

Reinforcing
a world
in motion.

B BETAFENCE

Environmental Solutions

Nature and engineering in tune...

Today's ever changing environment brings with it special challenges. Whether those challenges emanate from forces of nature or whether they come from the ever increasing difficulties of people living within this environment with the need for infrastructure development and better utilization of available land, Betafence Environmental Solutions, a specialised business unit of Betafence, is facing up to those challenges.

In recent years Betafence, the world leader in physical perimeter fencing systems, access control and detection systems, has been developing a range of Gabion Design Solutions for land reinforcement and erosion control needs.

Now Betafence Environmental Solutions is expanding this range of products with sound barriers, emergency flood defence, rockfall protection, etc. By forging partnerships with other forward thinking companies, through innovative design and investment in engineering knowhow, Betafence Environmental Solutions is assembling a range of products and engineered solutions to cope with the challenges of our ever changing environment.

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1. Gabion Design Solutions

Gabions are engineered retaining structures designed as mass gravity walls to hold back earth or other solid materials without overturning, sliding or foundation failure. Gabions can be used in different applications, they are an effective solution to combat erosion and to stabilise and strengthen embankments and water courses.

In recent years Betafence has concentrated on developing higher grade materials, efficient manufacturing processes and new, innovative design and installation techniques. This has increased the use of Gabions, not just for civil engineering and landscape applications, but also for architectural projects where both quality and aesthetics are paramount.

Architects, builders, developers and urban planners appreciate the broad aesthetic qualities of Gabions beyond the products basic purpose. The relationship between steel and stone is a truly creative one.

Offered solutions

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Protecting people
from a moving
landscape...

Betafence Weldmesh® Gabions



Betafence Weldmesh® Gabions are wire mesh baskets formed by connecting individual panels of mesh with helical spirals on the vertical edge wires creating an open series of box compartments that fold in a concertina fashion to be flat packed. Lids and bases are sometimes supplied loose with helical spiral binders to connect the top and bottom of the open cells along one edge. Alternatively they may be factory fitted where practical for ease of transportation.

Gabion applications include civil engineering or architectural applications.

The modular structure of these gabion walls allows for variation in section to be accommodated as the height increases. The inherent strength of the units ensures structural and dimensional stability whilst a degree of flexibility accommodates ground movement and settlement where necessary.

All Gabion wall designs should be checked by a suitably qualified structural engineer on site prior to construction.

Betafence Weldmesh® Bastions



Betafence Weldmesh® Bastions are factory lined internally with a non woven geotextile membrane to the perimeter mesh panels of the unit, allowing for the use of suitable selected granular fills to ensure compaction of the materials without any settlement.

Bastions can be used as temporary or permanent structures on civil engineering construction sites or as rapid deployment flood protection barriers instead of sandbags in certain circumstances.

The Bastion units are modular in section and fold in a concertina fashion for ease of transportation and erection on site. They are available in a variety of different sizes and lengths to suit the application.

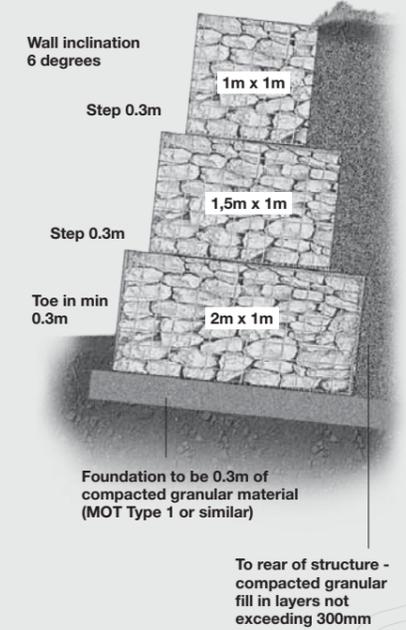
When used for permanent or temporary works they should be properly engineered as gravity retaining walls. For permanent retaining structures a suitable drainage fill should be incorporated through the structure at regular intervals along the wall length to prevent build up of hydrostatic pressure.

Application: Gabions and Bastions as retaining walls

Retaining walls are engineered structures designed to hold back earth or other solid materials without overturning, sliding or any foundation failure. The modular structure of these walls allows for variations in section to be easily accommodated as the height increases.

Walls of this type are normally built at an inclination of six degrees. Betafence Weldmesh® Gabion and Bastion walls can be constructed in stepped or flush-faced configurations depending on your requirements.

Example of a Mass Gravity Retaining Wall



For more information on the Weldmesh® Gabions and Weldmesh® Bastions, do not hesitate to contact the experts at Betafence Environmental Solutions. See backcover.

Betafence Weldmesh® Trapions

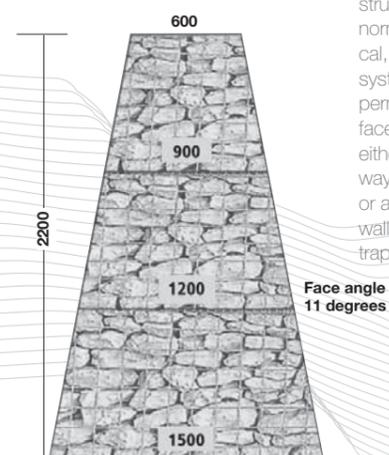


Betafence Weldmesh® Trapions are a form of Gabion manufactured from welded wire mesh panels with either one or both faces inclined at varying angles to the horizontal dependant upon the unit's height. They are supplied in lengths of 1, 2 or 3m or part lengths thereof, and pre-assembled with helical spirals for flat packing and ease of transportation to site.

Trapions can be used as free standing walls, for construction of sound barriers or for architectural applications.

Betafence Weldmesh® Trapions are engineered for dimensional rigidity and stability in structural applications. Inclination of the walls, normally at around 8% degrees from the vertical, is essential for the stability of these gravity systems. They are trapezoidal in section to permit easy construction of free standing flush faced (non stepped) tapered walls, to act as either sound barriers alongside roads and railways dependant upon what they are filled with, or as simple, decorative perimeter walls. The wall ends are terminated with prefabricated trapezoidal shaped Weldmesh® panels.

Typical Trapion Section



Face angle
11 degrees

Architectural & Landscaping



Architects, property developers and landscape garden companies appreciate the flexibility and broad aesthetic qualities of the Betafence Weldmesh® Gabion products.

The nature of the product particularly suits architectural projects which seek to embody and expose an integral structure in harmony with the local, external environment. Generally, claddings are applied to the external surfaces of buildings, either Trapions (normally free standing structures) or Gabions tied back using third party bolting systems.

Free standing perimeter boundaries employ both Gabions and Trapions. Gabions can also be used creatively to form monuments, pillars, signage plinths and seating.

Double Twisted Woven Wire and Weldmesh® Mattresses



Weldmesh Mattresses are prefabricated from welded steel wire mesh. Mattresses are manufactured from lighter grades of wire to increase their flexibility.

Applications include hydraulic protection schemes: embankment stabilisation work on rivers, shore protection, reed beds, canals and channel linings.

Mattresses are large in plan compared to their height and supplied in multiples of the mesh aperture typically up to 300mm high. They are subdivided with internal diaphragms placed at 1m intervals to give maximum internal compartment sizes of 2m x 1m.

Where water flow is high, additional internal diaphragms may be placed to reduce the compartment sizes and prevent movement or migration of stone. The correct grade of stone is essential as well as packing of the compartments to reduce the potential for movement. Mattresses are available manufactured from double twist woven hexagonal wire mesh or from welded steel wire mesh. The lids are often left unattached for transportation purposes as well as packing down for storage and ease of handling.

Accessories - fastening and bracing

Betafence can supply a range of accessories for fastening and bracing Gabions, Bastions, Trapions and Mattresses. All have been subject to stringent laboratory tests and will perform satisfactorily under normal operating conditions. To ensure the correct fastening method for specific applications, please contact the Gabion Design Solutions Technical Department for further advice.

CL50 Hog Pneumatic Ring Tool and Clips

For use in clipping lids to mattresses instead of lacing them with wire, or for joining the lids and bases to Gabions (instead of using helicals).



Helicals

Additional coils can be purchased for joining the lids and bases instead of lacing with wire. This can speed up the construction process considerably.



Internal Bracing Ties

Pre-cut length wire ties can be supplied (instead of the traditional method using the lacing wire supplied) to help prevent the basket from bulging once filled with stone.



For more information on the Weldmesh® Trapions, Architectural & Landscaping and Double Twisted Woven Wire and Weldmesh® Mattresses, do not hesitate to contact the experts at Betafence Environmental Solutions. See backcover.

2. Soundblock® The Silent Gabion

Soundblock® is the patented sound protection gabion solution of Betafence. Soundblock® is an efficient solution combining an optimal transmission resistance and sound absorption.

Thanks to the innovative, absorbing concept of the Soundblock® less noise is reflected and less sound permeates through the gabion wall.

The Soundblock® is also extremely versatile, sturdy and durable. Furthermore filled gabions ornament any landscape through their natural aesthetic.

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Protecting people
from the noise of
progress...

Benefits



Soundblock, the sound protection solution of Betafence, guarantees:

- an optimal sound reduction
- a quick and easy installation thanks to preassembled and flat packed units
- multiple filling possibilities and use of low cost filling material of the inner compartment
- a natural integration in any landscape
- a price competitive solution

Soundblock is made from welded wire panels, protected with a Zincalu® Ultra* coating and is available in different mesh sizes.

Soundblock can be installed exceptionally quickly and simply through its "fold open and fill" principle. The technique allows us to build creatively, quickly and most importantly cost effectively. The system is delivered flat-packed and can be assembled quickly and simply on site. For extra speed of assembly on site, preassembled units with factory fitted outside panels and inserted geotextile bags can also be supplied.

*Zincalu® Ultra coating comprises 95% zinc and 5% aluminium. The coating has an average weight of 350 g/m² which guarantees a 3 time longer life than ordinary zinc coating. All the accessories have the same quality to guarantee a maximum life. In compliance with BS EN 10244-2.

The outside compartment of Soundblock can be filled with different types of decorative stones, glass or natural material such as wood. Climbing plants may also even be allowed to grow over the side. The choice of material helps to determine the degree of sound absorption.

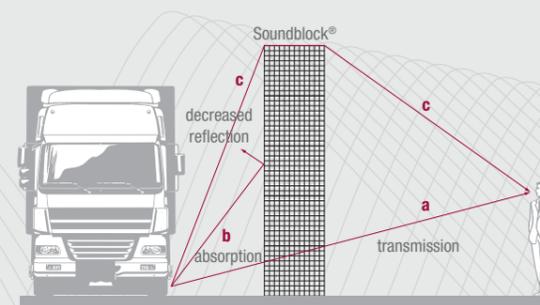
The interior compartment, which is not visible from outside, can be filled at a minimal cost with on site available material or with low cost recycled granular fill such as sand, soil or crushed brick. The granular fill central compartment in combination with the outer stonefilled compartments, provide the ideal soundproofing action.



Sound reduction properties

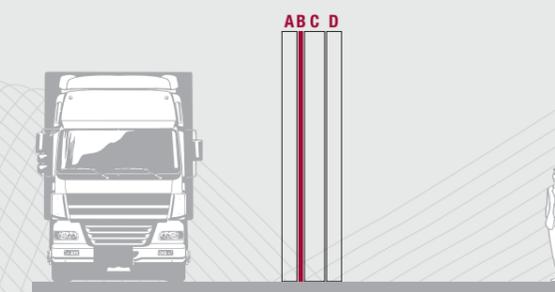
Betafence Soundblock® stands out in effectiveness as a soundproofing solution. The wall forms a sound barrier by **absorbing** the noise through its insulation effect. The central compartment is used as an active acoustic segment. As a result the **transmission** of the noise to the other side of the wall is limited. Soundblock® has been tested according to the European Standard EN 1793 – 1/2/3/4/5, ISO EN 254 and ISO 140-3 by Sonorcontrol, an independent and leading scientific laboratory, specialised in sound engineering..

Soundblock® optimally combines transmission resistance and absorption



A good sound screen prevents sound waves from directly moving from the source to the receiver (path a). The transmission resistance (DL_R) of the screen is defined here. However, undesired reflections (path b) may severely reduce the soundproofing effect of the screen. For that reason a good sound absorption (DL_a) is required on the sound side of the screen. The sound infiltrates the screen and loses its force through absorption. Reflections are greatly reduced as a result. Because of the long distance (path c) of the sound waves between the source and the top of the Soundblock®, it has an active acoustic working by bending the sound. This is also called diffraction.

Extra absorbing material for even better acoustic performance can be added



- A OUTER SEGMENT
- B EXTRA SOUND ABSORPTION MATERIAL
- C CENTRAL SEGMENT
- D OUTER SEGMENT

To guarantee even better acoustic performance, extra sound absorption material may be installed such as adapted stone filling, an absorption plate or extra insulation material. Soundblock® thereby complies with the highest soundproofing requirements.

PERFORMANCE OF DIFFERENT TYPES OF SOUNDPROOFING SCREENS	DL _a absorption*	DL _R transmission*
BASIC STANDARD	Minimum A2 to A3	Minimum B2
concrete screen	A1	B3
metal cartridges	A2	B2
wooden slat screen	A2	B1
Betafence Soundblock®	A2	B3
Betafence Soundblock® extra**	A3	B3

DL_a: sound absorption coefficient
DL_R: sound insulation coefficient

* minimum values
** with extra sound absorption material

For more technical information or for a customised Soundblock® design and offer, based on the specific needs relating to the sound reduction requirements and the implementation, contact the experts at Betafence Environmental Solutions. See backcover.

3. Rockfall and avalanche protection systems

Betafence decided to expand its offer within Betafence Environmental Solutions with rockfall and avalanche protection systems. Recently, a partnership with Trumer Schutzbauten, an experienced and highly competent partner in terms of rockfall and avalanche protection and rock/slope stabilisation, has been developed.

Since the late 1990s, Trumer Schutzbauten has offered various protection systems in the sectors of avalanche and rockfall protection. Due to their modular configuration, these systems are easy to install and highly adaptable to topographical features. The great flexibility of the systems allows the absorption and reduction of large kinetic energies over short distances. The proprietary Omega-Net is the corner stone of these systems and is also used as a preventative measure for heavy rock stabilisation, debris flow barriers and other special applications.



Offered solutions:

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- Avalanche protection systems 16
- Rock and slope stabilisation 17

Protecting people
from large kinetic
energies...

Rockfall Protection systems



Rockfall protection systems or catchment fences serve as secondary protection from falling and sliding rock in potential run-out zones or areas of deposition. They are used for the protection of inhabited areas and infrastructure.

Rockfall protection systems by Trumer Schutzbauten consist of an interception structure and a support or retaining structure. The interception structure is formed by the Omega-Net (see p.17) with its outstanding deformability, flexibility and energy absorption capabilities.

The rockfall protection systems are designed to be as simple as possible, having a modular configuration and as few components as necessary. This means the systems are not only very simple to install, but also to maintain and repair after an event. It also makes them the most cost efficient systems on the market.

As just one example, the unique properties of the Omega-Net allow net packages to be pre-hung on posts prior to installation and thus dramatically shorten the costly time required for a helicopter or heavy machinery. Once the net and post packages are installed, there is no further need for heavy lifting as the nets are attached and open in a "curtain-like" manner.

Avalanche protection



The avalanche protection systems by Trumer Schutzbauten utilize the flexible nature and high strength of the Omega-Net to prevent avalanches in their first stage of occurrence. This means the hazard is essentially removed prior to the start of an avalanche and not just mitigated once it has occurred.

Systems of this type are widely used because they essentially remove the hazard instead of mitigating an avalanche already in motion. As a result, avalanche tracks can revegetate thus offering a second layer of defence. Additionally, in scenically sensitive areas, the nets are practically transparent and so are an aesthetic alternative to traditional snow bridge or snow rack systems.

Due to the flexible choice of the anchor points, a low-cost installation is possible, even under the most difficult conditions. Slight topographical irregularities can also be managed easily as the net functions as a strong spring between the bearing ropes at the head and base of the posts. All of the benefits of easy and cost-efficient installation procedures for rockfall fences apply to these systems as well.

Rock and slope stabilisation



For various reasons, such as the close proximity of a hazardous slope to the element at risk, it is often desirable to eliminate the possibility of mass movements such as rockfalls and shallow slumps through the installation of a high strength slope retention system. Alternatively, more passive measures such as simple drape mesh systems are used to control the descent of material on a slope. Trumer Schutzbauten offers various solutions for both applications using the following net and wire mesh products:

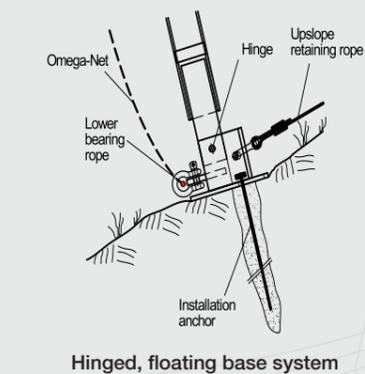
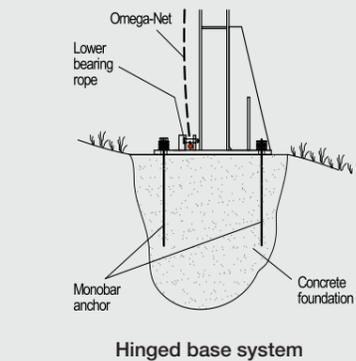
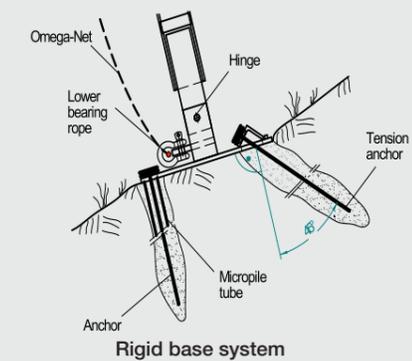
CONTAINMENT POTENTIAL

HIGH	<ul style="list-style-type: none"> ● Omega-Net: Wire diameter: 4.5 - 10.5 mm* Mesh size: 100 to 180 mm* ● High performance netting 50/50/4.6 mm Wire diameter: 4.6 mm* Mesh size: 50 x 50 mm*
LOW	<ul style="list-style-type: none"> ● Rectangular mesh Wire diameter: 1.4 - 3.8 mm* Mesh size: 19 - 60 mm*

*Other wire diameter and mesh sizes are available upon request.

Foundation types

Individual site requirements have an impact on the suitable foundation types. Trumer Schutzbauten catchment fences offer various base solutions in order to solve site related challenges.



Omega-Net

The Omega-Net by Trumer Schutzbauten consists of single, wave-like, pre-bent wire ropes that are interwoven. The ropes are made of galvanised, thick-wired spiral ropes that touch each other at the cross points, but which are not connected (i.e. no clamps are used). This condition makes the Omega-Net very flexible yet, due to the stiffness of the ropes, also capable of absorbing high energy impacts. As experience has shown, systems using Omega-Nets are some of the most reliable, easy to install and maintain.



Benefits

- The product is delivered in compact packages.
- Net installation can be carried out quickly, cost efficiently and without heavy-duty tools.
- The flexibility of the net allows an ideal adaptation to the ground surface.
- Damaged nets/ropes can be replaced on-site with the help of simple tools.

For more information on the rockfall and avalanche protection systems and the rock and slope stabilisation, do not hesitate to contact the experts at Betafence Environmental Solutions. See backcover.

4. Innovative solutions: 4.1 Flood defence

The need for creative solutions to reinforce a world in motion is obvious. At Betafence Environmental Solutions, innovative processes are at the heart of the company structure. Our innovation team is continuously focusing on the improvement of existing products and enlarging our range of products.

Extreme weather conditions pose perhaps the greatest of our challenges. Heavy rainfall and the threat of flooding affects all regions of the world. In order to protect people and property, flood defence strategies are very often developed by governments everywhere.

Betafence Environmental Solutions already has a range of products that can give both emergency flood protection and long term flood control. The team at Betafence Environmental Solutions are currently developing at innovative designs which will revolutionize the approach to emerging flood protection.

*Collier St. Scotland
Example of permanent flood control*



Environmental
change requires
innovative thinking...

4. Innovative Solutions:

4.2 Architectural Challenges

There are many examples of projects where Betafence Environmental Solutions has found a creative way to solve an architectural challenge.

Earth centre Doncaster

Rekowned architect Bill Dunster was looking for a self standing wall structure made from stone that was visible from inside and outside of the building when designing the Earth Centre in Doncaster (UK). Betafence rose to the challenge and designed a "Trapion" Wall (since patented) which not only met the architects design needs but also facilitated insulation to be built into the wall.



Sound Barrier Den Haag

Even a simple sound barrier gabion construction for a project in Den Haag was given an artistic twist with a form of signature at the end of the wall. The versatility of the welded gabion construction allowed this design.



Clarence Dock Leeds

When the architect wanted the exterior of a multi-storey car park in Leeds- England, to resemble a ship, Betafence were on hand with a combination of gabion retaining wall, and stainless mesh panels to give the appearance of a ships hull and billowy sails. Even the grass was planted in such way to resemble the seas waves!



If your project needs a creative solution, the design team at Betafence Environmental Solutions are at your disposal. See backcover.



Engineering knowhow,
linked to innovative
thinking, providing
solutions to ever
changing
environmental needs.

5. Quality & technical support

Betafence Environmental Solutions is a specialised business unit of the Betafence Group, the world leader in physical perimeter fencing systems, access control and detection systems. The company's products comply with the European Quality Standards and CE Mark.

Betafence Environmental Solutions can provide you with a design suggestion for all systems and applications offered. The customer follow-up and guidance is realised with care throughout the different stages of the project starting from the initial phase.

A highly skilled technical-commercial contact will assess the situation on-site, advise you and manage the entire process. The project will be studied in detail and a solution will be worked out based on the plans and specifications. The project is supervised and adjusted in close consultation with the customer. The after sales technical support remains at disposal after the installation.

CE



Key Figures Betafence

World leader

With the industry's largest fencing, access control and detection product portfolio, Betafence is the world's number one fencing supplier.

More than 130 years of excellence

Betafence looks back at more than 130 years of the highest quality in fencing.

As leader in product, service and application innovation, Betafence sets standards of excellence for the entire fencing industry.

€ 400 million

Sales of approximately € 400 million puts Betafence at the top of the international fencing market.

2.000 employees

Betafence currently employs 2.000 people worldwide. Its headquarters are located in Belgium.

11 plants

Betafence has 11 production sites in 10 countries: Belgium (Zwevegem), France (Bourbourg), United Kingdom (Sheffield), Germany (Schwalmtal and Werl), Italy (Tortoreto), Poland (Kotlarnia), South Africa (Cape Town), China (Tianjin), Turkey (Istanbul) and the USA (Ennis, Texas).

25 sales offices

Betafence has sales offices throughout the world. For all our sales representatives, customers satisfaction is the number one priority.

9 contracting companies

Betafence has 9 contracting companies for professional installation in 8 countries: Betafence Projects NV (international), Croatia (Zagreb), Czech Republic (Brno), Hungary (Budapest), Italy (Rome & Milan), Poland (Warsaw), Slovakia (Bratislava) and Spain (Madrid).

100 countries

Betafence is a company with worldwide coverage. Customers in 100 countries can rely on sales support and service

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