


X-Tie is a pre-formed bracing system made of Galmac® 4R coated steel wire, used to secure a tighter packing of the filling stones and improve the hydraulic performances of Reno Mattress Plus unit, enabling a quick and easy connection of the base panel to the lid during the installation process on the site.

X-Ties allow for a faster installation compared to traditional vertical ties made of lacing wire, as their pre-shaped hooks can easily be attached to the base panel; furthermore, due to their robustness and their capability to distribute the forces over a larger wire mesh surface, their density (1 X-Tie per m²) is half that of traditional vertical ties (2 per m²).


X-Ties are made of 2 pre-assembled components: the vertical leg connecting the base panel to the lid and the inclined tie to keep the vertical leg into position during the stone filling operations; the upper part of the vertical leg is eventually fixed to the lid by means of 2 C-rings.

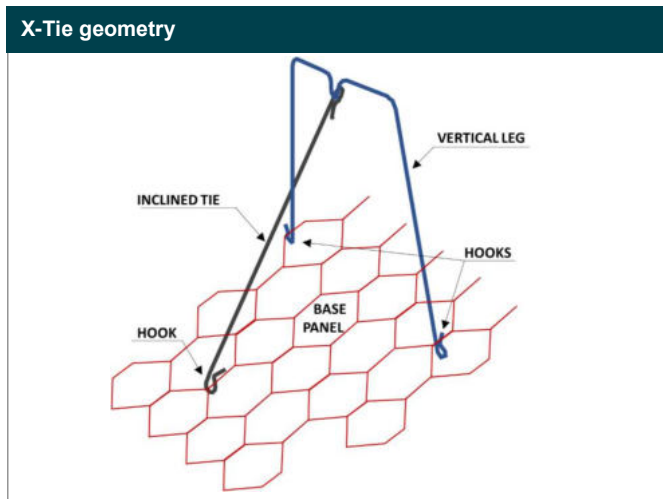
X-TIES PERFORMANCES			3.90
Physical Properties			
Steel wire diameter	EN 10218-2	mm	3.90
Galmac 4R coating	EN 10244-2	Class	Class A
Durability Performances			
SO ₂ corrosion resistance	ISO 6988	Cycles	> 56
Salt Spray (5% DBR)	ISO 9227	Hours	> 2,000
UV resistance (@ 2,500 hours) ⁽¹⁾	ISO 4892-3	%	< 25

DESIGN THE CHANGE



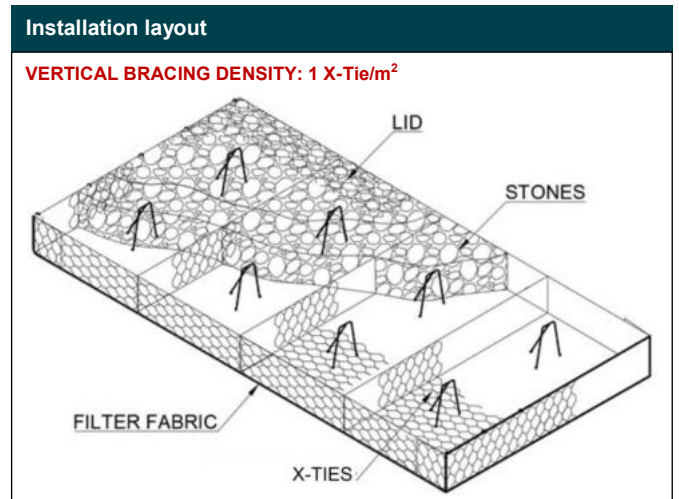
The **Permissible Shear Stresses** of Reno mattresses have been obtained by full scale flume tests performed at the Engineering Research Center of Colorado State University (USA) following the ASTM D 6460 test methodology. The **design values** depend on installation procedures (use of **X-ties**) and actual stones characteristics (D₅₀, C_u). Use Maccaferri **MACRA software** to effectively utilize the permissible shear stress of Reno mattress in the design of river training works.





X-Ties dimensions

Thickness of Reno mattress (m)	X-Tie height (cm)
0.17	17
0.23	23
0.30	30



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