KOUVIDIS®

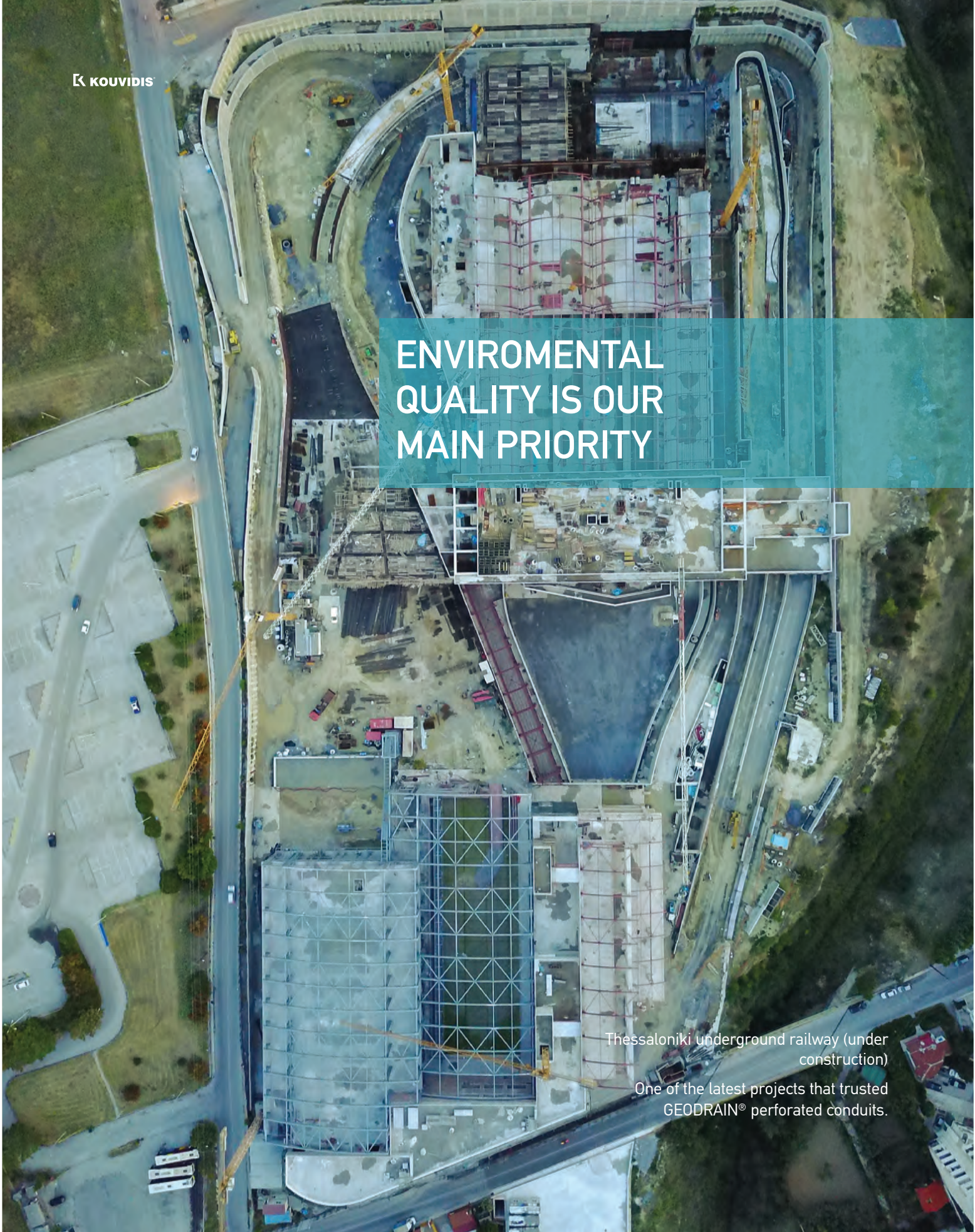
GEODRAIN®

Double structured wall
perforated HDPE conduits

FOR FOUNDATION DRAINAGE AND GROUND DRAINAGE

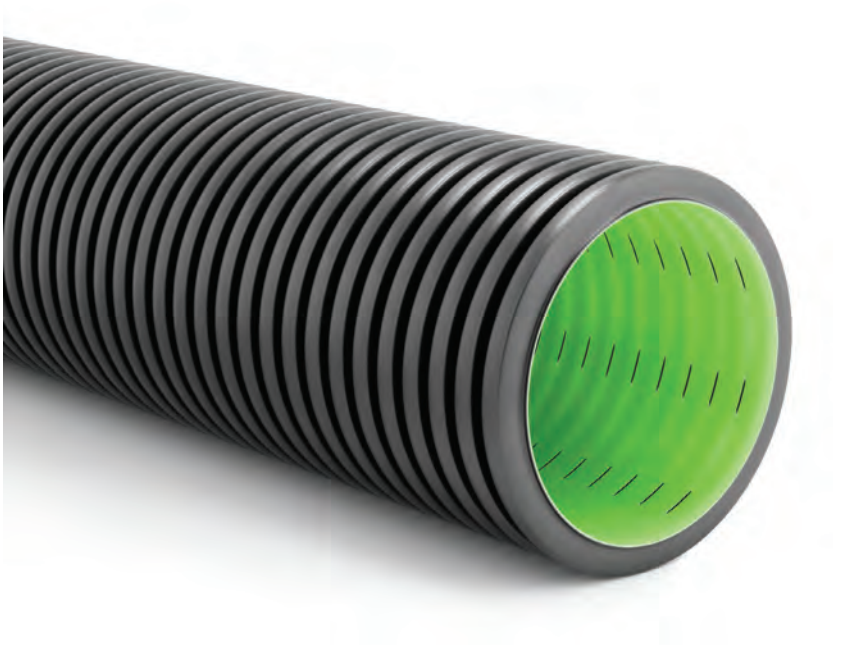
KOUVIDIS

ENVIROMENTAL QUALITY IS OUR MAIN PRIORITY



Thessaloniki underground railway (under construction)

One of the latest projects that trusted GEODRAIN® perforated conduits.



we design innovative plastic piping systems that contribute to a better drainage management

Mold, color peeling and coating disintegration indicate the presence of moisture within the structural elements and the lack of proper drainage around the foundations

Surplus water on arable land makes soil plowing ineffective while at the same time it accelerates the degradation of its structure with negative effects on plants.

perforated double structured wall conduits GEODRAIN® SN4 GEODRAIN® SN8

at a glance ...

Moisture, cracks and corrosion of underground sections in construction, pavement degradation and soil overflowing are some of the usual phenomena due to poor management of underground or seeped surface water.

Drainage of the subsoil is the safe collection and removal of water in the soil as well as the seeped surface water.

One of the biggest problems an engineer faces is controlling and removing surplus water that may be due to natural flow (rain or snow), fluctuation in the groundwater table, possible proximity of natural recipients, etc. with the help of a proper drainage project.

The purpose of drainage of the subsoil is to maintain moisture (waters) at normal levels by means of a suitable drainage pipe system. Simply put, drainage pipes will be a "tunnel" through which water can flow by taking advantage of its gravity and move away safely.

drainage
why is it necessary?

The danger

Water concentration on the surface of the soil may be due to various factors such as heavy rainfall, poor irrigation, moisture resulting from the rise of the groundwater table and possible leakage of the drainage network.

Water penetration into the mass of a structural element (foundation) can gradually cause chemical alterations which can lead to mechanical damage. Soils may lose their strength and collapse causing damage to buildings (subsidence).

Respectively, in arable land, excess water makes soil plowing ineffective while at the same time accelerate the degradation of its structure with negative effects on plants. In extreme cases it can lead to salinisation of the soil making it unsuitable for agricultural use.

The solution

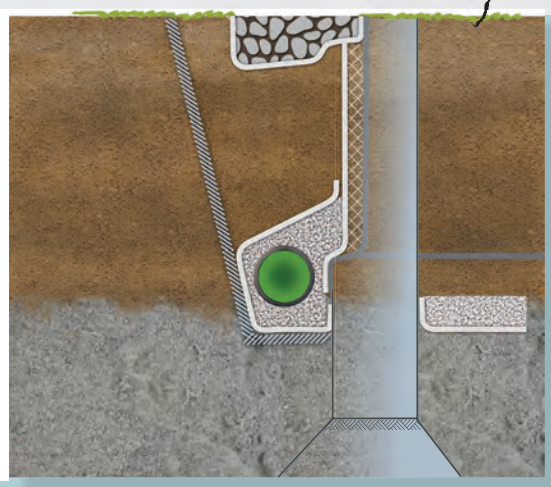
The design of a subsoil drainage system with perforated pipes that will collect and remove excess water either to natural recipients or to sewage or rainwater drainage systems.

This is executed by constructing a diversion of water (usually a trench) and a water collection and drainage network. The diversion is executed by stopping the continuity of soil and interfering with a vertical or horizontal barrier containing aggregates (gravel) that help to improve water runoff, geotextiles, which are additional filters to separate the drainage, layers from the environment, soil material and perforated plastic pipes to ensure proper water runoff at the desired point.

The benefits

Maintaining the level of humidity at normal levels has multiple benefits for structural elements as well as for crops, as it keeps the soil 'healthy'. That is:

- allows its proper venting,
- does not erode it,
- does not affect its degree of heat,
- does not prevent the proper development of root systems by proper absorption of its nutrients



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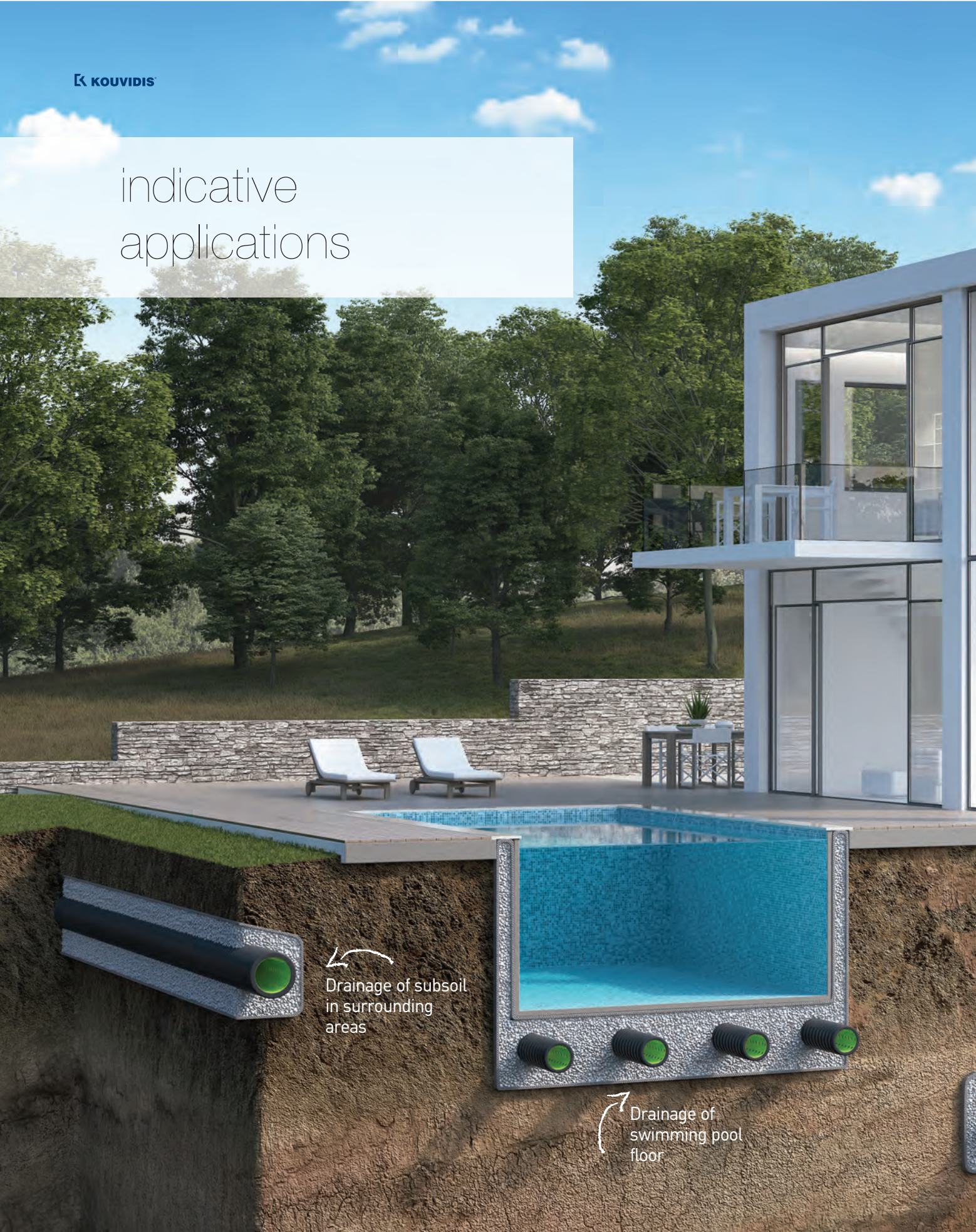
indicative applications




KOUVIDIS
Drainage of retaining walls
Perimeter drainage of foundations

what should I know...

1 Water collection/discharge point

Selection of the point where collection and removal of drainage water will take place. This point should be at a level lower than the height of the drainage pipe network. This point may be a natural recipient or a sewage or rainwater drainage system. Alternatively, it may be a collecting well where the water, with the help of a pump, can be removed in suitable places.

2 Trench creation

The trench should have the corresponding width according to the diameter of the drainage pipes to be placed inside it and the corresponding depth so that the drainage pipes are near the base of the foundations of the structure and under the water collection systems that are on the soil surface area (if any).

3 Geotextile installation

Geotextile is a polypropylene or polyester fabric, woven or non-woven, and surrounds, in the form of a "shell", all the trench materials. Along with the other aggregates it acts as a "filter" allowing the water to pass unobstructed into the drainage pipe blocking the entrance of soil material inside it and protecting it from clogging its slots.

4 Layer of gravel formation

The gravel forms the underlay on which the drainage pipes are to be based. In fact, they are another kind of "filter" as they are guiding the water to the drainage pipes while preventing the fine grains of the soil area from entering the filter. The grading of the material and its permeability is the subject of a technical study.

5 Installation of drainage pipes

Drainage pipes are perforated with perimeter holes to collect the water and safely remove it to the collection/discharge point (see 1). They are plastic, with double structured wall, rigid or flexible, corrugated externally, so that they can be installed more easily following the soil morphology, and smooth inside to facilitate the flow of water. They are placed with a slope of at least 0.5% from the highest to the lowest point.

6 Installation of chambers

At the point of direction change, a cylindrical chamber of at least DN300 (nominal diameter) may be installed, for the purposes of supervision or cleaning, while the network may be terminated in a chamber of nominal diameter DN1000 (see 1).

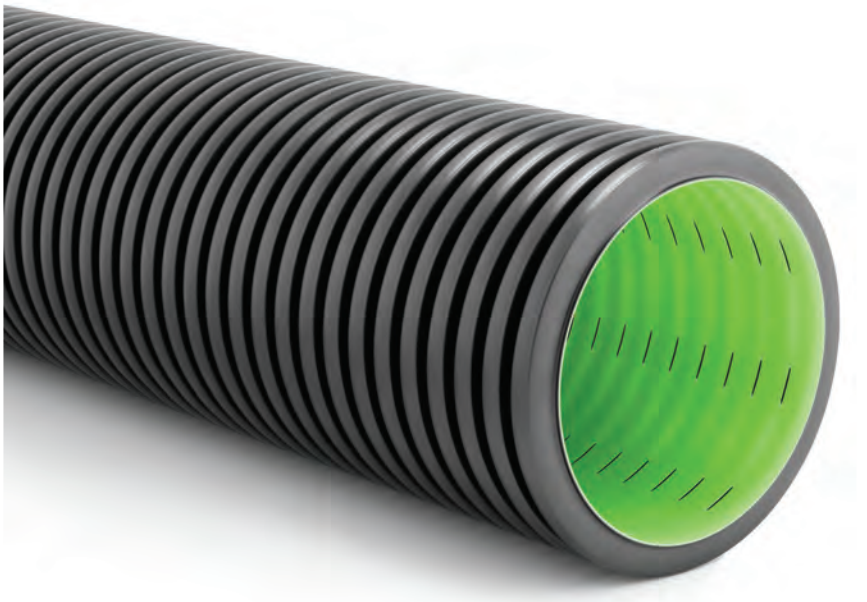
7 Backfilling

Initially, drainage pipes are coated with a layer of gravel, the grading of which is determined by the study. The geotextile is then placed over the gravel, if necessary (depending on the backfilling material) and finally the trench is backfilled with the inert materials removed during excavation operations.

In order to properly design a drainage system, it is necessary to define many different parameters such as the characteristics of the catchment basin and in particular its topography, the type of soil and especially its permeability, the chemical composition of the groundwater, the point of discharge of the drainage water and the level of the groundwater table.

In any case, an engineering study will be needed so that water drainage is effective without affecting soil composition (drought) and network operation (overload).

NOTE: All of the above information is useful and good practice on correct drainage of water. It is not, under any circumstances a study or installation guide. For further information contact KOUVIDIS Technical Support Department.



GEODRAIN® drainage pipes characteristics

GEODRAIN drainage pipes are made of high density polyethylene (HDPE), they have two walls, a corrugated exterior and a smooth interior, structured together and symmetrically perforated at specific degrees, 360⁰ or 220⁰. Produced in coils and straight bars, they are easily loaded and transported due to their reduced weight, and are quickly cut using simple professional cutting tools.

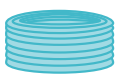
They are suitable for subsoil drainage in all types of residential buildings, stadiums and surrounding areas, industrial and commercial applications, photovoltaic parks, agricultural applications, landfills, uncontrolled landfills and road networks.

Packaging
6m bars

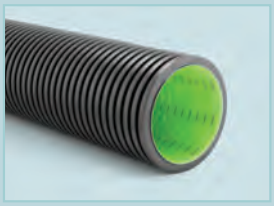
Color

External layer	RAL 9004
Internal layer	RAL 6038

Packaging
coils 50m/25m



SN 8	SN 4	TYPE R2		2 years	
Ring stiffness EN ISO 9969	Ring Stiffness EN ISO 9969	Product type DIN 4262-1	Chemical resistance ISO 10358	Ageing resistance UV stabilized	Perforation area DIN 4262-1



	GEODRAIN® Pliable conduit	GEODRAIN® Rigid conduit
Pipe category	Type R2 (DIN 4262-1)	Type R2 (DIN 4262-1)
Ring Stiffness (acc. to ISO 9969 standard)	SN 4 KN/m^2 SN 8 KN/m^2 (upon request)	SN 4 KN/m^2 SN 8 KN/m^2
Degrees of perforation (acc. to DIN 4262-1 standard)	360^0 - TP (totally perforated) Perimetric and symmetric perforation	220^0 ±10 (locally perforated) Along pipe symmetric perforation
Perforation area (acc. to DIN 4262-1 standard)	>50 cm^2/m	
First raw material	High density polyethylene (HDPE)	
Corrosion resistance	YES	
Ageing resistance	Resistant to UV radiation (2 years)	
Green product	Halogen and heavy metals free	
Color	External layer: Black RAL 9004 Internal layer: Green RAL 6038	
Harmonized Legislation	RoHS Directive, REACH Regulation	
Outer diameters (OD)	Ø63, Ø75, Ø90, Ø110, Ø125, Ø160, Ø200	Ø110, Ø125, Ø160, Ø200, Ø250, Ø315, Ø400
Pipes length	Coils 50 m: OD63, OD75, OD90, OD110, OD125 25 m: OD160, OD200	Bars 6 m
Packaging	Each coil includes a connection coupler and an end cap	Each bar includes a sealing ring and a socket (integrated or separate)

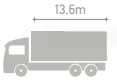
NOTE: Diameters Ø63, Ø75 will be available during the second semester of 2018

pipes & fittings characteristics

DN/OD

LP
Διάτρηση
DIN 4262-1

220⁰



GEODRAIN®				SN 4	SN 8
DN/OD mm	ID mm	Packaging bars (m)	Truck (m)	Part No	Part No
110	91	6	4800	1613110	1603110
125	134	6	3072	1613125	1603125
160	169	6	2520	1613160	1603160
200	178	6	1800	1613200	1603200
250	223	6	960	6290250	6210250
315	278	5,98	574,08	6290315	6210315
400	347	5,94	427,68	6290400	6210400

NOTE 1: Diameters OD90 & OD125 have a minimum order quantity policy.
NOTE 2: Diameters OD90, OD110, OD125, OD160 & OD200 offered with assembled separated couplers and an elastomeric sealing ring placed at the straight free end
NOTE 3: Diameters OD250, OD315 & OD400 are produced with a female (integrated molded female socket with a preinstalled elastomeric sealing ring) and a male end (smooth wall with a smaller outer diameter).

ATTENTION: Ensure that the engraved (or printed) marking is on upper side when laying the pipes on the trench.

PERFORATION TYPES

totally perforated
β=60⁰ I y=360⁰

locally perforated
β=60⁰ I y=220⁰

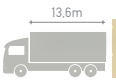
DN/OD

TP

Perforation
DIN 4262-1

360⁰

GEODRAIN®



DN/OD mm	ID mm	Bending radius	Packaging coil (m)	Truck (m)	SN 4 Part No	SN 8 Part No
90	74	0.36	50	7000	2633090	2613090
110	91	0.44	50	4500	2633110	2613110
125	105	0.50	50	3500	2633125	2613125
160	135	0.64	25	1900	2623160	2603160
200	170	0.80	25	1225	2623200	2603200

NOTE 1: GEODRAIN pipes come with a protection cap at the one edge and a connection coupler at the other.
NOTE 2: GEODRAIN SN 8 pipes have a minimum order quantity policy.
NOTE 3: The above-mentioned numbers (m/ truck) deal with coils that are not placed on palettes.

Connection couplers with hooks

DN/OD mm	Packaging pc/box	Part No
90	10	6101090
110	5	6101110
125	5	6101125
160	2	6101160
200	3	6101200

End caps

90	15	6100090
110	8	6100110
125	8	6100125
160	6	6100160
200	6	6100200

Elastomeric sealing ring

160		6104025
200		6104026

Connection couplers

Relevant DN pipe	Product Part No.
OD160	6103000
OD200	6103001
OD250	6103002
OD315	6103003
OD400	6103004

Repair couplers

Relevant DN pipe	Product Part No.
OD160	6114000
OD200	6114001
OD250	6114002
OD315	6114003
OD400	6114004

Elastomeric sealing ring

Relevant DN pipe	Product Part No.
OD160	6104025
OD200	6104036
OD250	6104037
OD315	6104038
OD400	6104039

NOTE: This specific elastomeric sealing ring is necessary for the following fittings: Connection Couplers, Bends, Branch 45° and Tee Branch 90° when those connected with the free, without any formation, end of the pipe.

Elastomeric sealing ring for female end

Relevant DN pipe	Product Part No.
OD200	6104030
OD250	6104031
OD315	6104032
OD400	6104033

NOTE: This specific elastomeric sealing ring is for the inner wall of the molded female end of the pipe.

ATTENTION: The pipes are produced and offered with the current elastomeric sealing ring (pre-installed).

Bends 45^0

DN/OD mm	Product Part No.
OD160	6105000
OD200	6105001
OD250	6105002
OD315	6105003
OD400	6105004

Bends 90^0

DN/OD mm	Product Part No.
OD160	6106000
OD200	6106001
OD250	6106002
OD315	6106003
OD400	6106004

Branch 45^0

DN/OD mm	Product Part No.
OD160	6107000
OD200	6107001
OD250	6107002
OD315	6107003
OD400	6107004

Tee Branch 90^0

DN mm	Product Part No.
OD160	6108000
OD200	6108001
OD250	6108002
OD315	6108003
OD400	6108004

Male jolly

DN/OD mm	Product Part No.
OD200	6118001
OD250	6118002
OD315	6118003
OD400	6118004

NOTE: Male jollies are connected with the molded female end of the pipe with the use of two elastomeric sealing rings (61040XX) that are placed at the first and the third groove of the other, without any formation, free end of the pipe.

Female jolly

DN mm	Product Part No.
OD200	6119001
OD250	6119002
OD315	6119003
OD400	6119004

NOTE: Female jollies are connected with the molded male end of the pipe with the use of two elastomeric sealing rings (61040XX) that are placed at the first and the third groove of the other, without any formation, free end of the pipe.

Male end caps

DN/OD mm	Product Part No.
OD160	6111000
OD200	6111001
OD250	6111002
OD315	6111003
OD400	6111004

NOTE: Male caps are placed at the female end of the pipe.

Female end caps

DN/OD mm	Product Part No.
OD160	6112000
OD200	6112001
OD250	6112002
OD315	6112003
OD400	6112004

NOTE: Female caps are placed at the male end of the pipe.

Lateral connector (saddle)

Main sewer DN/OD	DN/OD	Drill hole (mm)	Product Part No.
250/315/400	110	127	6109000
630/800/1000	110	127	6109001
300/400/500	160	177	6109002
250/315	160	170	6109011
400	160	170	6109012
630/800/1000	160	177	6109003
315	200	208	6109004
400/500	200	208	6109005
630/800/1000	200	208	6109006
400/500	250	263	6109007
630/800/1000	250	263	6109008
630/800/1000	315	320	6109009
1000/1200	400	412	6109010

NOTE: The Part No. 6109002 refers to main sewer with internal diameter (ID).

Drilling Crown

Drill hole	Product Part No.
127 mm	6000017
170 mm	6000023
177 mm	6000018
208 mm	6000019
263 mm	6000020
320 mm	6000021
412 mm	6000022

KOUVIDIS Lubricant for connection of pipes & fittings

Packaging	Part No.
5 kg	6001005

KOUVIDIS adhesive & sealant

Packaging	Part No.
6x310 ml	6001004

landfills

sports courts

motorways

agriculture

indicative application fields

GEODRAIN® Pliable conduits

Pliable double structured wall pipe, perforated at 360° (TP/totally perforated), for stormwater drainage in all types of residential buildings (perimeter drainage), solar farms, agricultural applications, gardening and generally applications requiring installation flexibility.

GEODRAIN® Rigid conduits

Rigid double structured wall pipe, perforated at 220°/240° (LP/locally perforated), for stormwater drainage in road networks (country roads), industrial and commercial applications, controlled and uncontrolled landfills, sports courts, landscaping areas and generally underground networking applications where the ground is subjected to high and permanent stress loads.

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installation guide

Installation of pipes in underground networks requires a series of works that need to be carried out as specified in the design so as to ensure the safety of the works and the installation itself.

Basic information on trenches

When digging a trench for conduit installation care must be taken in order to ensure a smooth, even underlying surface. It is best that trenching is performed as late as possible before the laying of the conduits and for backfilling to take place as soon as possible after their laying. Some basic accuracy checking criteria for the trench works are:

- Slope and level of the bottom of the trench in accordance with the differences in height provided for
- Dimensions of the excavated sections.
- Pipe diameters and mechanical strengths
- Evenness of the trench surfaces, bottom and walls
- Removal of surface and ground water.
- Selection, reuse and temporary storage of the excavated materials and removal of those which are unsuitable.

Reception and transportation to the installation point

The pipes and their fittings must be inspected upon delivery, to see that they bear the correct labels and markings and meet all the necessary specifications laid down in the design. Prior to installation they must be carefully checked for any signs of damage.

Storage

The conduits must be stored in such a way as to ensure that they remain incorruptible. They must not be placed next to open trenches and their storage area must be clean and free from any foreign bodies such as sharp stones that could cause damage. The use of specially customized forks or special polyester straps is indispensable

Laying

Place the pipes in such way ensuring that their surface, alongside their length, lies completely on the bottom of the trench. In the case of interruption of the installation process, or due to a temporary break in the works, or in view of connection at a later date, the ends of the pipes must be sealed with protective caps. The caps must not be removed before the connection process. The area of the pipe that will come into contact with the connection fitting (coupler) must be clean and show no signs of damage.

Connection

During the connection process (coupler, well, etc.) it must be ensured that no foreign bodies can get inside the pipes. In order to achieve this, particular care must be taken when cutting and assembling the conduit.

Guidelines for the correct use of KOUVIDIS Sealant and KOUVIDIS Lubricant, during the assembling of GEODRAIN pipes with the relevant coupler, can be found at www.kouvidis.com.

Inspection

During the installation, in addition to visual checks, the following checks must also be performed: checks for any deformation of the pipes, change in degree of compaction and the adequacy and effectiveness of the laying. The surface on which the conduits are laid must be thoroughly inspected and meet the requirements of the design regarding its degree of slope and evenness.

POINTS OF SPECIAL CARE

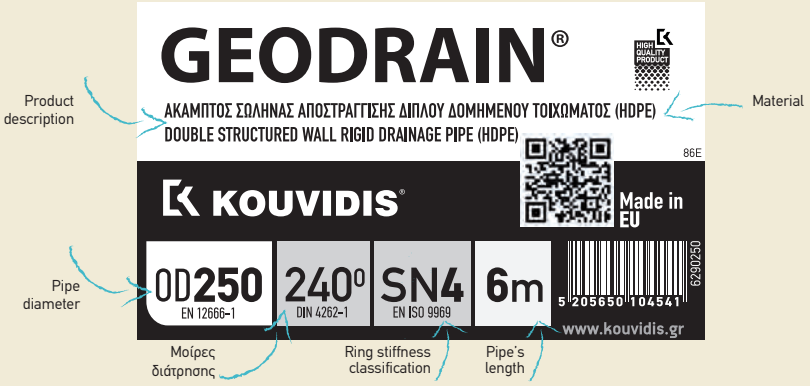
1. Drain pipe must always be placed on a layer of gravel, and the first backfilling layer covering the drainage pipe should also be made of gravel. The grading of the gravel and the height of the layers above and below the pipe are determined by the technical study.
2. The drainage system should be at a higher level than the level of the water collection/discharge well in order to avoid the risk of water reversal in case of overloading.
3. In any case, when designing a drainage system, a study shall be carried out on the topography and the type of soil, the chemical composition of the underground water, and the level of the groundwater table

CAUTION: The above information is an informative guide for safe trenching and pipe installation and should not in any way be confused with the specifications defined in the study. For more information, please consult the European Standard EN 1610 (Construction and testing of drains and sewers).

technical appendix

Explanation of GEODRAIN label

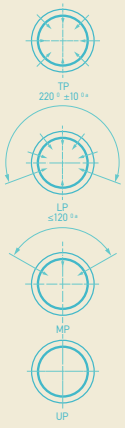
In every GEODRAIN pipe there is a label that facilitates the identification of the product and the explanation of its specific properties.



PRODUCT TYPE

	DIN 4262-1
Circular pipes with pliable inner and outer surface.	R1
Circular pipes with smooth inner and pliable outer surface	R2
Circular pipes with a one-material wall, homogeneous wall structure, smooth inner and outer surface.	R3

TYPE of perforation



	DIN 4262-1
Totally perforated pipes 360⁰	TP
Locally perforated pipes 220⁰±10⁰	LP
Multi-purpose pipe ≤120⁰	MP
Unperforated pipes	UP

Ring Stiffness classification (EN ISO 9969)

Nominal Diameter (DN)	Nominal Stiffness (SN) [kN/m²]
DN ≤ 500mm	SN 4, SN 8, SN 16
DN ≥ 500mm	SN 2, SN 4, SN 8, SN 16

SN: Nominal Stiffness

5 things to remember...

1. GEODRAIN pipes have excellent mechanical strength with SN4 (4 kN/m2) and SN8 (8 kN/m2) ring stiffness, and rich properties such as low coefficient of friction, high abrasion resistance (necessary due to wear caused by flow velocity and friction of solid materials with the inner surface of the pipe), chemical resistance in the corrosive environment that can be created by groundwater and ultraviolet (UV) resistance, necessary during the external storage phase.

2. They are produced in different diameters ranging from DN/OD 90 mm up to DN/OD 400 covering different application fields. They are available in flexible form, in coils with 360° perforation - TP (totally perforated) and in rigid form with 220° perforation - LP punch (locally perforated) with high water collection surface.

3. Due to the special geometry of the outer wall (corrugated), they achieve high mechanical strength with considerably lower weight compared to the corresponding single wall pipes (solid wall). they are therefore lighter, making their storage, transport and installation easier.

4. Cost and installation time savings are enormous considering the much lower cost of materials and quick and safe installation as a result of low weight, ease of transport and assembly without the use of tools.

5. They are produced from high density polyethylene that does not contain halogenated substances, are fully recyclable and have a very low environmental footprint.

...and one more thing

KOUVIDIS has more than 39 years of experience in the production of plastic pipe systems and more than 8 years in the production of double structured wall pipes. It has 2 ultra-modern production lines for double structured wall pipes and is the first purely Greek company to invest in the production of this type of pipe.

LEGEND

Packaging (m / coil)

Packaging (m / bar)

Distinction among the best workplaces in Greece (2017)

Certification body of Quality Management System EN ISO 9001:2008

Certification body of Environmental Management System EN ISO 14001:2004

Certification body of Occupational Health and Safety System OHSAS 18001:2007

The product does not contain hazardous substances acc. to 2011/65/EU RoHS Directive. Certification body VDE.

Compliance with REACH Regulation EC/1907/2006 about chemicals

2nd version 03.2018

KOUVIDIS is a purely Greek second - generation family company, specialized in the development and production of plastic conduit systems for cable protection, sewage and drainage since 1979.
The three distribution centers (Athens, Thessaloniki, Crete) and the two subsidiaries companies in Cyprus and Germany ensure the necessary capacity to serve daily more than 500 sales points both in Greece and abroad. Holding a leading position in the Greek market, and having a clearly customer oriented philosophy, KOUVIDIS mission is to ensure Electrician's safety and to constantly improve his work through the design and the production of innovative and value - added products.

VDE RoHS compliant · TÜV AUSTRIA ISO 9001 · TÜV AUSTRIA ISO 14001 · TÜV AUSTRIA OHSAS 18001 · GREAT PLACE TO WORK. Best Workplaces 2017 Greece

for more...
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