



COMPANY SPECIALIZING IN THE RESEARCH AND
DEVELOPMENT OF IMPROVED SOFT GROUND DRAINS

SPE-DRAINS



www.spedrain.com



*“Quality assurance,
technology innovation and talented training”*

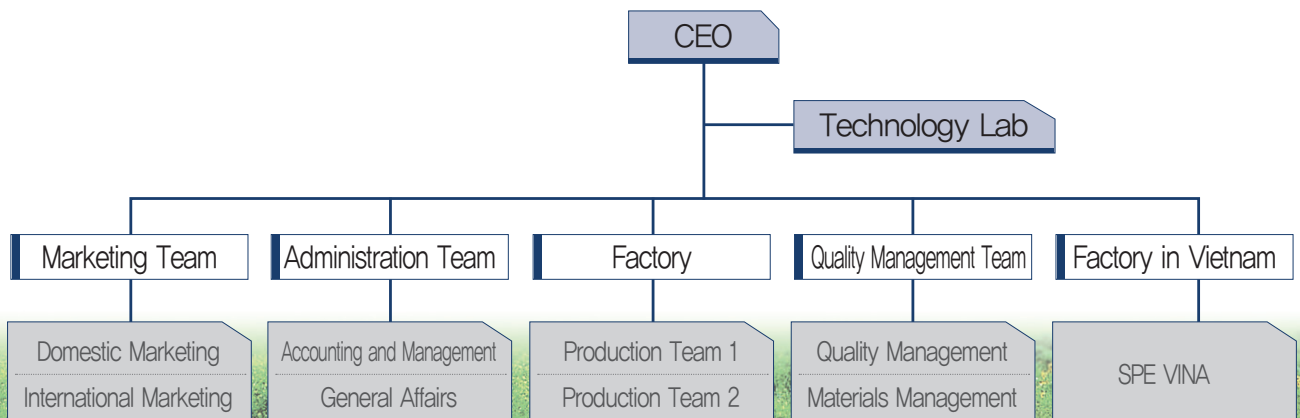
SPE INDUSTRY, the company with 10 years' experience on drains for soft ground improvement market, specializes in drains manufacturing & supplying for soft soil improvement in civil work. We can produce a variety of products which is appropriate for each ground's drainage situations such as PVD(Prefabricated Vertical Drain) and horizontal drainage materials for increasing performance of soft ground.

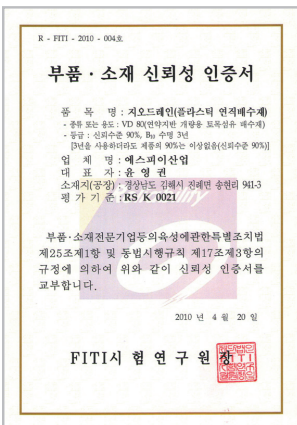
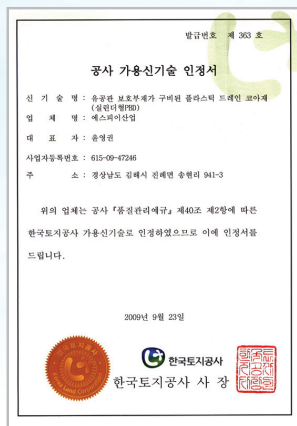
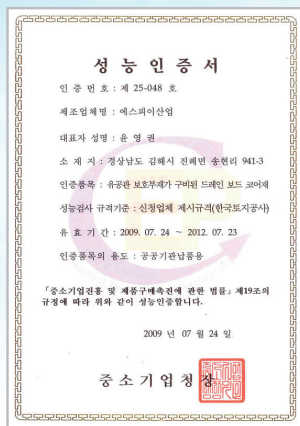
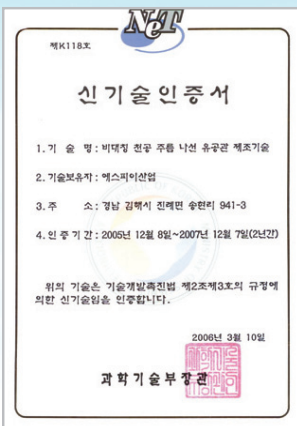
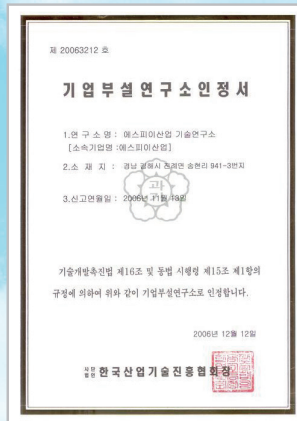
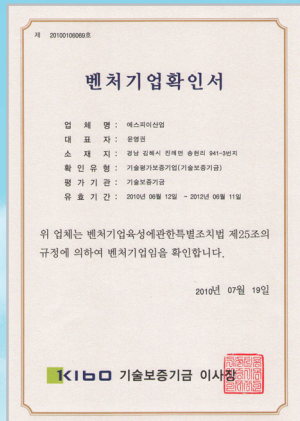
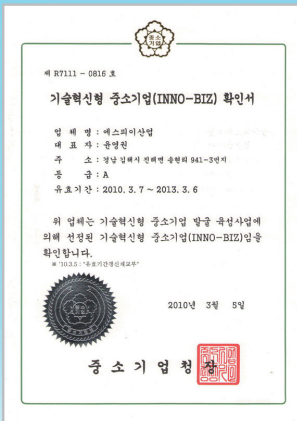
We have factories in both Korea and Vietnam so we are ready to satisfy client's order to produce and supply it at any requested time with several production lines in both areas and have a lot of supply experiences for big projects around west-east Asia. We can tell you in sure that we can do our best to be the lowest position for your project and we have always committed to maintain or exceed quality standards that are demanded in the drains manufacturing field by best clients.

History

2004.	01.	Founded SPE Industry	2009.	09.	Acquisition of Technology Certification from Korea Land and Housing Corporation
	11.	Established local factory	2010.	02.	Selected as Superior Product by Public Procurement Service
	12.	Selected as Clean Business (No. 111185)		04.	Acquisition of Reliability Certification of Parts and Materials
2005.	11.	ISO9001:2002(ASR-Q-05443)	2011.	05.	Established first overseas factory in Vietnam
	12.	KT Certification	2012.	06.	Selected as one of the Promising SMEs for Export
2006.	03.	Certified as venture company		11.	Evaluated as a success for the Technology Business Incubator Project by the final assessment of the first half year (2011)
	05.	Civil engineering joint venture with Vietnam	2013.	04.	Extended INNO-BIZ Certificate
	10.	Joint development agreement with Korea Land and Housing Corporation	2014.	02.	Selected good product by PPS
	12.	Founded Affiliated Laboratory		06.	Extended certificate of Promising Export Firm, Extended certificate of venture
2007.	03.	InnoBiz Certification			
	03.	“2007” Selected as Expert Enterprise			
2008.	03.	“2008” Selected as Expert Enterprise			
	06.	Selected as Promising Mid-Small Business for Export			
	07.	Acquisition of quality assurance Q mark			
2009.	07.	Acquisition of Performance Certification from Small and Medium Business Administration			

Organization





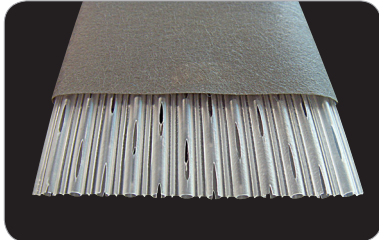
Patent

- Patent : Total of 9, including PCD
- International patent : Total of 1 including Asymmetric Punched spiral Pipe (Vietnam)
- Utility model : Total of 7, including anchor plate with serrated fixture
- Design : Total of 5 including drain board core material for soft ground
- Trademark : PCD
- Patent application : Total of 17, including patents, utility models, designs, and trademarks



Vertical drain

- C-PBD/cylindrical PBD



C-PBD/C-PBDR/C-PBDRW

Co-developed and Won new construction technology certification by Korea Land and Housing corporation, the big project owner in Korea. C-PBD is a plastic drain board core with cylindrical boring pipes. The structure of C-PBD with cylindrical boring pipes prevents a lowering of drainage efficiency and a pushing filler inward reducing the cross sectional area of drain, hence reducing, or even losing, the drain capability.

- PCD/plastic cylindrical drain

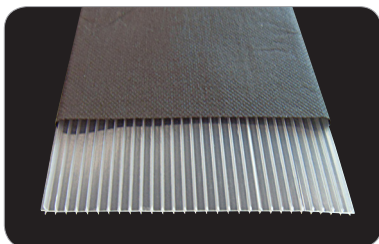


PCD32/PCD50

Won new technology as vertical drains by Korean government for the first time and ever.

PCD is a porous pipe with asymmetrically punched spiral or round creases. PCD has two different size of outer diameter, 32ϕ and 50ϕ . This can be available with both the vertical drain and horizontal drain.

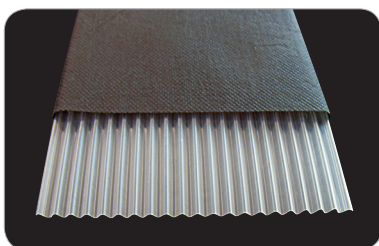
- Ribbed PBD



VD75/VD75R/VD80/VD80R/VD90

VD75, VD75R, VD80, VD80R and VD90 have a herringbone-shaped core that is highly flexible and is therefore well suited to areas where large relative settlement occurs.

- Corrugated PBD



VD55/VD55R(C)/VD60/VD60R

VD55, VD55R(C), VD60 and VD60R have a crenellated core that is extremely resistant to high soil pressures.



Biodegradable PBD

- S-PBD



S-CPBD/S-VD80

Environmentally friendly green plastic board drain S-PBD is allows biodegradation by microorganisms residing in earth after the consolidation period has ended. It has added effects of ground fertilization by work material used as stiffener and removal of pollutants within earth.

Horizontal drain

- CHD



CHD200/CHD300

CHD is a fully filterd, prefabricated subsoil drainage system widely used around world. CHD is placed under the surcharge to receive the flow from the vertical drains and conduct it laterally to discharge points at the edge of the surcharge.

Method of improvement of soft ground

- Vacuum consolidation settlement



Soft ground rapid draining equipment and construction method through vacuum pumping

Vacuum consolidation settlement method applies suction through the horizontal pipe directly connected to vertically placed C-PBD or PCD in order to accelerate consolidated settlement of soft ground. This method early suppression of the settling of the remains and compresses the air by giving the loading effect around the 10m diameter even without progressive surcharge and preloading

Environment-friendly construction method

- Construction Method of reducing Environmental Pollution



Construction method of reducing environmental pollution

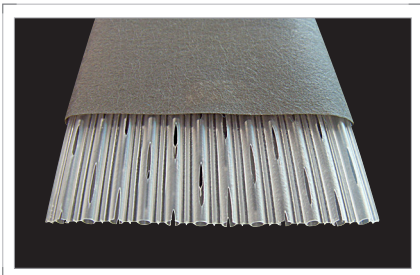
It is an eco-friendly construction method of improving weak foundation by adding the function of eliminating pollution sources, for which the environmental pollution reduction materials are employed to absorb and solidify the pollutants when the pollution sources are leached by the deprecipitation water.



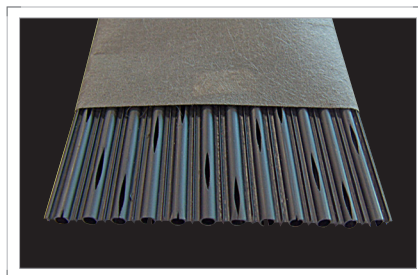
C-PBD/Cylindrical PBD

Introduction

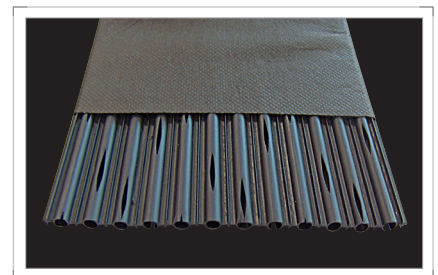
C-PBD, the thing devised to solve such a conventional problem as decreasing drainage ability with depth, has the eternal pipe for a water flow of drain boards core material which minimizes the drawback. To prevent the flex or severance of drain board material in the case of consolidation settlement by surcharge, the projection part of a core consists of a circular pipe with a bore hole for inflow of pore water, which prevents filters from reducing a space for a water flow of a core. This is related to the drain board for promoting dehydration of water on the soft soil, which prevents a lowering of drain efficiency by maintaining the inner space for a water flow.



• C-PBD

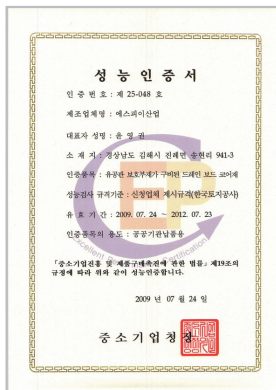


• C-PBDR

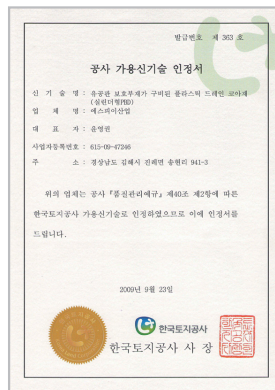


• C-PBDRW

Certification



Joint development with Korea Land and Housing Corporation



New technology product of Korea Land and Housing Corporation



Performance certified by Small and Medium Business Administration

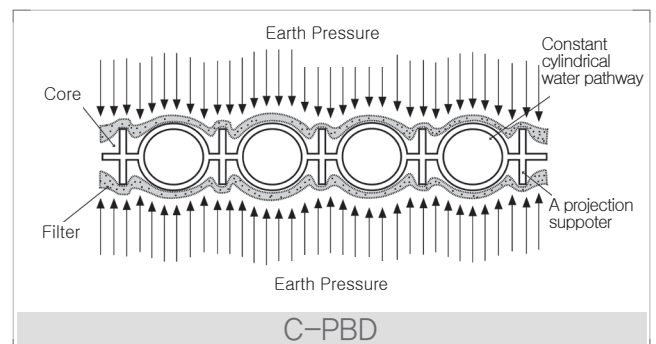
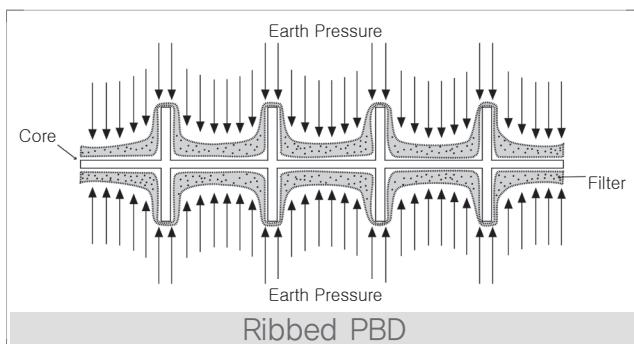


Certified of Designation of Excellent Product

Sustain discharge capacity

Conventional drain board is exposed under extreme load, pleating or cutting occurs on the ground due to by the earth pressure caused by consolidation settlement. Also the covering non-woven of drain board can be pushed inwards by the under confine pressure or lateral force reducing the cross sectional area of drain, hence reducing, or even losing, the drain capability.

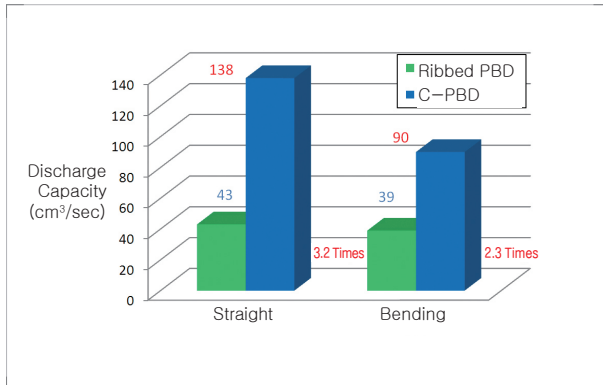
To promote moisture and dehydration of a soft ground like a reclaimed land, C-PBD has the shape of pipe core forms as the structure not depressed and bended even earth pressure. The space for passing water of a cylindrical perforated pipe never be choked for all regressing phenomenon of non-woven fabric caused by earth pressure so as to have inner cylindrical draining function and increase of draining function and double draining effect by outer core and draining efficiently. C-PBD makes the offer of a core plate of a high performance plastic drain board minimizing smear zone, the technical gist.





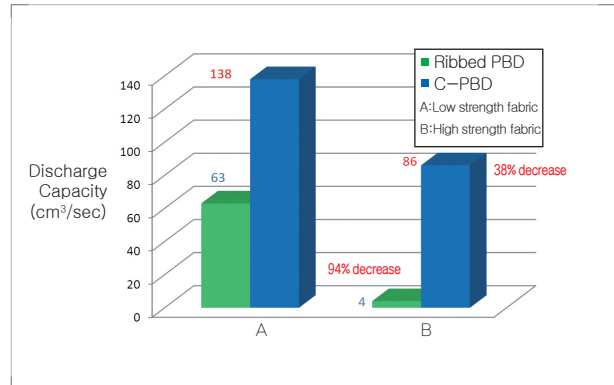
Discharge capacity comparison with ribbed PBD

2.3-3.2 times greater discharge performance



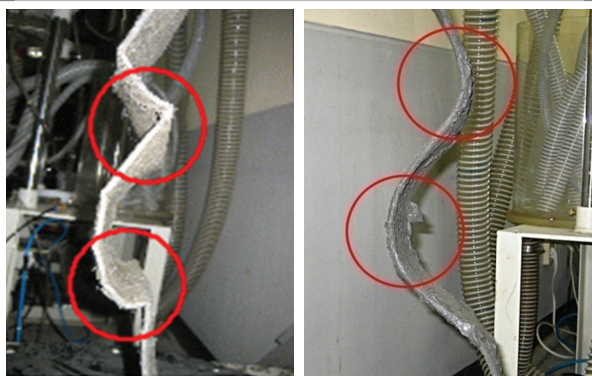
- Straight : 3.2 times more than ribbed PBD
- Curved : 2.3 times greater than ribbed PBD

High performance even with weak filter fabric

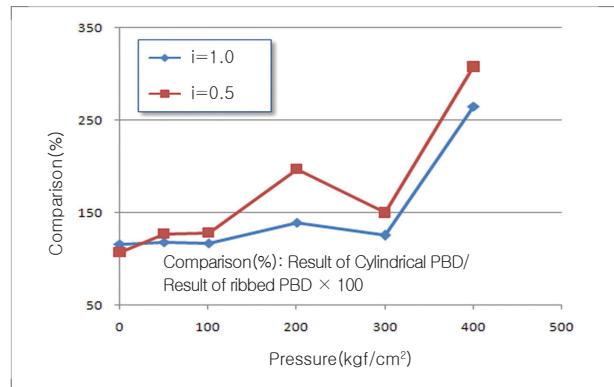


- C-PBD shows high discharge performance even with filter fabric having high ductility
- Ribbed PBD shows 94% decrease at initial discharge capacity with high ductile filter

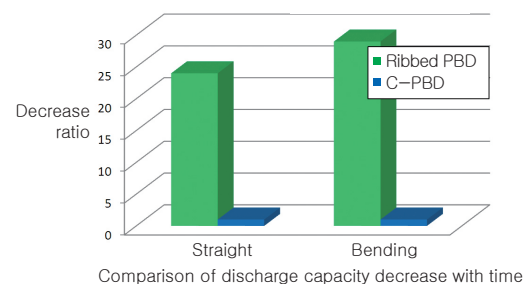
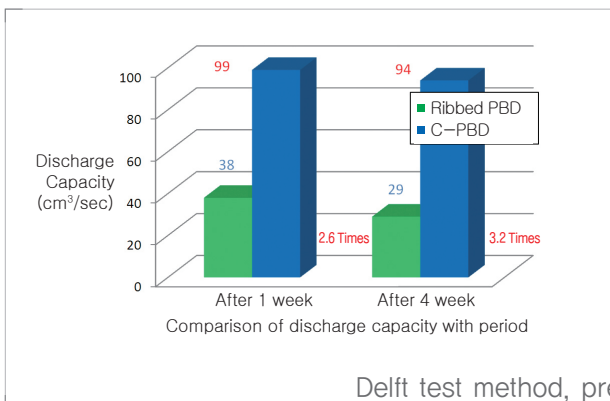
Less buckling and deformation



Better performance with deeper installation



Sustain initial discharge capacity with time



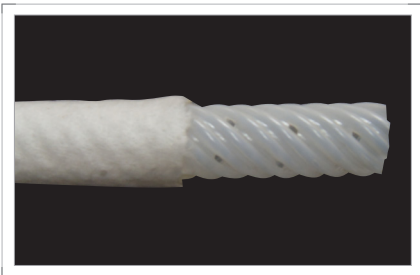
Delft test method, pressure 500kPa, 4 weeks



PCD/Plastic cylindrical drain

Introduction

PCD The conventional board drain is easily pleated or cut due to the earth pressure caused by consolidation settlement. However PCD with asymmetric spiral cylindrical structure keeps from the pleating and cutting of drain by earth pressure. PCD has long term capacity of drain with superior absorption and constant apparent opening size of filter material during consolidation settlement.



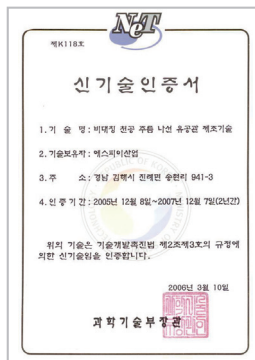
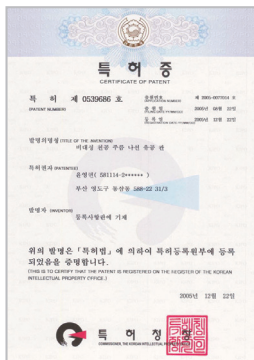
• PCD32



• PCD50



Certification



The first in Korea certified as new technology on vertical drains

Can be used both as vertical and horizontal drain

Type	Standard(mm)		Use
	External diameter	Internal diameter	
PCD32	32±2	26±2	Vertical drain
PCD50	50±2	45±2	Horizontal and vertical drain

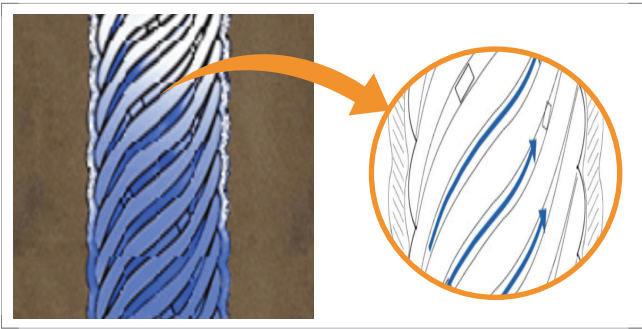
Photos





Benefit |

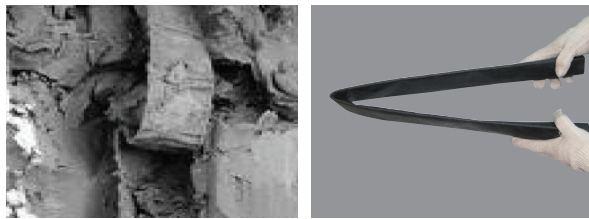
Superior drainage efficiency



- PCD shows high water inflow and discharge efficiency to the top due to the spiral creases on the exterior surface.
- Because there is no core clogging due to soil particles, it will show excellent drainage for long periods of time.
- External asymmetrical creases allow discharge of water to the top allowing superior drainage efficiency.

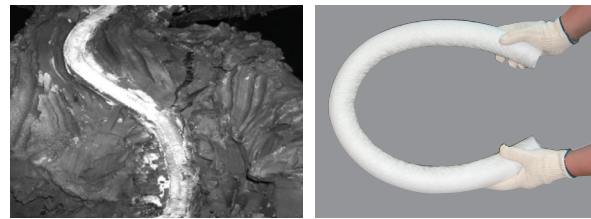
Superb securement of drain cross section during a huge transformation

General PBD



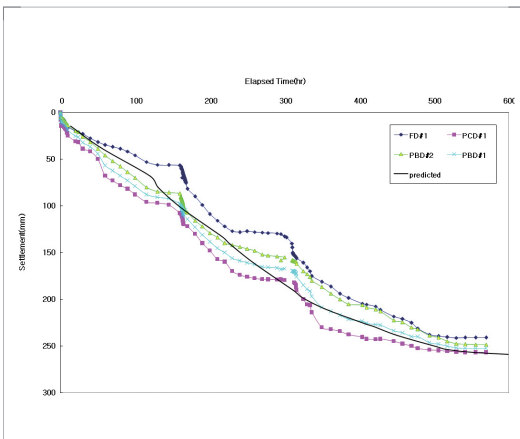
Discontinuity of Drainage

PCD

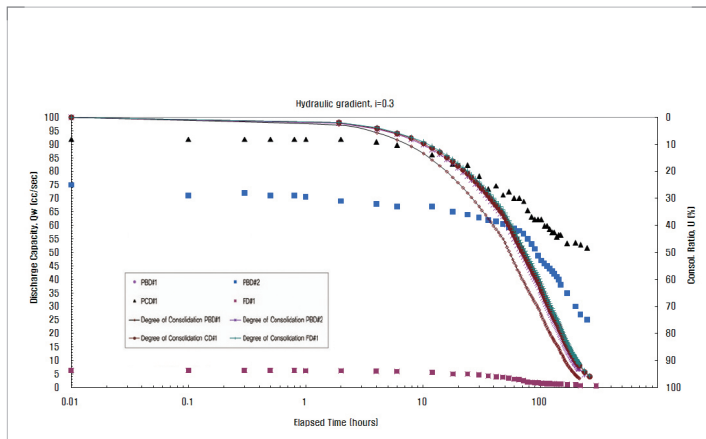


Continuity of Drainage

Superb improvement effect due to excellent comparative drainage performance



Comparison of settlement with time



Drainage performance with time, comparison of consolidation



PBD/Plastic board drain

SPE INDUSTRY

Introduction

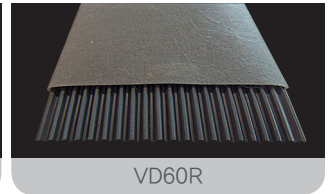
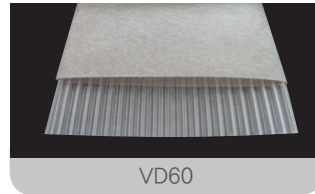
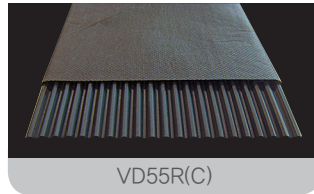


VD55, VD55R(C), VD60 and VD60R have a crenelated core that is extremely resistant to high soil pressures.

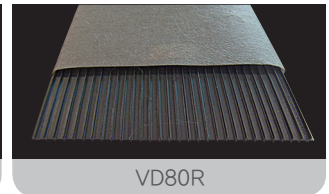
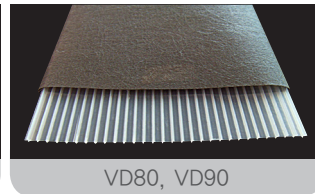
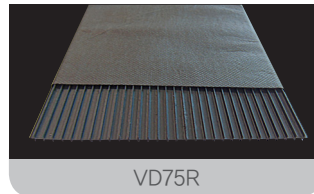
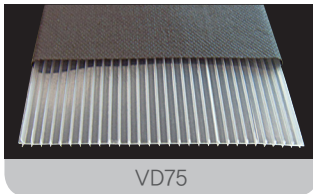
VD75, VD75R, VD80, VD80R and VD90 have a herringbone-shaped core that is highly flexible and is therefore well suited to areas where large relative settlement occurs.

Shape and type

Corrugated type



Ribbed type



Characteristics

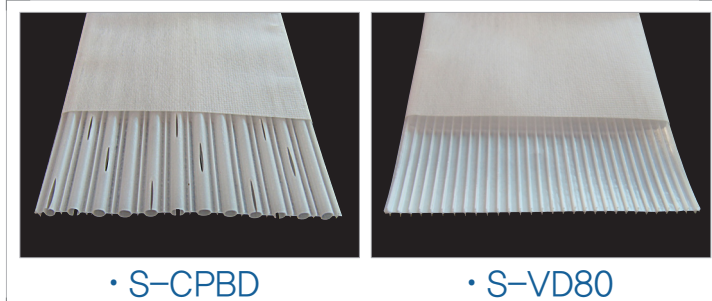
- Installation is inexpensive.
- Has plenty of installation experiences.
- Installation depth may be restricted.

Photos





Introduction



S-PBD(biodegradable PBD) is an environmentally friendly green plastic board drain which allows biodegradation by microorganisms residing in earth after the consolidation period has ended. It has added effects of ground fertilization by work material used as stiffener and removal of pollutants within earth.

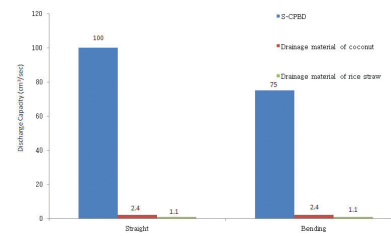
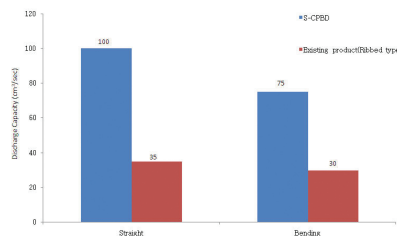
Characteristics

- Anti-contamination of environment by thorough bio-degradation

- Reduction of various contamination materials inside soil

→ Offers additional purification function of contaminants in pore water
(Environment contamination repressive materials are added to the filter)

- Maintaining excellent drainage performance



· Before installation

· After 5years

· After 6years

· After 8years

· After 10years

· After 12years

Benefit

- Show the same level of performances of existing PBD's.

- Allows users to use existing PBD slab casting equipments.

- Since content of bio-degradation material can be easily controlled, it is possible to control bio-degradation speed.

- Offers additional purification function of contaminants in pore water.



CHD/cylindrical Horizontal Drain

Introduction

CHD(Cylindrical Horizontal Drain) is a fully filtered, prefabricated subsoil drainage system widely used around world. It consists of a plastic inner ribbed double core overwrapped with a geo-textiles filter fabric. CHD is placed under the surcharge to receive the flow from the vertical drains and conduct it laterally to discharge points at the edge of the surcharge. In most cases the installation of CHD is less expensive than a granular or sand drainage blanket.



Benefit

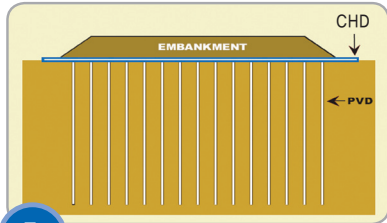
- Save cost not less than 50% instead of sand or crushed stone blanket.
- No cut off drainage pass even with high settlement.
- Easy to install and save time to work.
- Easy to control quality and to deliver than sand or crushed stone.

Comparison of horizontal drainage method

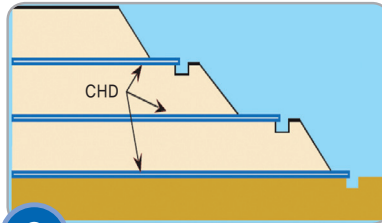
With natural drainage materials	Material	CHD	Aggregate	Sand	Crushed stone																																																																							
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	VE/LCC	<table border="1"> <tr><td>supply</td><td>F</td><td>94.2</td></tr> <tr><td>Drainage efficiency</td><td>C</td><td>1.00</td></tr> <tr><td>Eco-friendly</td><td>V</td><td>94.2</td></tr> <tr><td>Experience</td><td></td><td></td></tr> <tr><td>safety</td><td></td><td></td></tr> <tr><td>Quality Assurance</td><td></td><td></td></tr> </table>	supply	F	94.2	Drainage efficiency	C	1.00	Eco-friendly	V	94.2	Experience			safety			Quality Assurance			<table border="1"> <tr><td>supply</td><td>F</td><td>84.9</td></tr> <tr><td>Drainage efficiency</td><td>C</td><td>1.50</td></tr> <tr><td>Eco-friendly</td><td>V</td><td>56.6</td></tr> <tr><td>Experience</td><td></td><td></td></tr> <tr><td>safety</td><td></td><td></td></tr> <tr><td>Quality Assurance</td><td></td><td></td></tr> </table>	supply	F	84.9	Drainage efficiency	C	1.50	Eco-friendly	V	56.6	Experience			safety			Quality Assurance			<table border="1"> <tr><td>supply</td><td>F</td><td>89.1</td></tr> <tr><td>Drainage efficiency</td><td>C</td><td>1.20</td></tr> <tr><td>Eco-friendly</td><td>V</td><td>74.3</td></tr> <tr><td>Experience</td><td></td><td></td></tr> <tr><td>safety</td><td></td><td></td></tr> <tr><td>Quality Assurance</td><td></td><td></td></tr> </table>	supply	F	89.1	Drainage efficiency	C	1.20	Eco-friendly	V	74.3	Experience			safety			Quality Assurance																				
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Cost comparison	Division	Sand mat	Crushed stone mat	Fiber mat	CHD																																																																							
	Profile																																																																											
	Relative price	2.14	1.63	2.26	1.0																																																																							



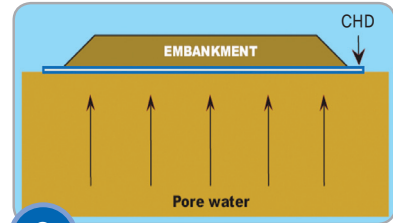
Application |



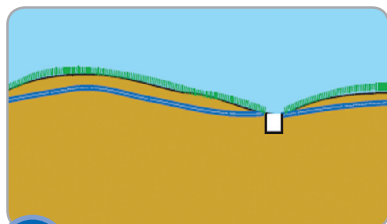
1 Substitution for Sand Mat



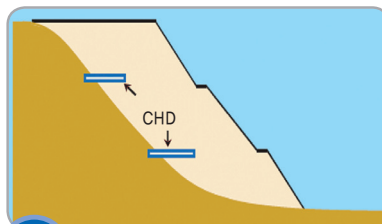
2 Pore water drainage of banking



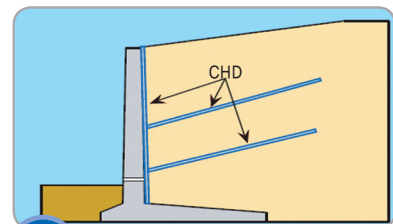
3 Spring pore water drainage from existing ground.



4 Rain water drainage from ground surface.



5 Use as Horizontal Drain on Slopes.



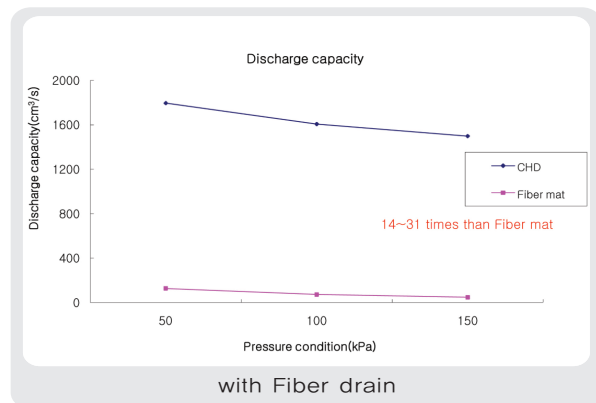
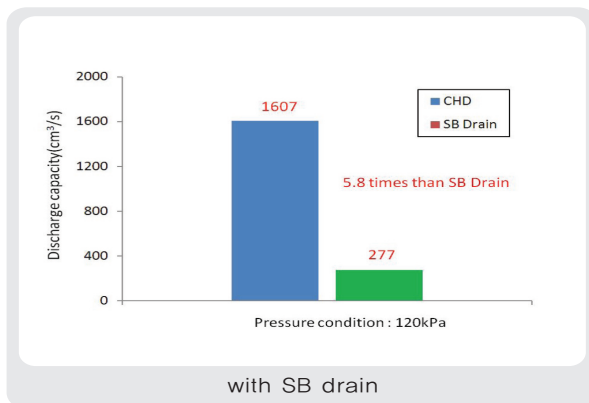
6 Drainage of Retaining Walls

Discharge capacity testing results |

Gradient	Pressure	Tested value	
		Permeability $k(\text{cm}/\text{sec})$	Discharge capacity $q(\text{cm}^3/\text{sec})$
0.5	50kPa	256	1,795
	120kPa	229	1,607
	150kPa	214	1,499

(ASTM D 4716, CHD200)

Discharge capacity comparison |



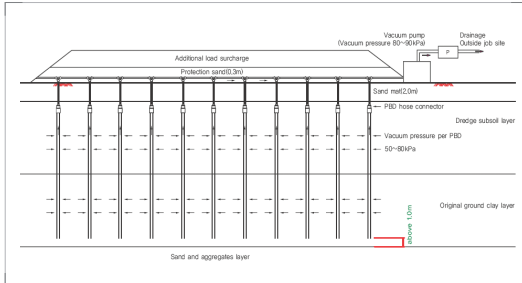
Photos





Vacuum consolidation settlement

Introduction



Vacuum consolidation settlement method applies suction through the horizontal pipe directly connected to vertically placed C-PBD or PCD in order to accelerate consolidated settlement of soft ground. This method early suppression of the settling of the remains and compresses the air by giving the loading effect around the 10m diameter even without progressive surcharge and preloading.

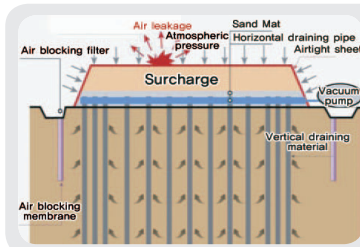
Characteristics

- Ground improvement is possible in a short period of time.
- Advantageous in reducing installation time or lowering construction costs.
- Danger of transformation in surrounding ground can be diminished.
- There is no need for horizontal drain layer.
- Environmentally friendly construction method allows environmental safety.



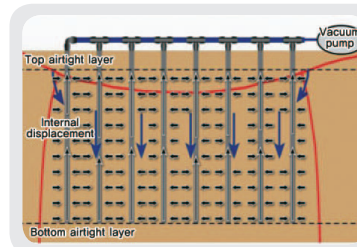
Comparison with the Existing Vacuum Consolidation Method

Existing vacuum consolidation



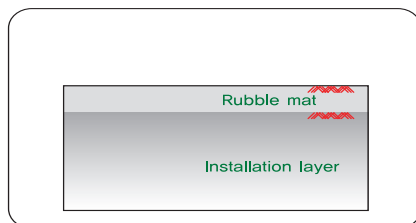
- Defective sealing when vacuum membrane is damaged
- Rapid decrease of vacuum efficiency when the different layers are distributed

Individual vacuum consolidation

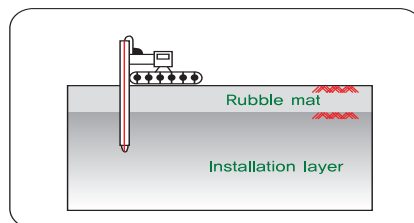


- Airtight sheet is not required, and horizontal displacement control is available

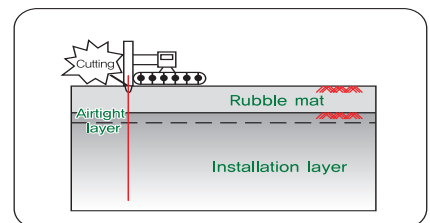
Method of installation



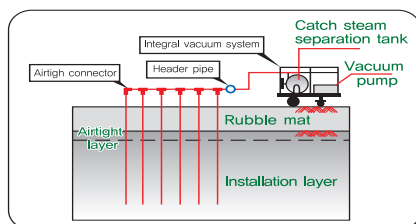
1. Stan by installation



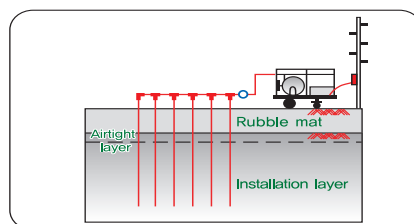
2. Vertical drain installation



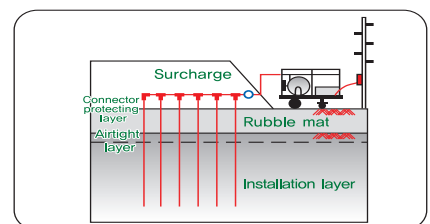
3. Cutting



4. Connecting with vacuum pump



5. install electricity



6. Protecting layer and surcharge (if necessary)



In-house Quality Test |

- At shop: Width, Weight, Thickness, Tensile Strength, discharge capacity
- By External Testing Agency : drain performance, coefficient of permeability, tear strength, disruptive strength, effective size of the opening (carried out once a month)
(Request to FITI Testing & Research Institute, a testing agency internationally accredited, and Korea Apparel Testing and Research Institute)



Measuring the width of the product



Measuring the weight of the product



Measuring the thickness of the product



Measuring the tensile strength of the product

Quality Testing Apparatus |



Ball Bursting



Permeability



Apparent pore size



Discharge capacity

Quality Control by Recognize Officially Organization |



Appointing the quality assurance agency (Q mark)



Certifying the reliability



ISO 9001/2000

| SPE Industry (domestic) |



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