drenotube®

DRAINAGE ALL IN ONE

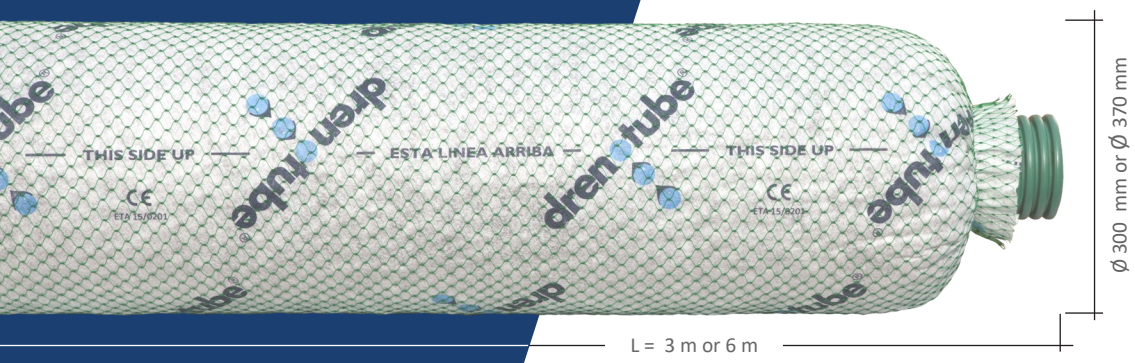
PREFABRICATED DRAINAGE

ULTRA LIGHT

GEOSYNTHETHIC GRAVEL INCLUDED

DIMENSIONS AND FLOWS BASED ON INCLINATION (i)

SUPERIOR VIEW



Ø 300 mm or Ø 370 mm

L = 3 m or 6 m

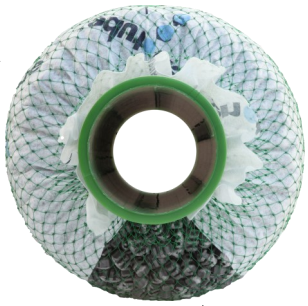
BOTTOM VIEW

Ø 110 mm or Ø 160 mm

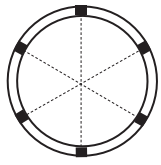
The lower part is not covered with geotextile to guarantee a perfect functioning during more than 25 years without risk of clogging.

Polyethylene net

FRONT VIEW

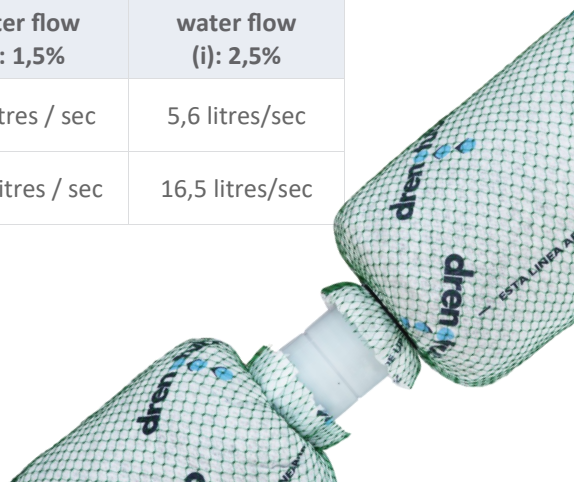


Geosynthetic aggregate



6 Slots at regular intervals throughout the perimeter.

tube D	total D	Lenght	water flow (i): 0,5%	water flow (i): 1,5%	water flow (i): 2,5%
Ø110mm	300mm	3 m / 6 m	2,5 litres / sec	4,3 litres / sec	5,6 litres/sec
Ø160mm	370mm	3 m / 6 m	7,5 litres / sec	13,- litres / sec	16,5 litres/sec



DRENOTUBE ADVANTAGES

PERFORMANCE AND RELIABILITY

- Water retention capacity: 30% more efficient than with better quality gravel.
- 100% consistent industrial quality and performance efficiency.
- System tested and certified in the USA and Canada with thousands of installations in service since 1991.
- CE Marking under the approval number ETA 15/0201

PROFITABILITY

More economical than traditional system, saves time in installation and without specialized labor.

- More economical and easy transport.
- Reduces volume of excavations, thanks to its better performances.
- Does not require gravel.

SIMPLE AND FAST INSTALLATION

- Simple: **drenotube®** installs in one operation.
- Fast: 10 meters / minute - Installation is 4 times faster and cheaper than with the traditional system.
- 100 times lighter than gravel, installation without mechanical devices, avoids handling accidents..
- High density translucent polyethylene (HDPE) interlocking quick couplings.
- Prefabricated system which ensures the cleanliness and the protection of the drain of the fine particles of soil.
- **drenotube®** is flexible and adapts to the shapes and obstacles of the terrain (slopes, trees, buildings, etc.)
- In deep trenches, **drenotube®** connections are made outside minimizing trench shoring and hazard of rock falls.

ECOLOGICAL

- At least 70% recycled geosynthetic aggregate.
- 100% of the components are recyclable.
- l extraction of gravel thus preserving the natural environment.
- 25 years of useful life of all components.
- inert materials that do not pollute the soil.

CERTIFICATION

- CE
  ETA 15/0201
  ITeC EOTAoffice

Drenotube® system for all types of longitudinal drainage

drenotube® is an integral, prefabricated infiltration and drainage system that replaces traditional gravel in draining trenches using modular geosynthetic engineered particle. The drenotube® system is designed to improve drainage performance by eliminating fines and reducing compaction and embedding associated with crushed stone.

Prefabricated

drenotube® is fully assembled at the factory and is subject to strict quality controls. Traditional drainages that are carried out on site, are more likely to have installation defects because they depend on the quality of installation.

drenotube® DR consists of a double-walled annular central tube, with slots distributed around its perimeter and coated with geosynthetic particles. The assembly is held by a high-strength polyethylene mesh flanged at the ends. Between the mesh and the geosynthetic particles, a geotextile film prevents the penetration of fine particles from the ground that could clog the drain.

Modular

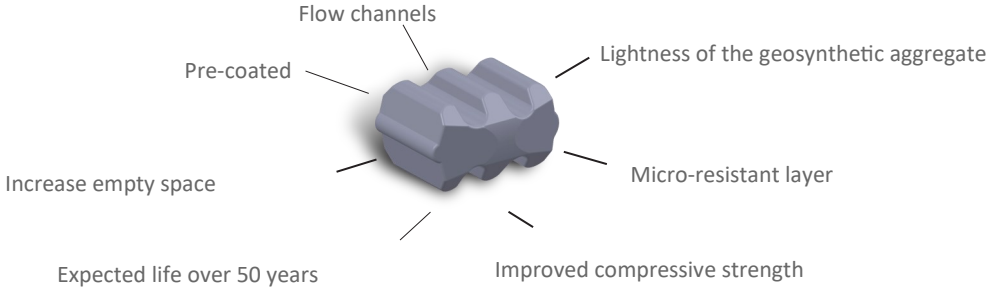
For the drainage application, **drenotube®** comes in 3 versions: the DR 300, the DR 370 and the BD or cylindrical package consisting only of geosynthetic particles. Depending on the nature of the soil, this allows a greater capacity of water retention and easily adjustable, it will be sufficient for that to combine the different elements between them.

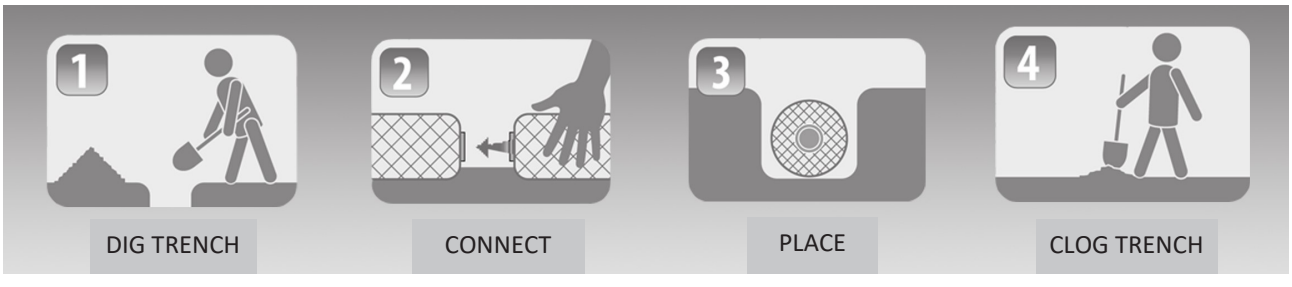
Applications

drenotube® Applies to all types of longitudinal drainage; for roads and various networks, railways, landscaping, sports fields (football, golf, horse.), drainage of retaining walls, support structures covering tunnels, abutments, building foundations, agriculture ,

Geosynthetic Aggregate

Specially designed to increase water retention and drainage capacity.





Implementation of a drenotube® drain at the Mango logistics center, in Barcelona (Spain)

Implementation of a drenotube® drain on the Tarragona highway (Spain)

"A poorly designed network will induce surface disturbances (overflows of structures, floods, etc.), and major structural disturbances of the roadway over the medium term. These situations are aggravating factors for the safety of users and the integrity of the road.
... "
Excerpt from the "Technical Guide, Road Sanitation" Sétra - Department of Technical Studies of roads and highways.

Road drainage

The prefabricated drainage system drenotube® DR370SN04ST6 has been designed to collect and evacuate the internal waters from the road for:
- Reduce the environmental impact of runoff water;
- Ensure the rapid evacuation of the water from the Platform to improve user safety and minimize interruption of service;
- Extend the useful life of the road and the durability of infrastructure.

Implementation of a drenotube® drain on the railway of Suria (Spain)

The track manager must take care to ensure in all circumstances the safety and regularity of traffic. Regular monitoring and maintenance must also cover all structures and earthworks (embankments or trenches) used for the establishment of the line.

In the case of the Suria railway, the profile along the track between two embankments of different levels caused an accumulation of clay soil on the rails after heavy rains.

Thanks to the installation of drenotube® in January 2015 the rails remain clean and dry.

Implementation of a drenotube® drain in Barcelona - Spain

The installation of the drenotube on the parallel avenue of Barcelona in July 2014 made it possible to ensure perfect drainage of the central green zone.
The work could be done much faster and easier than traditional drainage without cutting the traffic of vehicles thanks to the lightness of the system.

Implementation of a drenotube® drain in Arnhem - Netherlands

Implementation of a drenotube® drain at the Madrid National Golf Center (Spain)

The drenotube® drainage system eliminates problems caused by gravel, which blocks pipes and damages mower blades.

Gravel contains fine particles that shorten the life of the drainage. Geosynthetic particles contain no fine particles.

Another important benefit of the drenotube® is the removal or reduction of gravel in the basement. This system is ideal for walkways and bunkers, draining wet areas along the terrain. drenotube® can be used in new installations or in the maintenance of greens.

Data Sheet DR300SN04 - SN08 ST6 / 3
Prefabricated drainage system

Annealed Tube	Test Method	Unit	Rated Value
Outside diameter	UNE EN 61386-1	mm	110
Internal diameter	UNE EN 61386-2-4	mm	SN04 : 93 – SN08 : 91
Ring stiffness	UNE EN ISO 9969	kN/m^2	SN04 : 4 – SN08 : 8
Slots positioning		º	360
Slot area		cm²/m	50 (±10)
Material	UNE 53994 :2011		polyethylene
Geosynthetic aggregate	Test method	**Unit**	**Rated Value**
Apparent density	UNE 92120-2:1998	kg/m^3	10
Absolute density	UNE 83134	kg/m^3	20
Empty spaces		%	50
Specific surface		m^2/m^3	230
Number of particles		u/m^3	~115.000
Water absorption in 7 days	UNE EN 12087:1997	%	2,0
Water absorption in 21 days	UNE EN 12087:1997	%	2,2
Granulometry	UNE EN 933-1	% passes	<8 mm: 0 <20 mm: 73 <25 mm: 100
Working temperature	-	ºC	-20 a +65
Colour	-	-	Graphite
Geotextile filter	**Test method**	**Unit**	**Nominal value**
Polymer	-	-	polypropylene
Weaving technique	-	-	Punching
Surface mass	UNE EN ISO 9864	g/m^2	100
Thickness 2 kPa	UNE EN ISO 9863-1	mm	0,7
MD / CMD tensile strength	UNE EN ISO 10319	kN/m	8,0/8,0
MD / CMD Stretch at Break	UNE EN ISO 10319	%	90/80
Static punch (CBR)	UNE EN ISO 12236	N	1300
Dynamic perforation (cone fall)	UNE EN ISO 13433	mm	28
Permeability on plan	UNE EN ISO 11058	m^3/s/m^2	0,120
Flow capacity on plan @ 20 kPa	UNE EN ISO 12958	m^3/s/m	1x10-6
Porometry (pore size) O90	UNE EN ISO 12956	µm	80
UV protection			YES
Mesh	**Unit**	**Nominal value**	
Polymer	-	polyethylene	
Weight	g/m	67	
Semi perimeter	cm	51	
Type of mesh	-	Tubular oriented	
Drenotube ®	**Unit**	**Nominal value**	
Length	m	3 or 6	
Weight	g/m	SN04 : 1300 – SN08 : 1592	
Capturing surface	cm^2/m	SN04 : 51 – SN08 : 50	
External diameter	mm	300	
Maximum burial depth, according to nature and soil moisture	m	SN04 : de 5 to 8 – SN08 : de 6 to 10	
Minimum burial depth	m	0,40	

Data Sheet DR370SN04 - SN08 ST6 / 3
Prefabricated drainage system

Annealed Tube	Test Method	Unit	Rated Value
Outside diameter	UNE EN 61386-1	mm	160
Internal diameter	UNE EN 61386-2-4	mm	SN04 : 140 – SN08 : 136
Ring stiffness	UNE EN ISO 9969	kN/m^2	SN04 : 4 – SN08 : 8
Slots positioning		º	360
Slot area		cm^2/m	85 (±10)
Material	UNE 53994 :2011		polyethylene
Geosynthetic aggregate	**Test Method**	**Unit**	**Rated Value**
Apparent density	UNE 92120-2:1998	kg/m^3	10
Absolute density	UNE 83134	kg/m^3	20
Empty spaces		%	50
Specific surface		m^2/m^3	230
Number of particles		u/m^3	~115.000
Water absorption in 7 days	UNE EN 12087:1997	%	2,0
Water absorption in 21 days	UNE EN 12087:1997	%	2,2
Granulometry	UNE EN 933-1	% passe	<8 mm: 0 <20 mm: 73 <25 mm: 100
Working temperature	-	ºC	-20 a +65
Colour	-	-	Graphite
Geotextile filter	**Test Method**	**Unit**	**Rated Value**
Polymer	-	-	polypropylene
Weaving technique	-	-	Poinçonnage
Surface mass	UNE EN ISO 9864	g/m^2	100
Thickness 2 kPa	UNE EN ISO 9863-1	mm	0,7
MD / CMD tensile strength	UNE EN ISO 10319	kN/m	8,0/8,0
MD / CMD Stretch at Break	UNE EN ISO 10319	%	90/80
Static punch (CBR)	UNE EN ISO 12236	N	1300
Dynamic perforation (cone fall)	UNE EN ISO 13433	mm	28
Permeability on plan	UNE EN ISO 11058	$m^3/s/m^2$	0,120
Flow capacity on plan @ 20 kPa	UNE EN ISO 12958	$m^3/s/m$	1x10-6
Porometry (pore size) O90	UNE EN ISO 12956	µm	80
UV protection			Oui
Mesh	**Test Method**	**Unit**	
Polymer	-	polyethylene	
Weight	g/m	76	
Semi perimeter	cm	63	
Type of mesh	-	Tubular oriented	
Drenotube ®	**Unit**	**Rated Value**	
Length	m	3 or 6	
Weight	g/m	SN04 : 2150 – SN08 : 2482	
Capturing surface	cm^2/m	SN04 : 51 – SN08 : 50	
External diameter	mm	370	
Maximum burial depth, according to nature and soil moisture	m	SN04 : de 5 to 8 – SN08 : de 6 to 10	
Minimum burial depth	m	0,40	

drenotube®

PREFABRICATED DRAINAGE AND INFILTRATION

PERFORMANCE

EASY INSTALL

PROFITABILITY

ECOLOGICAL

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