KYOWA's Filter Unit

Natural protection for the environment

Japanese Technology

Embankments ▪ Earthworks ▪ Harbor defenses ▪ Emergency interventions
Temporary installations ▪ Bridge pile protection
River bed and bank construction ▪ Shore preservation for lakes
Ballast for sub-sea pipes ▪ Anti-scouring protection
Artificial reefs ▪ Creating ecosystems

MESH ▪ NET ▪ ROPE

KYOWA

Reference projects, labels and certifications

Over **16,000 reference sites** in Japan,with over **700,000 Filter Units** installed.

- 1995,1998,2000 & 2004,Certificate of Technical Testing, **awarded by the Pubric Works Research Institute (Japanese national testing body)**
- 2004 the Ecogreen type is awarded the **"Ecomark"label**
- Since 1996,**Filter Units** have been part of the equipment used by the Japanese Civil Defense forces
- 2008 **Filter Unit** achieve **CE labeling for 7 types of products**,durability under UV exposure up to 30 years,

再生PET繊維 60%以上
エコマーク認定番号
03105013

History

Kyowa,founded in 1969,is the leading company in the Japanese market for mesh sheets and safety nets for industry and construction.

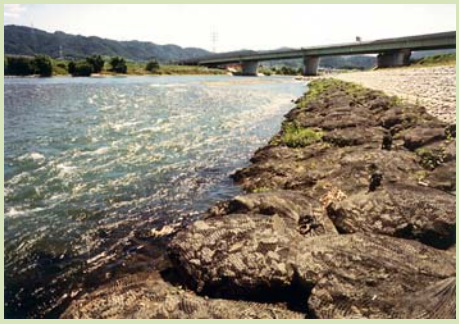
The Filter Unit was used for the first time in 1987,to protect the fondations of the great bridge at Akashi(world's longest span,with a total length of 3,911m).

For more than 25 years,the Filter Unit has been widely used in civil engineering for rivers and coastal works.

We have been promoting Filter Unit for European market since 2010, and we already have many track records.

Main Advantages

Hydraulics



Adapts perfectly to all soils
- Highly efficient coverage
- Attenuation of energy

Ecology

Supports natual vegetation
- Encourages the development of fauna and flora

Execution/Implementatio

Speed of execution/Reduction in labor costs
- Flexibility of the product and simple mechanization for installation
- Installed dry or underwater

TECHNICAL CHARACTERISTICS

Synthetic fiber material

The **Filter Unit** is made of polyester.
It is ideal for all hydraulic works as it is non- corrosive, rot proof,non-rusting and weather-resistant.

- Suppleness and flexbility of the fiber makes it adaptable to all soils and reliefs
- Increased speed of execution
- Extended lifetime

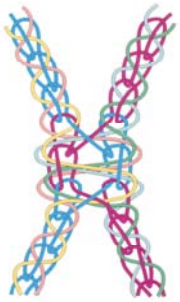
Product characteristics	
S type	Recycled polyester
Ecogreen type	Recycled polyester

S type
Double mesh

Ecogreen type
Double net

Structure of the mesh

- The specific structure of the Raschel© mesh guarantees the stability of the **Filter Unit** by preventing the mesh thread from anraveling even if there is a break.
- Highly resistant to impacts and pressure

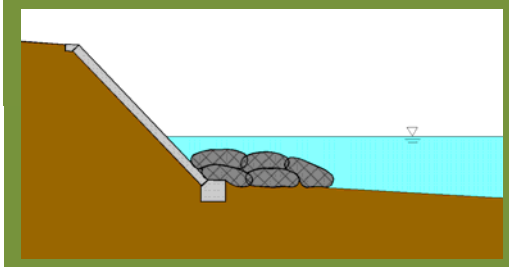


Resistance to currents
without being moved

Tonnage per FU	Unit	Grouped
2 tons	3.1m/sec	4.7m/sec
4 tons	3.5m/sec	5.3m/sec
8 tons	3.9m/sec	5.9m/sec

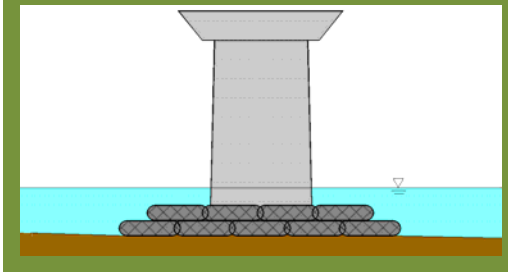
Safety margin/weight = ×1.5 included

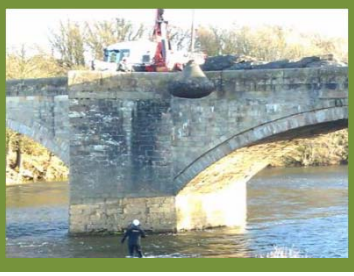
Track records at river

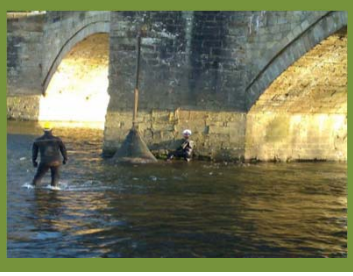


U.K. 2013
foot protection

U.K. 2013
foot protection







U.K. 2010
bridge foot protection

TECHNICAL CHARACTERISTICS

Standards relating to applications

Filter Unit is used for all types
of strengthening and separation works

- Roads and other trafficked areas EN 13249
- Railways EN 13250
- Earthworks,foundations and retaining structures EN 13251
- Erosion control works(coastal protection and bank revetments)EN 13253
- Reservoirs and dams EN 13254
- Canals EN 13255
- Tunnels and underground structures EN 13256
- Solid waste disposals EN 13257

High durability

To prevent weathering by ultra violet ray,syntheatic fiber is solution dyed.

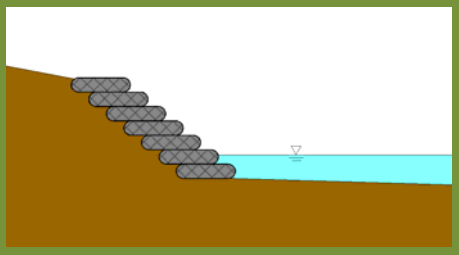
Passed an scceleration test equivalent to 30 years.

Its characteristics

allow it to be used for the long term in a range of various contexts

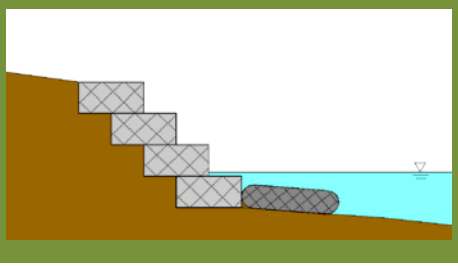
- Immersed saline environments
- Specific environments,as buried in alkali and acidic soils,and in regions of high or low temperature

Track records at river



Czech Republic 2013 bank protection

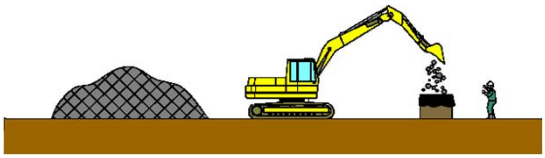
Slovakia 2013 bank protection

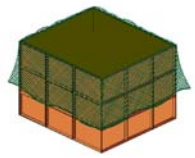


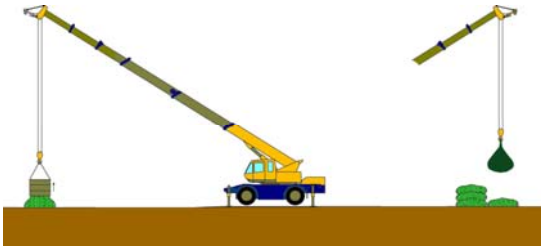
U.K. 2014 foot protection with gabion

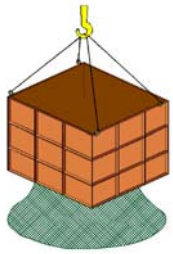
METHOD OF EXECUTION

Filling









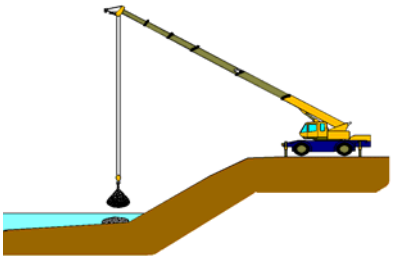
Filling materials

The **Filter Units** are filled in a production box, using any type of solid material:stones , pebbles, rubble, coal, etc.

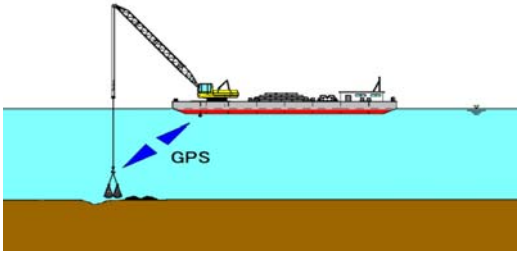
Procedure for filling

- Set **Filter Unit** in the production box
- Fill with material
- Close up the Filter Unit and attach the ring
- Lift off the caisson
- Lift the **Filter Unit** using the ring,and place in position

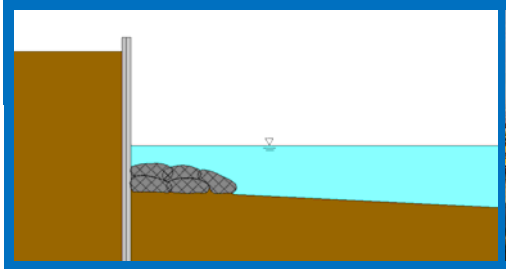
Placing in position



Highly maneuverable,**Filter Units** can be used easily and quickly,allowing for very rapid speed of positioning.
This speed of execution significantly lowers costs of installation and labor.



Track records at port



Belgium 2014
scour protection

Netherlands 2014
scour protection

Italy 2009
create canal dike

ACCESSORIES

Ring

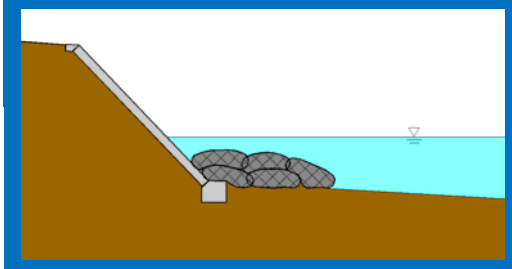
Each **Filter Unit** is supplied with a cast-iron ring which connects the 6 fastening points of the net lifting rope.

This ring ensures that the Filter Unit is extremely easy to place in position,and also makes it possible to link nets together using a rope.

Production box

The **Filter Unit** are filled using a production box(to be constructed by the client). This pre-dimensioned production box serves too as filling measure.

Track records in Japan



foot protection-recover the vegetation

emergency measures

temporary road temporary dike

PRODUCT SPECIFICATIONS

3types of products in a range of tonnages, suited for all hydraulic applications in river or maritime contexts

Ecogreen type(green)for all applications,durability under UV expousure 30 years

The *Ecogreen Filter Unit* is a double net in moss-green polyester which integrates perfectly into a natural setting and along watercourses.The unique flexibility of the *Ecogreen Filter Unit* ,together with its ease of use, enable it to marry up perfectly into any type of space where construction is required,particularly since the interstices provided by its filler material encourage the creation of ecosystems and rapid re-growth of vegetation.

Technical specifications								
Ecogreen CE	Mesh size	Unit weight, FU empty	Dimensions in meters, FU installed			Resistance to currents without being moved		Reccomended granulometry of the stuffing material
			Height	Diameter	Vol	Unit	Grouped	
2 tons	25mm	6kg	0.4m	1.9m	1.25m^3	3.1m/s	4.7m/s	50mm
4 tons	25mm	13kg	0.6m	2.4m	2.5m^3	3.5m/s	5.3m/s	50mm

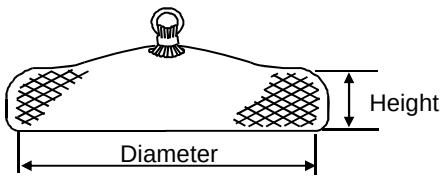
・Safety margin/weight= × 1.5included
・Specific gravity of stuffing stones 2.6-2.65, it is possible to use maximum diameter 200mm for all types

S type(green)for maritime applicatinons,durability under UV exposure 30 years

Specifically adapted to extreme conditions and to marine environments,with double weaving and a restrain rope which assists in reducing rubbling from the contents,and thus wear to the net,by around 30%.

Technical specifications								
S Type CE	Mesh size	Unit weight, FU empty	Dimensions in meters, FU installed			Resistance to currents without being moved		Reccomended granulometry of the stuffing material
			Height	Diameter	Vol	Unit	Grouped	
8 tons	50mm	48kg	0.7m	3.0m	5.0m^3	3.9m/s	5.9m/s	75mm

・Safety margin/weight= × 1.5included
・Specific gravity of stuffing stones 2.6-2.65, it is possible to use maximum diameter 200mm for all types



Ecogreen type

S type

Distributor for Australia, New Zealand and Pacific Nations:

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