1:1 Scale Tested Based on EAD 340059-00-0106 (former ETAG 027)

System	Energy Rating	Approved Heights
TSC-1000-ZD Hybrid	1000 kJ	4.0 - 5.0 m
TSC-3000-ZD Hybrid	3000 kJ	5.0 - 6.0 m

Before photo of a 3000 kJ hybrid test. The system consists of 5 m high posts with 12 m of Omega-Net.

During the impact, the majority of the energy is absorbed during the initial contact with the upper section of the structure, but the projectile is allowed to progress through the system to the bottom portion of the net.

Several adaptations are made to a standard catchment fence to reduce maintenance such as the brake locks pictured above.

A lower energy attenuator system composed of High Performance Netting in combination with standard hinged posts and base plates.

Core Components -
simple design, simply the best

These systems components are designed as simple as possible with regards to installation, maintenance and functionality.

One of the main goals while designing a rockfall mitigation structure is to make it very simple with as few components as necessary. Each component is designed to be robust and functional keeping the safety aspect in mind. This helps to create a system with optimal performance and also makes it simple to install and easy to maintain.

The design procedure is an ever-evolving process. It is not just limited to the design team, but also includes constant feedback from our clients, and also contractors who install the systems and evaluate the performance of the systems in the field. It is only through such an interactive process that a high value product can be created.

Brake elements are only found at the extremities of a system, directly at anchor points. All brake elements are connected with shackles to the ropes and can be easily changed. In this example, brake elements consist of large steel coils that unwind during impact.

A new generation of brake elements uses a roller to deform an angled steel strip in a very efficient and compact manner.

The rope guidances on the posts and base plates are integrated and designed to be robust, giving the ropes smooth surfaces to glide over during an impact to help minimize fatigue. There is no assembling required.

The key component to all systems is the highly flexible Omega-Net, that can easily be prepared with posts and ropes in compact packages for delivery by helicopter or crane. No shackles are required for attaching the net to bearing ropes.

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