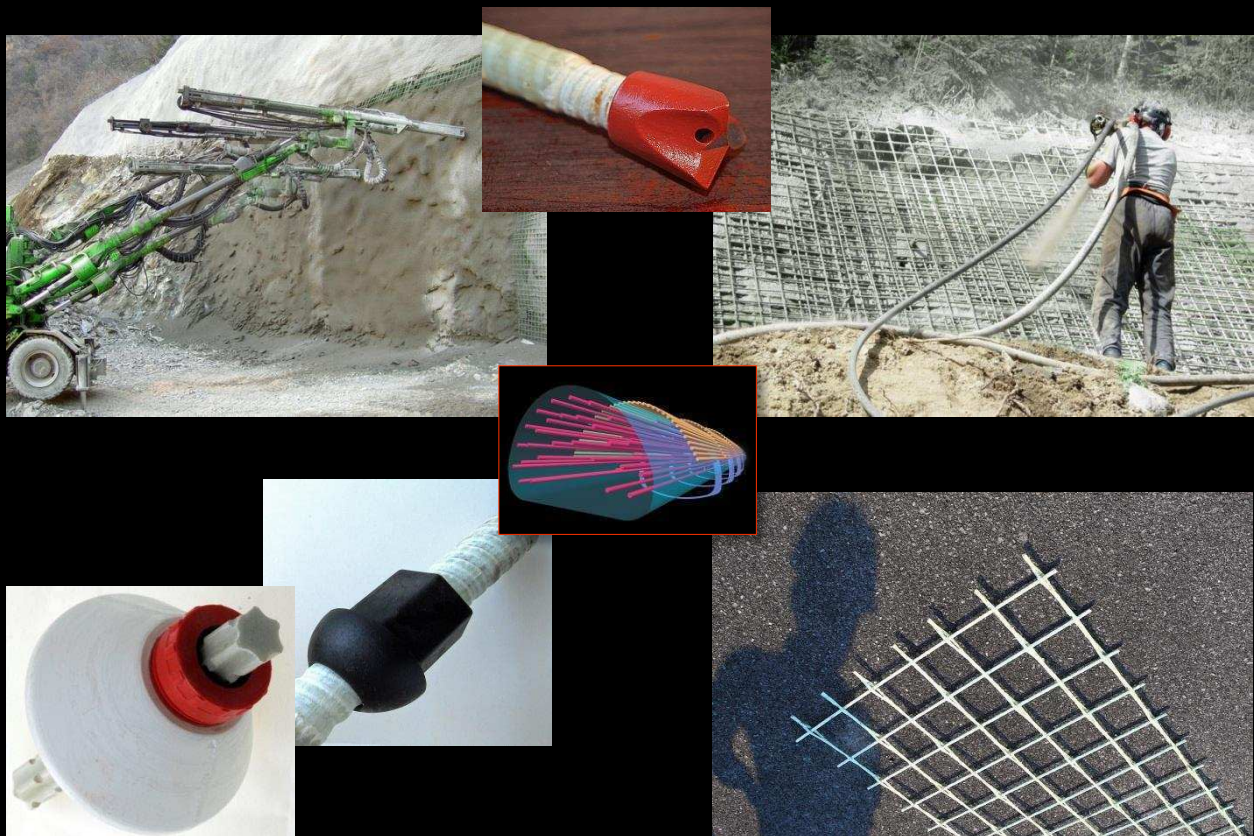


ATP

SNWS/C system

Soil Nail Wall System



U n d e r g r o u n d & C i v i l W o r k s d i v i s i o n



“SPIKED WALLS” geotechnical

The main objective is to reinforce and consolidate the existing soil by means of GRP passive anchors (nails) in order to provide a homogeneous structure able to support the entire shear load of the soil and so limiting any displacements.

The bars are passive and develop their reinforcing action through interaction with the surrounding soil.

The GRP nails work predominantly in tension and generally react on a wall made with shotcrete armed with adequate GRP net.

Applications:

- **stabilization of slopes** cut by roads and railway lines;
- temporary or permanent **retaining walls** in excavations in urban areas for multi-storey buildings;
- **stabilization of tunnel portals** in steep slopes and unstable.

The nails utilized in the reinforced walls technology are inserted in holes formed by the probe and filled with cement mixture for the entire length.

The nails are not pre-tensioned and are spread in the wall to ensure an apparent cohesion anisotropic in the existing terrain.

The coating of the support wall is not the most important part, however, ensures stability of the land between the reinforced layers and protects the soil from erosion and surface by weather effects.

It is usually made of a thin layer of shotcrete (10-15 cm thick) reinforced with GRP fibers and net realized with layers from top to bottom.

The typical construction of a “Spiked Wall “ includes the following stages:

- An excavation of depth and extension dependent on the type of soil;
- Covering of the exposed face with a thin layer (2-3 cm) of shotcrete;
- Positioning of the reinforcing nails;
- Laying the mesh fiberglass and its fixing with the locking plates;
- Final covering with shotcrete reinforced with glass fibers.

Main Advantages:

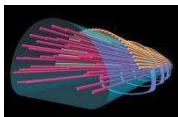
ATP is able to provide a complete system, **totally made with synthetic material**, made of: HT/RB-Bolt25 type fiberglass nails (complete with fixing plates and threaded nuts) and GWN type fiberglass mesh.

The cement projected may also be reinforced with glass fibers type “Spritzfilcem”.

The SWNS/C system is **resistant to chemical and to electrochemical attack**, and so it is particularly indicated in presence of stray currents such as in railway work.

Besides, when it must be removed for subsequent excavation, not only it offers great advantage to the excavation, but the resulting scrap is considered, by the existing laws, inert material and consequently it can be reutilized or disposed of without the necessary precautions imposed in the case of metals.

FRP - Rock Bolt

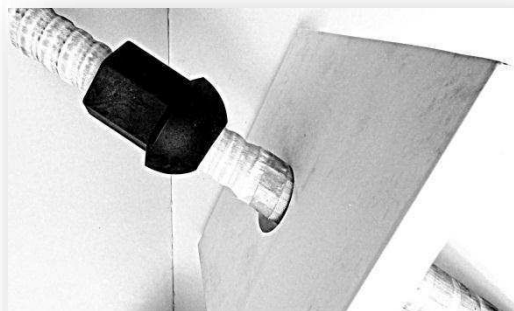
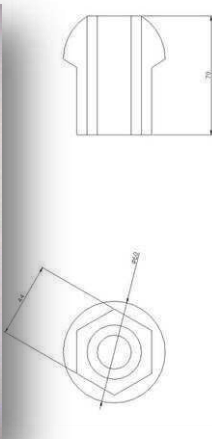


HT-RB25-bolt

Barra in VTR con dado e piatto in materiale plastico rinforzato.

GFRP rebar with plastic head and washer plate.

Consolidamento di terreni - Soil reinforcement



Barra in vetroresina con filetto in testa per il consolidamento dei terreni e gallerie in allargo attraverso rivestimento esistente.

Head threaded glass fiber rod to be used as soil reinforcement and consolidation for tunnel enlargement.

Barra		Rod	
Diametro esterno	25 mm	Outer diameter	25 mm
Peso	900 g/m	Weight	900 g/m
Densità	1,9 g/cm ³	Density	1,9 g/cm ³
Contenuto in vetro	≈ 70%	Glass content	≈ 70%
Sezione minima	400 mm ²	Minimum section	400 mm ²
Resistenza a trazione	≈ 900 MPa	Tensile strength	≈ 900 MPa
Modulo elastico	≈ 40 GPa	Tensile Elastic modulus	≈ 40 GPa
Carico ultimo	≈ 350 KN	Ultimate load	≈ 350 KN
Dado		Nut	
Lunghezza	70 mm	Lenght	70 mm
Chiave	44 mm	Key	44 mm
Diametro massimo	60 mm	Max diameter	60 mm
Carico rottura	≈ 70 KN	Breacking load	≈ 70 KN
Materiale	Tecnopolimero rinforzato	Material	Glass fiber reinforced
Piastra VTR		Plate FRP	
Dimensioni	150x150x10 mm	Dimension	150x150x10 mm

Standard wire net dimensions

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Geometrical and Physical Characteristics

Diameter	Mesh	Total tensile strength	Weight
mm	mm	KN	Kg/m ²
8	150 x 150	230	1,3
8	200 x 200	170	1,0
10	150 x 150	350	2,1
10	200 x 200	270	1,6
12	150 x 150	500	3,0
12	200 x 200	380	2,3
15	150 x 150	800	4,7
15	200 x 200	600	3,5

Material (GFRP – Glass Fiber Reinforced Plastic)

unit

value

Test method

Tensile strength

MPa

>700

App.B CNR DT203

Elastic modulus

GPa

>35

App.B CNR DT203

Elongation to break

%

1,5

App.B CNR DT203

Specific weight

g/cm³

1,9 (±5%)

ISO - 1183

Geometrical and Physical Characteristics

**unità
unit**

**valore
value**

Metodo di prova
Test method

Density of the fiber

g/cm³

2,55

ISO - 1183

Density of the resin

g/cm³

1,1

ISO - 1183

TG of the resin (glass transition)

°C

>80

ASTM – E - 1640