



Bio Verti-Drain[®]

Biodegradable Prefabricated Vertical Drain
For Soft Ground Improvement



DAEHAN *i.m.* Co.,Ltd.

Since 1987

ESG & Bio Verti-Drain®

Global trend of ESG

Pursuing sustainable development through eco-friendly management with social responsibility and transparent management, ESG management is emerging as a global issue in every industry. The interest and demand for eco-friendly products and engineering to cope with such global trends and needs have been rapidly increasing, which is also true in Geosynthetics.



DAEHAN i.m. has been developing and launching new eco-friendly products and engineering of the next generation, which meet such philosophies and values of the times as the global leader in the manufacturing of geosynthetic products. **Bio Verti-Drain®**, a biodegradable vertical drain for the improvement of soft ground, as one of the representative eco-products of DAEHAN i.m., is an eco-friendly product that leaves no pollutants in the ground as it is completely decomposes and returns to natural substances after completing consolidation of the ground.

Bio Verti-Drain®, the innovative geosynthetic product coping with the recent global trend to remove plastics, consists of a PBS core in an aliphatic polyester series, having superior biodegradability, and a PLA non-woven fabric filter based on cornstarch. **Bio Verti-Drain®** biodegrades in the ground after completing its functions to consolidate the weak soil due to the superior material and drainage properties almost the same as high-stiffness plastic drains. Specifically, unlike general drains that remain for a long time in the ground, it can greatly contribute to environmental protection as it returns to water and carbon dioxide without leaving residuals behind after completing its functions.



Bio Verti-Drain®
Sustainable solution
building a better tomorrow!

Bio Verti-Drain®

Eco-Label



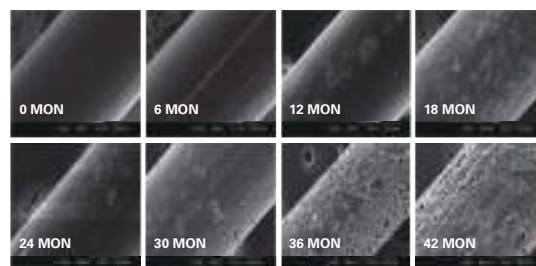
Bio Verti-Drain® is recognized for its superior performance and biodegradable features by an accredited testing institute as an eco-friendly product that effectively reduces environmental pollution and carbon emission to the earth. Moreover, **Bio Verti-Drain®** acquired the EL724 Eco Label through strict examination by the Korean government for the first

time in Korea. **Bio Verti-Drain®** is the optimum product with high added value that can cope with European markets' carbon neutrality policies.

Characteristics



Bio Verti-Drain®



Degradation by aging in ocean reclamation
(Surface SEM Analysis)

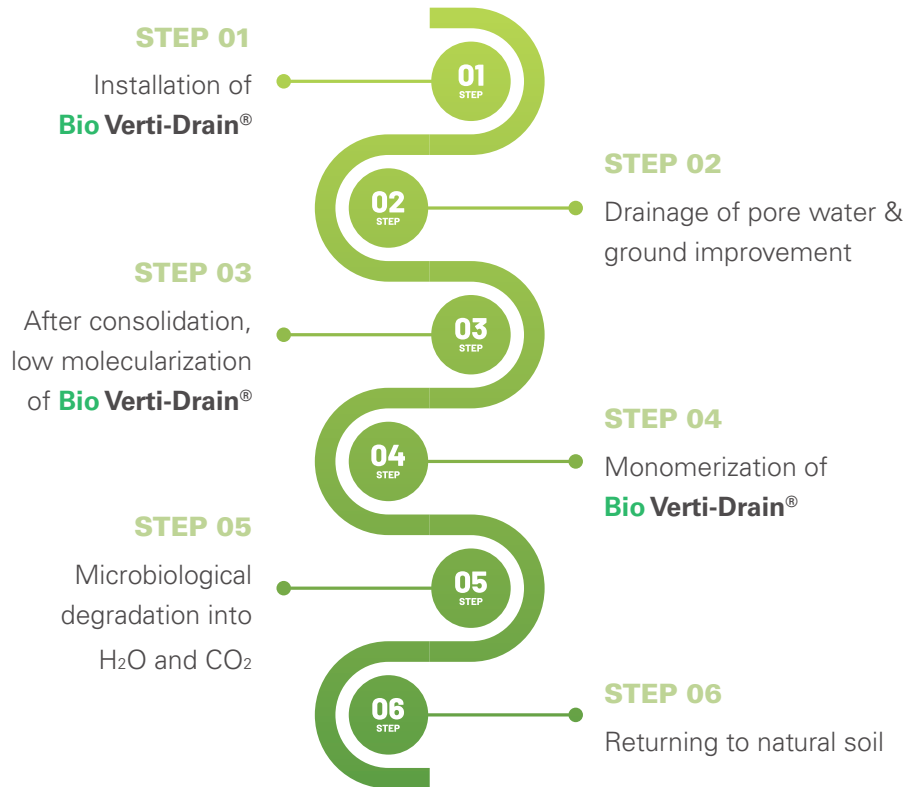
Bio Verti-Drain® maintains its performance for about 3 years and naturally decomposes without leaving behind any residual plastics in soil after consolidation.

Bio Verti-Drain® is made of biodegradable raw materials for both filter and core. If any biopolymers mixed with general plastic materials (PP, PE, etc.) are used for biodegradable drains, serious soil contamination problems may occur because of microplastics remained in the soil after ground improvement.



Bio Verti-Drain®

Biodegradation Process



Bio Verti-Drain® is composed of PBS(Poly Butylene Succinate) affiliated with aliphatic polyester and eco-friendly biodegradable PLA(Poly Lactic Acid) based on cornstarch.

Bio Verti-Drain® is a biodegradable product which degrades into H₂O and CO₂ in natural conditions after completing soil consolidation and it is different with bio-disintegrable products which leave behind soil pollutants after partial degradation.

	Bio-disintegrable Plastic	Bio Verti-Drain® Biodegradable Plastic
Definition	Product made with mixture of mainly non-degradable material and some biodegradable material	Product made with only biodegradable material
Degradation Characteristic	Only some biodegradable materials are degraded and leave behind rest of soil pollutants	Totally degraded after soil improvement process

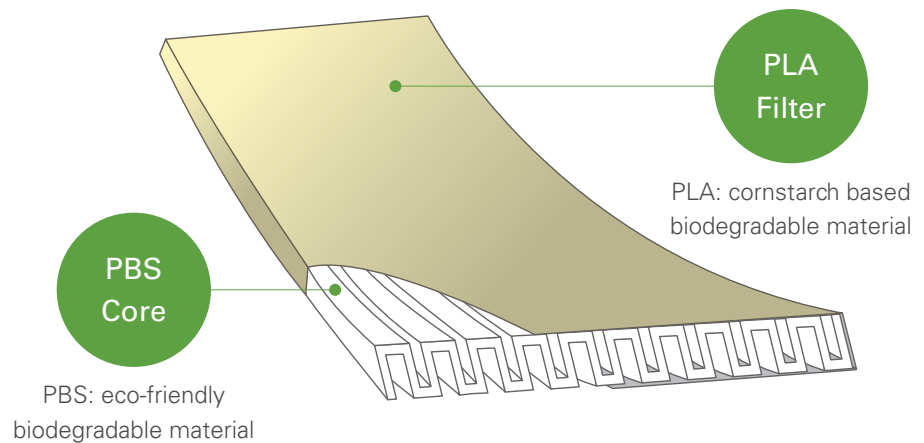
Comparison of Bio-disintegrable Plastic and Biodegradable Plastic

Bio Verti-Drain[®]

Advantages

- Achieved Eco-Label Certificate from Ministry of Environment, Korea
- 100% biodegradable product which leaves no plastic residues after soil consolidation
- Eco-friendly product which decomposes into H₂O and CO₂
- Outstanding performance & discharge capacity equivalent to general plastic-based PVDs
- Obtained Product Reliability Assessment by the 3rd party authorized testing institute

Composition



Production and Quality Control

Bio Verti-Drain[®] is manufactured through fully automated production system certified by ISO and CE, and supplied after strict quality control and testing through an in-house laboratory with international-level testing capabilities.



Applications and Projects of Bio Verti-Drain®

Applications



Eco-friendly soil improvement works



Land development for industrial zone, residential area, various plants, etc.



Seaport, airport, railway, revetment construction site development



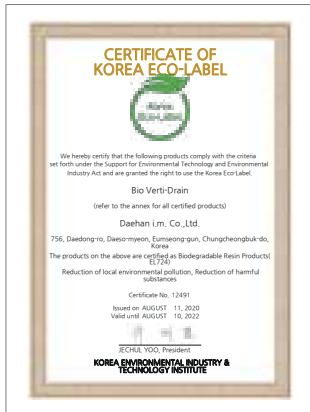
Soft soil improvement of dredged landfill and reclamation area

Major Projects

- Saemangeum North-South Road, Korea | 2019-2020
- Busan Eco-Delta City, Korea | 2020
- Sinansan Line Private Investment Section 6, Korea | 2021
- Railway Project, Switzerland | 2023



Certificates



Korea Eco-Label (EL724)



Korea Eco-Label (EL721)



Patent (Bio Verti-Drain®)



Reliability Assessment Report (Bio Verti-Drain®)



ISO 9001



CE



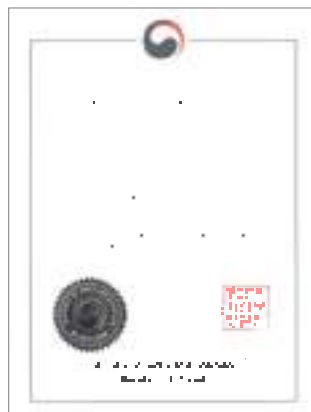
Quality Assurance



Technical Research Institute



Venture Enterprise



Inno-Biz



Chungbuk Star Company



Outstanding Export Performance



The leader who makes the earth safe and stable

DAEHAN i.m. is leading the future of geosynthetics.



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