

DRAINAGE

Drainage system definition

Drainage is the natural or artificial collection and discharge of surface and underground water from certain areas and

facilities using a system of drain pipes, wells, channels, underground galleries, etc.

Drainage system application

- In agriculture
- To drain out parks, gardens, sport grounds
- To protect buildings and underground structures
- To drain out landfills and waste disposal areas
- In road engineering and construction. To protect and drain out road structures such as roads, streets, parking lots, tunnels, etc.
- For temporary drainage during construction works



Advantages of Pipelife drainage system

- Wide range of accessories, fittings and manholes
- Optimal drainage capacity
- Easy installation
- Long life
- Low weight
- Easy cleaning
- Easy transportation and storage
- Manufactured in compliance with European standards and local requirements and regulations.

With respect to its application the drainage system guarantees good hydraulic and mechanical performance (including good load bearing capacity and breaking strength), therefore the quality and security it provides is top priority.

The raw materials used for the production of drain pipes satisfy the requirements concerning the resistance to chemical pollutants, to microorganisms, to animal waste, and UV resistance (up to two years).



Range of pipes:

Double layer corrugated pipes - R2 acc. to DIN 4262-1

Item code	Description
PRAGMADR_DW160/6-220°	Double layer drain pipe of PP DN160/6 m-220° SN8 with effective length of 6 m
PRAGMADR_DW200/6-220°	Double layer drain pipe of PP DN200/6 m-220° SN8 with effective length of 6 m
PRAGMADR_DW250/6-220°	Double layer drain pipe of PP DN250/6 m-220° SN8 with effective length of 6 m
PRAGMADR_DW315/6-220°	Double layer drain pipe of PP DN315/6 m-220° SN8 with effective length of 6 m
PRAGMADR_DW400/6-220°	Double layer drain pipe of PP DN400/6 m-220° SN8 with effective length of 6 m

*Double layer corrugated pipes DN/ID 500, DN/ID 600, DN/ID 800 and DN/ID 1000, may be supplied upon customer's special order.

*Pipes come with a socket and a rubber sealing.

Fittings: ref. to the pricelists for Pragma and PVC KG

Item code	Description
ECO Corr_DR_DW_B/WOSR/OD160/220°/400kg/m²/6	ECO Corrugated drain pipe DN/OD160/220°/400kN/m²/WOSR/6m_black
ECO Corr_DR_DW_B/WOSR/OD200/220°/400kg/m²/6	ECO Corrugated drain pipe DN/OD200/220°/400kN/m²/WOSR/6m_black
ECO Corr_DR_DW_L/WOSR/OD250/220°/400kg/m²/6	ECO Corrugated drain pipe OD250/220°/400kN/m²/WOSR/6m_light
ECO Corr_DR_DW_L/WOSR/OD315/220°/400kg/m²/6	ECO Corrugated drain pipe OD315/220°/400kN/m²/WOSR/6m_light
ECO Corr_DR_DW_L/WOSR/OD400/220°/400kg/m²/6	ECO Corrugated drain pipe OD400/220°/400kN/m²/WOSR/6m_light

Item code	Description
ECO Corr_DR_DW_B/WOSR/OD160/220°/800kg/m²/6	ECO Corrugated drain pipe DN/OD160/220°/800kN/m²/WOSR/6m_black
ECO Corr_DR_DW_B/WOSR/OD200/220°/800kg/m²/6	ECO Corrugated drain pipe DN/OD200/220°/800kN/m²/WOSR/6m_black
ECO Corr_DR_DW_L/WOSR/OD250/220°/800kg/m²/6	ECO Corrugated drain pipe OD250/220°/800kN/m²/WOSR/6m_light
ECO Corr_DR_DW_L/WOSR/OD315/220°/800kg/m²/6	ECO Corrugated drain pipe OD315/220°/800kN/m²/WOSR/6m_light
ECO Corr_DR_DW_L/WOSR/OD400/220°/800kg/m²/6	ECO Corrugated drain pipe OD400/220°/800kN/m²/WOSR/6m_light

Single layer smooth surface pipes-R3 acc.to DIN 4262-1

Item code	Description
KGEMDR110/5C-SN4 220°	Single layer drain pipe of PVC DN110/6 m-220° SN4
KGEMDR160/5C-SN4 220°	Single layer drain pipe of PVC DN160/6 m-220° SN4
KGEMDR200/5C-SN4 220°	Single layer drain pipe of PVC DN200/6 m-220° SN4
KGEMDR250/6C-SN4 220°	Single layer drain pipe of PVC DN250/6 m-220° SN4
KGEMDR315/6C-SN4 220°	Single layer drain pipe of PVC DN315/6 m-220° SN4
KGEMDR110/5C-SN8 220°	Single layer drain pipe of PVC DN110/6 m-220° SN8
KGEMDR160/5C-SN8 220°	Single layer drain pipe of PVC DN160/6 m-220° SN8
KGEMDR200/5C-SN8 220°	Single layer drain pipe of PVC DN200/6 m-220° SN8
KGEMDR250/6C-SN8 220°	Single layer drain pipe of PVC DN250/6 m-220° SN8
KGEMDR315/6C-SN8 220°	Single layer drain pipe of PVC DN315/6 m-220° SN8

Item code	Description
PE100DR90 - 10/12 220°	Single layer drain pipe of PE DN90/12m - 220° SN22, s=5,4mm
PE100DR110-10/12 220°	Single layer drain pipe of PE DN110/12m-220° SN22, s=6,6mm
PE100DR125-10/12 220°	Single layer drain pipe of PE DN125/12m-220° SN22, s=7,4mm
PE100DR140-10/12 220°	Single layer drain pipe of PE DN140/12m-220° SN22, s=8,3mm
PE100DR160-10/12 220°	Single layer drain pipe of PE DN160/12m-220° SN22, s=9,5mm
PE100DR180-10/12 220°	Single layer drain pipe of PE DN180/12m-220° SN22, s=10,7mm
PE100DR200-10/12 220°	Single layer drain pipe of PE DN200/12m-220° SN22, s=11,9mm
PE100DR225-10/12 220°	Single layer drain pipe of PE DN225/12m-220° SN22, s=13,4mm
PE100DR250-10/12 220°	Single layer drain pipe of PE DN250/12m-220° SN22, s=14,8mm
PE100DR280-10/12 220°	Single layer drain pipe of PE DN280/12m-220° SN22, s=16,6mm
PE100DR315-10/12 220°	Single layer drain pipe of PE DN315/12m-220° SN22, s=18,7mm
PE100DR355-10/12 220°	Single layer drain pipe of PE DN355/12m-220° SN22, s=21,1mm
PE100DR400-10/12 220°	Single layer drain pipe of PE DN400/12m-220° SN22, s=23,7mm

Note: s - wall thickness



*Double layer corrugated pipes PRAGMA DR SN12 and SN16 kN/m², with diameters ranging from DN/ID500 to DN/ID1000, may be supplied upon customer's special order.

Important note:
perforation patterns - SLOTS



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*Single-layer drainage pipes, with diameters ranging from DN/OD90 to DN/OD400 - PN6 (SN5) and PN16 (SN91), may be supplied upon customer's special order.

Important note:
perforation patterns - ROUND CUTS

Fittings:

We offer the full range of fittings that are suitable for use with the three types of drain pipes. Each fitting is to be selected in consideration of the pipe material and the method of joining. (ref.to the product catalogues for Pragma and PVC KG).

Inspection chambers and manholes:

We offer the full range of manholes with different diameters of the bottom suitable for joining to the three types of drain pipes (ref. to the product catalogues for Prakto and PRO).

Geotextile:

Its use is recommended for several reasons:

- Because it protects the drainage system from the penetration of sand and gravel.
- Because it separates the gravel from the surrounding earth and helps gravel stay in the same position and preserve its designed load bearing capacity throughout its service life.
- Because it ensures the good function and guarantees the long life of the system. For more information, please, contact your sales agent.

Please contact your Sales representative for more information.

General technical information

Geometry of drain pipes according to DIN 4262-1

Based on the type of cross section drain pipes may be:

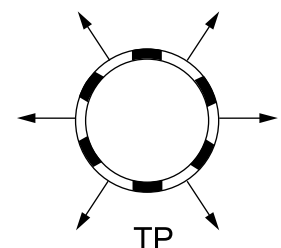
- **Type R** - pipes with round cross-sectional profile
- **Type C** - pipes with tunnel-shaped cross-sectional profile

Based on the wall structure/surface drain pipes may be:

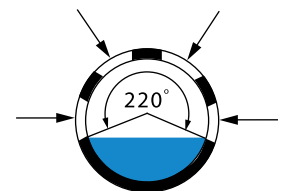
- **R1** - pipes with profiled external and internal structure/surface
- **R2** - pipes with profiled external and smooth internal structure/surface
- **R3** - pipes with smooth external and smooth internal structure/surface

Based on the holes/slots/perforation of pipes with nominal diameter up to DN400 (inclusive) drain pipes may be:

- **TP** - Thoroughly perforated pipes (TP) where the infiltration holes are arranged in equal intervals along the entire circumference on at least four rows of slots. These pipes may be used for all nominal dimensions up to DN400 (inclusive).
- **LP** - 2/3 perforation. Partially perforated pipes (LP) where the infiltration holes are made symmetrically to the pipe vertical axis and arranged in equal intervals within a range of about 220° (symmetrically to the vertical axis at 110°), without perforation of the pipe bottom. The slots should be made on at least three rows. Normally, they are used for nominal dimensions ranging from DN100 to DN200.



TP

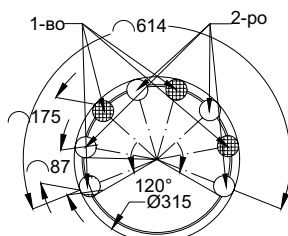


LP

Perforation pattern:

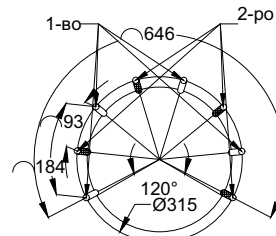
- Slots

Pragma DN/OD315
Perforation degree - 220°
distance from row to row - 26.6 mm
Rows - 37
Number of holes on a row - 4
Overall number of holes - 148
Hole size: L(hole)-40 mm, B(hole)-1.5 mm
Overall light section on a m' - 88.8 cm²/m'

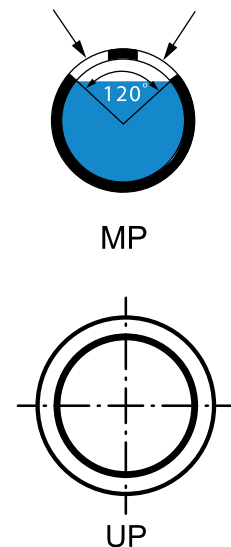


- Round cuts

PEHD100, PN10 DN315
Perforation degree - 240°
distance from row to row - 44 mm
Rows - 22
Number of holes on a row - 4
Overall number of holes - 88
Hole size - Ø12
Overall light section on a m' - 100 cm²/m'



- **MP** - 1/3 perforation. Multifunctional perforated pipes (MP) where the infiltration holes are made symmetrically to the pipe vertical axis and arranged in equal intervals within a range of about 120° (symmetrically to the vertical axis at 60°), without perforation of the pipe bottom. The slots should be made on at least two rows. The bottom of MP-pipe serves to carry away the infiltrated water. It is used for nominal dimensions of DN 200.
- **UP** - no holes /slots/ perforation to carry away/discharge large amounts without infiltration of underground/atmospheric water. It serves as a collector to carry away water through chambers to the sump. It may be used for all nominal dimensions up to DN400 (inclusive).



Perforation should always be made between the ribs of profiled pipes to guarantee water-tightness, i.e. drained water should never be allowed to penetrate inside the two pipe layers (the ribbed layer and the smooth surface layer). According to DIN 4262-1:2009-10, the mean perforation area depends on the type of pipe perforation (TP-360°, LP-220° or MP-120°) and the slot size, and not on the diameter of drainage pipe.

Design

Single-layer corrugated pipes - R1

are intended for the installation of „horizontal“ drainage systems in different geological and hydrological conditions, to take care of surface runoff in agrarian lands, parks, lawns, sport and recreation areas, shallow ground facilities and sites. Thanks to their corrugated internal side, these pipes are more likely to be clogged with mud than the double-layer smooth surface pipes. The depth of laying this type of pipes is up to two meters (manufacturer's recommendations) due to their lesser ring hardness.

Double-layer corrugated and single-layer pipes - R2 and R3

Their use is recommended for the drainage of buildings, highways, streets, airports, parking lots, in the construction of waste disposal landfills, etc. The maximum depth of laying the pipes is not more than 6 m.

The rate of infiltration/inlet of underground water into the drainage system should be well taken into consideration. If the rate is slow, the drainage will be inefficient, and if it is fast – some amount of the soil may be carried away through the drainage system, which requires the use of some geotextiles or similar materials to prevent it.

Water is in liquid physical condition so it runs in earth in two ways: by the action of gravity force, driven by its weight from top to bottom, and capillary, by the action of capillary forces, running toward every place where it encounters cavities of capillary size. This is the principle behind the direction of slots orientation when laying the pipes.

The most important technological parameters of any prospective drainage system are the ease of its installation, the system permeability, and optimal



diameter.

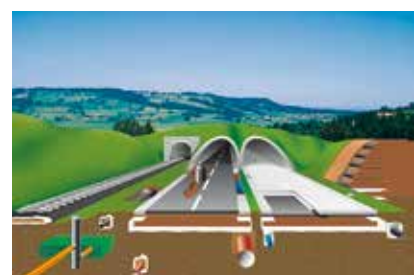
The pipes that make the drainage system must be necessarily connected to the drainage wells in order to ensure that all moisture from the drained area will be collected in one and the same place and then will be carried away from that place either in the sewerage system or to another place by pumping (a nearby dam for instance) or to the soil through an infiltrating plant (such as Stormbox).

Construction

The main purpose of construction control and supervision is to ensure that the drainage system is performed in full compliance with the design.

The following works should be monitored:

- The excavation of drainage system route
- The composition and quality of infiltrating layer
- The quality of pipes
- Preparing the base of drainage system route
- The laying of pipes and draining layers
- Inspection of the leveling of laid pipes
- The installation of manholes.



Before proceeding to drainage system commissioning, its horizontal plane should be carefully washed and the manholes should be cleaned from dirt and foreign objects. Horizontal pipes should be washed using water jet (coming from a water supply mains or a tank truck) to wash away any trapped dirt particles.

Drainage system operation

The drainage system will be used longer and will operate efficiently only when it is properly used and operated. The supervision and control authorities are responsible for:

- Conducting regular inspections of the drainage system and fixing minor defects
- Issuance of required passports and licenses
- Regular monitoring of the underground water level in the drained area with the purpose to establish the effectiveness of drainage system operation
- Controlling the quality of drained water
- Making planned and ongoing repairs and failure troubleshooting
- Turning the drainage system into spring and winter mode of operation.



Drainage system function and monitoring

Monitoring the function of drainage system consists of regular inspections (at least four times per year) of the condition of manholes, drain pipes, collectors, and also test measurement of drained water.

The causes for disturbing the drained water discharge may be:

- Collapsing of individual improperly installed pipes
- Mechanical damage of the pipes during construction works
- Deposits stuck on some sections and surfaces of the pipes
- Improper operation
- The causes of disturbed drained water discharge may be discovered in any of the following ways:
- Monitoring the whole drainage process all over the drained terrain
- Digging out vertical inspection pits at several points in the drainage system.

European standards and local requirements and regulations regarding the drainage systems

DIN 4262-1:2009-10

Pipes and fittings for subsoil drainage of trafficked areas and underground engineering - Part 1: Pipes, fittings and their joints made from PVC-U, PP and PE

БДC EN 1610:2003

Construction and testing of drains and sewers

БДC EN 752:2008

Drain and sewer systems outside buildings

БДC EN 13476-3:2008

Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 3: Specifications for pipes and fittings with smooth internal and profiled external surface and the system, Type B.

DIN 1187

Drain pipes of unplasticized poly(vinyl chloride) (PVC-U). Dimensions, requirements, testing.

БДC CEN/TS 1852:2003

Plastics piping systems for non-pressure underground drainage and sewerage. Polypropylene (PP).

БДC CEN/TS 13244:2004

Plastics piping systems for underground and overground pressure pressure water systems for general application, drainage and sewerage. Polyethylene (PE).

БДC EN 13252:2002

Geotextiles and geotextile-related products - Characteristics required for use in drainage systems.

Note: It is possible that the product image do not match exactly the real product.