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RENO PLUS

Mattresses

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KEY ADVANTAGES
at a glance

→ Quick installation

→ Variable combination solutions

→ Material savings due to reduced revetment thickness

→ Ecological system solution

RENO PLUS
Mattresses

Climate protection and the sustainability of construction practices are also becoming increasingly important for hydraulic works. The preservation of natural mineral resources and the reduction of transportation emissions play a central role within this context.

The inherent necessity to safeguard the precious resource of water, which frequently comes into direct contact with the structures, imposes rigorous technical requirements upon the building products and system solutions. Simultaneously, it demands the utilisation of environmentally-friendly construction materials

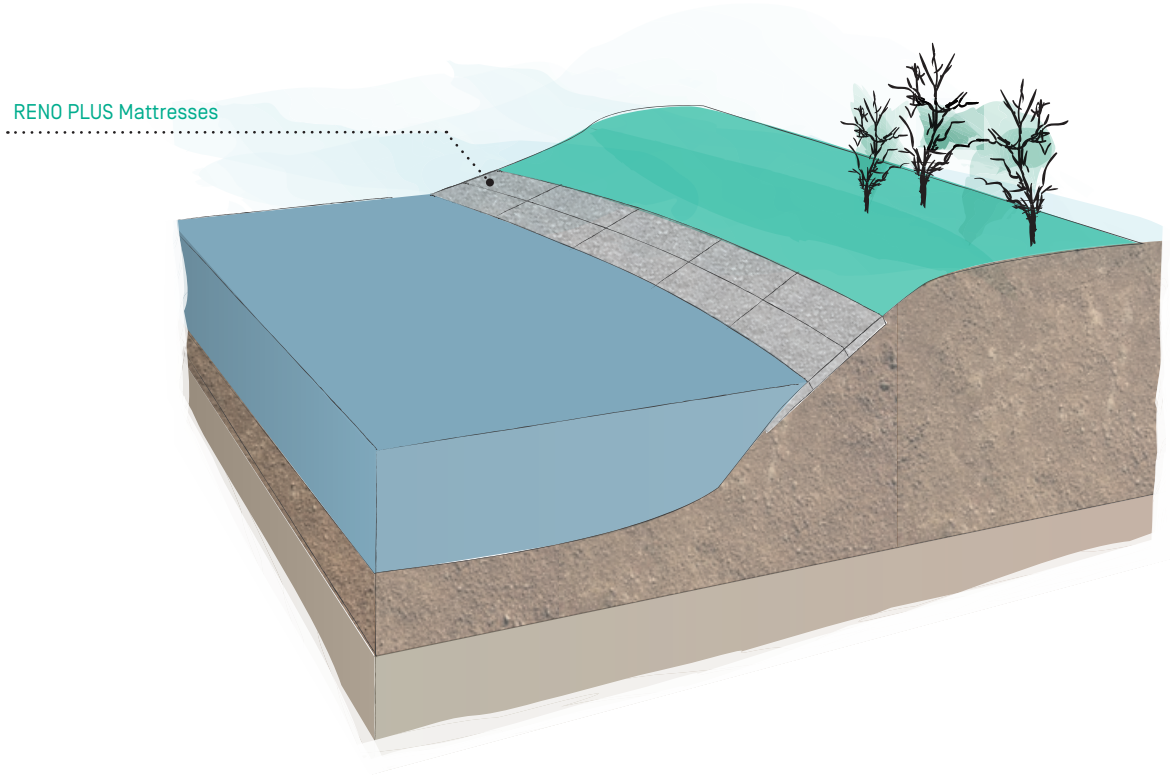
The development of RENO PLUS Mattresses arose as a sustainable and resource-conserving solution to the multifaceted requirements within the realm of riverbank and riverbed protection. Due to savings on materials and transportation, they effectively reduce the ecological impact of riverbank protection measures while simultaneously fostering a near-natural habitat through their full plantability.

PRODUCT DETAILS
and properties

Mattresses are a highly effective method when it comes to ensuring the stability of riverbanks and riverbeds. These products are lightweight steel wire mesh compartmented baskets with a rectangular box shape that can be filled with natural stones once opened. The term "mattress" has become synonymous with these structures, owing to their dimensions of up to 3 x 6 metres and their relatively low height.

The mattresses are flexible and adapt excellently to the irregular courses of riverbanks. By being fully plantable, these mattresses meet all the requirements for creating near-natural riverbank habitats. The diverse plant species that grow on these mattresses, varying in size and type, actively contribute to shading and cooling the surrounding environment, while also absorbing CO_2.

These mattresses offer lasting protection against burrowing animals, making them the ideal choice for safeguarding riverbanks long term.



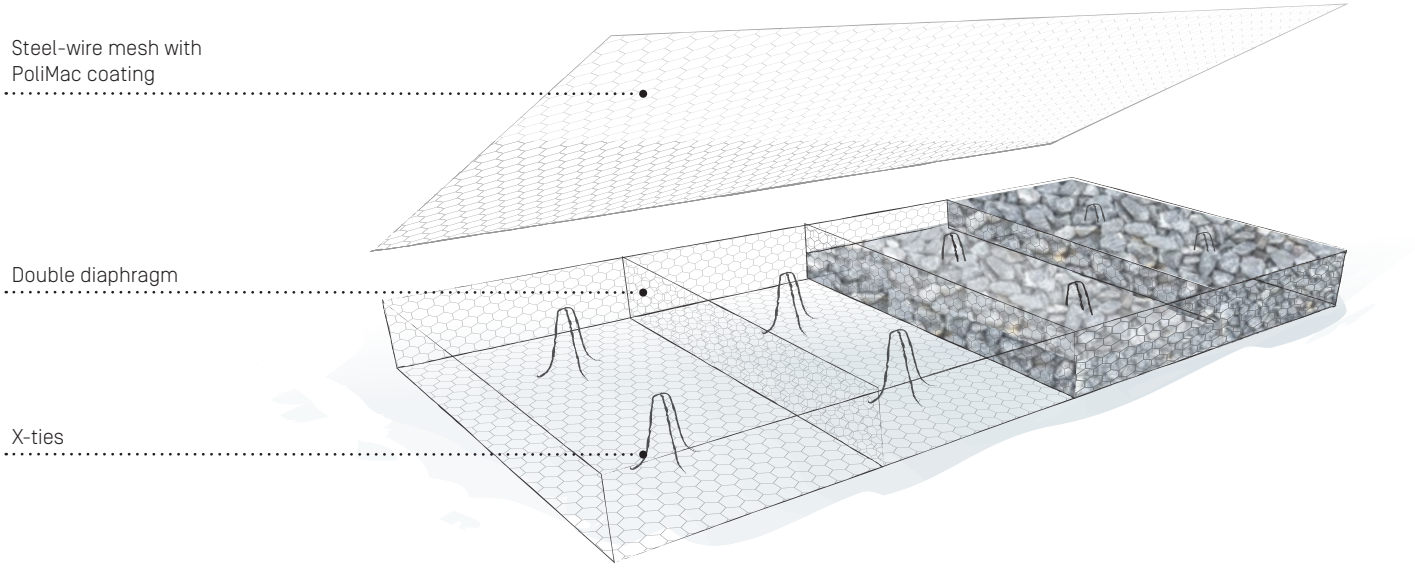
High load capacity with low layer thickness

The distinctive design of RENO PLUS Mattresses, including double partition panels (diaphragms), ensures exceptional positional stability of the rockfill, making them significantly more resilient compared to conventional mattresses. In terms of shear stress absorption alone, it enables riverbank protection that can be achieved with a considerably reduced layer thickness.

The reduced material demands stemming from the decreased layer thickness result in substantial savings: less material transportation, faster mattress filling and installation, shorter operational periods for construction machinery and workers, ultimately culminating in lower expenses for both material and labour.

RENO PLUS Mattresses exhibit exceptional resilience, enabling them to achieve effective riverbank protection with a layer thickness that is **up to 73% less than that required for traditional armourstone-based** methods.

System components



PoliMac coating as long-term corrosion protection

RENO PLUS Mattresses consist of a double twisted hexagonal woven wire mesh with a mesh size of 6 x 8 cm. The woven wire mesh is galvanised and provided with a corrosion-resistant PoliMac PVC coating. According to standard DIN EN 10223-3, this corrosion protection ensures a working life of up to 120 years even in a high-aggressive environment (C4).

Double diaphragm partition panels

The bottom as well as the cell partition panels and side panels consist of a continuous piece of steel wire mesh. The cell partition panels are produced by folding the woven wire mesh up and over, resulting in a doubled structure that enhances both stability and strength. The sturdy and robust double diaphragms effectively prevent any bending or sagging during the installation process and ensure that the cells maintain their dimensional stability even when filled.

Optional lid variants

The steel wire mesh for the lid is supplied in rolls and can be combined with various other products such as coir mats, geomats or rodent protection nets ex works.

X-ties

For enhanced resistance to high shear stress, special vertical connecting elements, known as X-ties, are provided and strategically installed at the centre of the mattresses to ensure a secure and optimal fit of the lid. By providing essential reinforcement, the rockfill is effectively held in place, enabling the mattresses to absorb and effectively dissipate even the most extreme levels of shear stress.

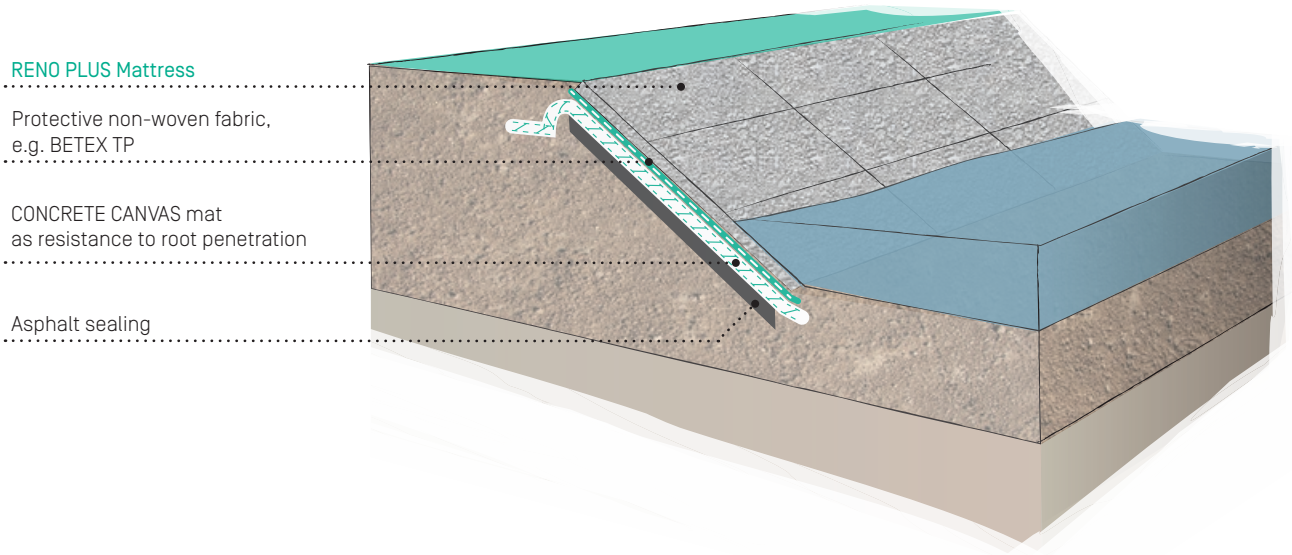
Riverbank and riverbed protection and erosion control: By absorbing high levels of shear stress, RENO PLUS Mattresses offer a slender alternative to conventional riverbank revetment or riverbed protection.

Technical details

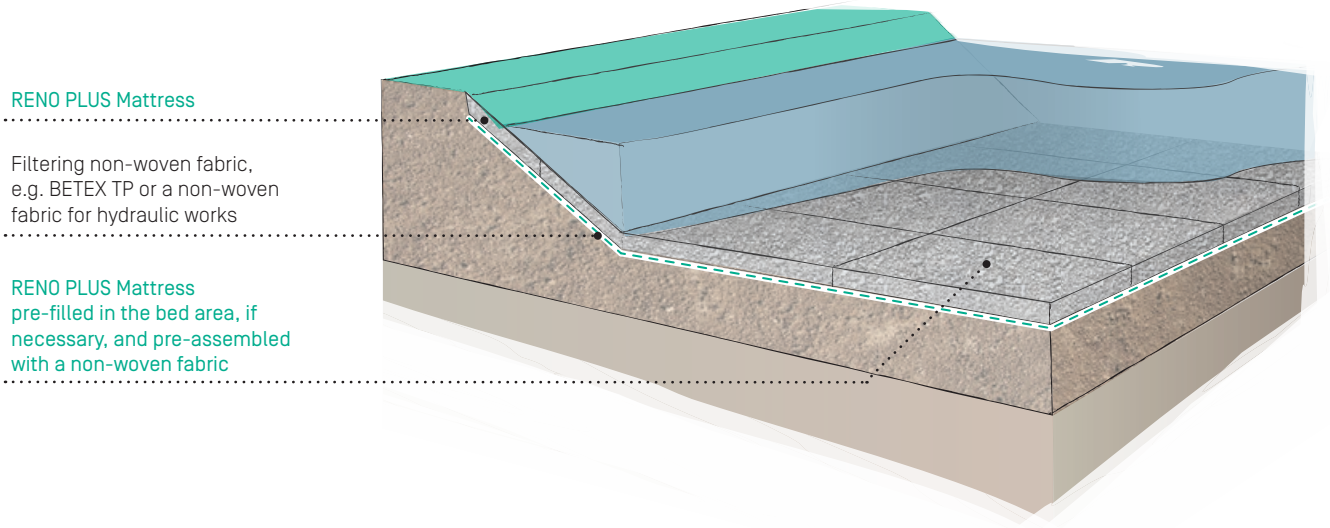
Properties	Test standard	Unit	RENO PLUS
Steel wire diameter (inside/outside)	EN 10218-2	mm	2.20 / 3.20
Edge wire diameter (inside/outside)	EN 10218-2	mm	2.70 / 3.70
Galmac coating	EN 10244-2	Class	A
Rated tensile strength	EN 10223-3	kN/m	40
Punching shear force wire mesh	ASTM A 975-21	kN	20
SO_2 corrosion resistance	ISO 6988	Cycles	> 28
Salt spray test (5% DBR)	ISO 9227	h	> 6,000
Resistance to UV rays (@ 2,500 hours)	ISO 4892-3	%	< 25
Abrasion resistance	EN 60229	Cycles	> 300
Brittleness temperature	ASTM D746-15	°C	> -35
Corrosion spread (@ 2,500 hours)	ASTM A975-21	Corrosion length less than one mesh	

APPLICATIONS
RENO PLUS Mattresses

Riverbank protection system on existing sealing



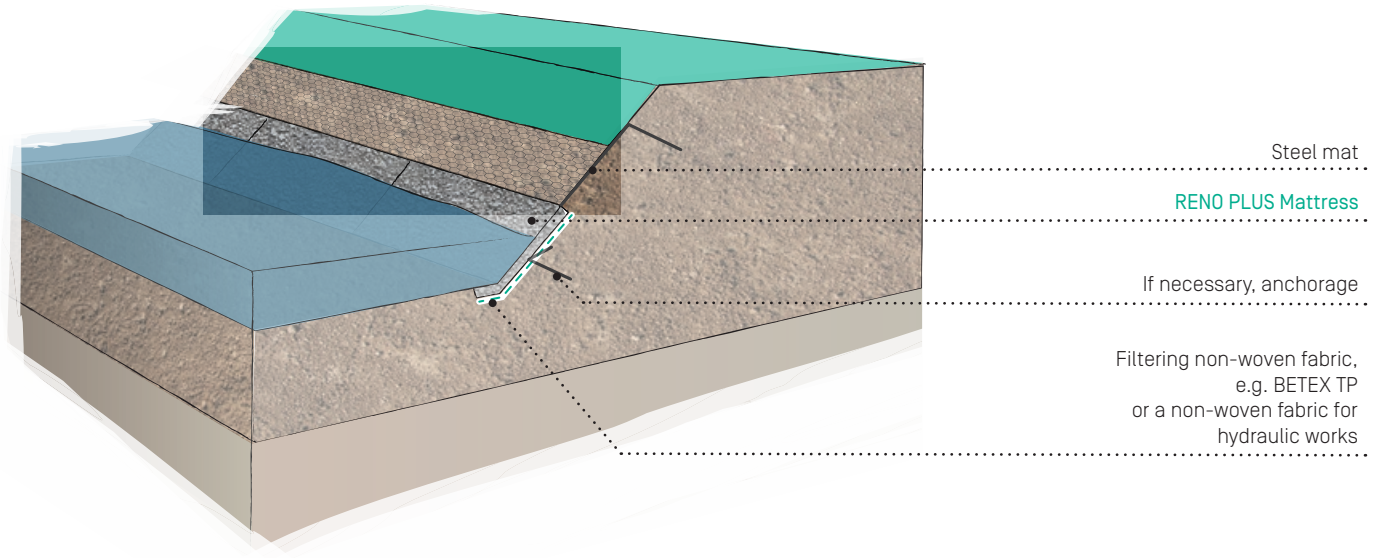
Slope and riverbed protection, e.g. against screw turbulence



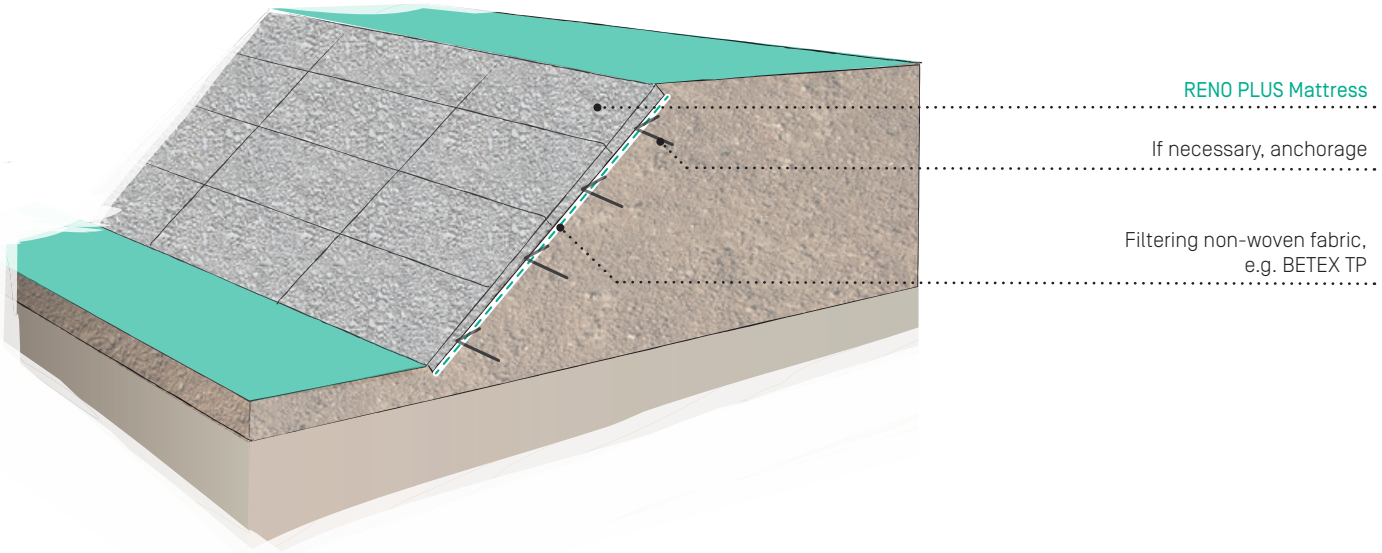
RENO PLUS mattresses are primarily used for hydraulic works to ensure riverbank and riverbed protection and as channel linings for erosion control with high flow rates and/or pronounced bed loads. The mattresses are also ideal for use in areas at high risk of erosion and underwash.

Further applications include surface erosion control in loose rock formations and as a lining solution for cleanliness areas in conjunction with underlying fouling protection.

Suspended revetment



Slope protection or erosion control (gradient > 1:1.5)



Dimensioning of RENO PLUS Mattresses

RENO PLUS Mattresses are available in three thicknesses – 0.17 m, 0.23 m and 0.3 m – to meet varying riverbank protection requirements. The thickness of the mattress is based on the flow cross-section and the expected maximum flow velocity or on the associated shear stress. The expected bed load is also taken into account.

RENO PLUS Type	Max. shear stress [N/m²]	Max. flow velocity [m/s]
0.17 m	371 – 445	5.5 – 6.0
0.23 m	445 – 534	6.0 – 6.5
0.30 m	532 – 637	6.5 – 7.0

We are happy to supply current data sheets, specifications, certificates and technical verifications on request.
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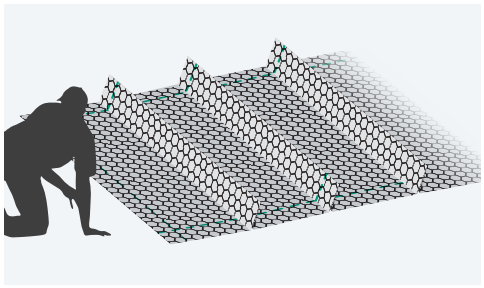
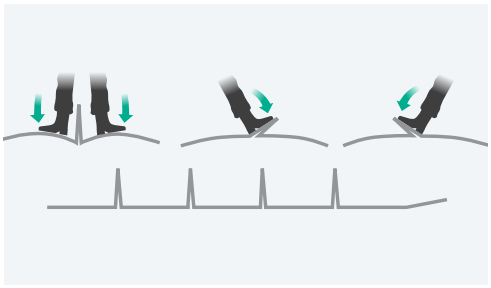
INSTALLATION INSTRUCTIONS

RENO PLUS Mattresses

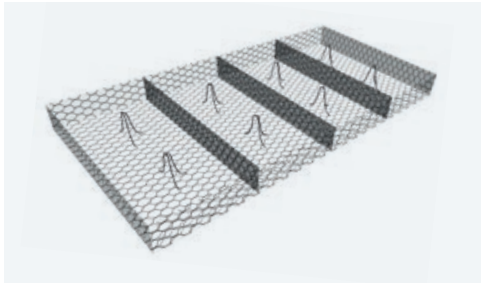
Installation of RENO PLUS Mattresses



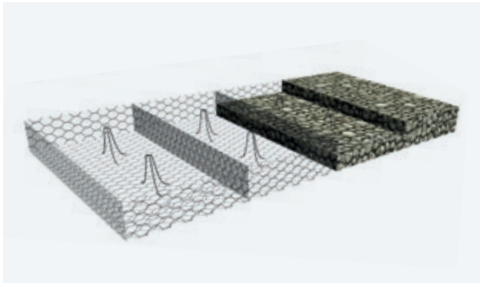
1. Folding the elements



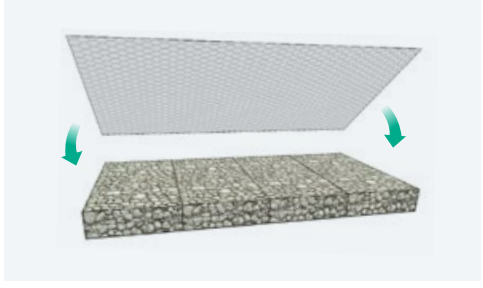
2. Folding up the diaphragms



3. Positioning the X-ties



4. Filling the cells



5. Closing the lid

6. Fixing the lid and X-ties

To be taken into account:

As standard, it is crucial to prevent any mixing with the soil material of the underlying subsoil. To guarantee effective separation and filtration, it is advisable to position a suitable non-woven fabric, such as the mechanically-bonded non-woven fabric BETEX TP, beneath the mattress.

From slope gradients > 1:1.5, it might be necessary to fix the mattresses to the slope surface.

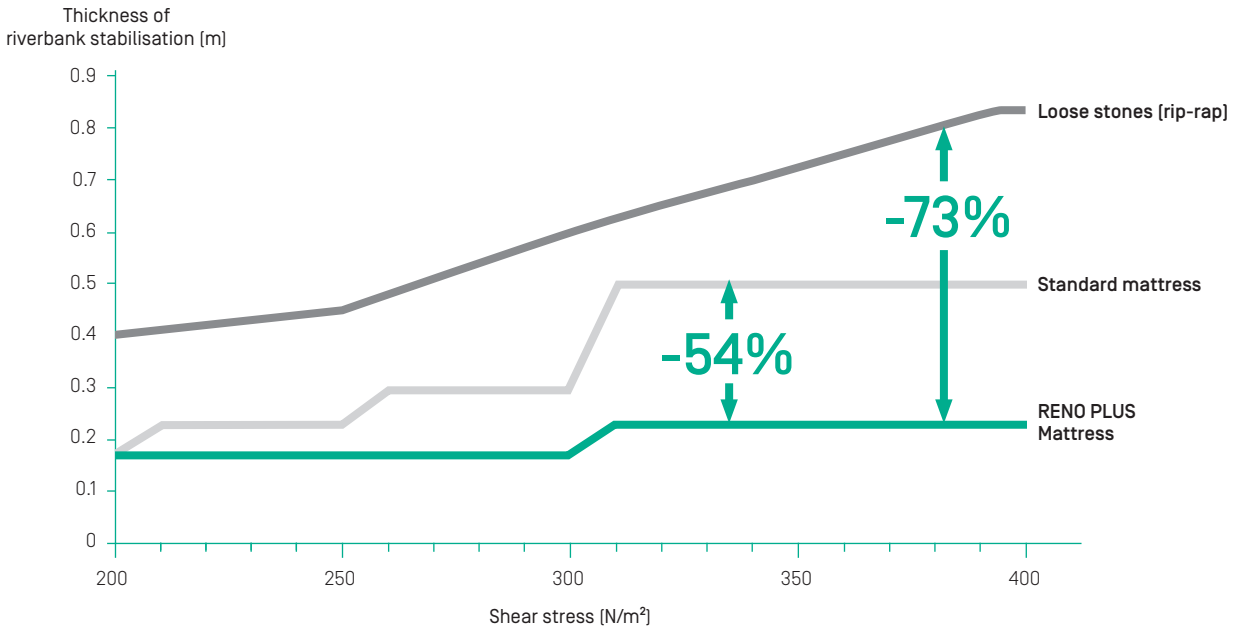
SUSTAINABILITY
RENO PLUS Mattresses

Conservation of natural resources

The utilisation of RENO PLUS Mattresses allows for a considerable reduction in both the required rockfill size and installation thickness for riverbank and riverbed protection.

The resulting CO_2 saving is up to 82% $kgCO_2$-eq per m^2 of riverbank protection.

Comparison of riverbank protection – potential for savings in terms of layer thickness



Near-natural habitats

RENO PLUS Mattresses offer a natural habitat for aquatic plants and animals. The robust foundation provided by the steel wire mesh structure promotes the growth of vegetation, leading to enhanced water quality. Further, these habitats have the ability to attract a diverse range of aquatic life, including fish, amphibians and invertebrates. This can also help to enhance biodiversity in this area.

RENO PLUS Mattresses require

-82%

less kg CO_2 per m^2 riverbank protection

compared to riverbank protection with loose stones (rip-rap)

Working life of up to

120

years

due to the PoliMac coating

RENO PLUS Mattresses achieve a

-73%

reduction in the layer thickness of the bank stabilisation

compared to riverbank protection with loose stones (rip-rap)

Durability

RENO PLUS Mattresses are extremely durable and robust and boast a long working life. In contrast to natural materials or purely plastic products, the PoliMac coated steel wire mesh demonstrates superior resistance to UV rays, extreme weather conditions and chemical degradation. This extends maintenance intervals, thereby reducing the frequency of interventions required in the watercourse. The working life is up to 120 years.

Environmentally safe

All components of the RENO PLUS Mattresses are environmentally safe. This was fully proven within the framework of a German environmental safety certificate according to M Geok E and with the EPD certificate (Environmental Product Declaration).

Material recycling

At the end of their working life, RENO PLUS Mattresses can be recycled. The steel wire mesh can be efficiently melted down and re-purposed to create new products, thus significantly reducing the demand for new materials and minimising waste generation.

ADVANTAGES
RENO PLUS Mattresses

- → EPD certified
- → Measurable
- → High shear stress
- → Excellent resistance
- → Environmentally safe
- → Long working life
- → Abrasion resistant

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