SIMONA

HPQ
Manufacturer-related Product Qualification
DBS 918 064
(Technical notifications)

SIMODRAIN® Drainage Pipe Systems

for traffic route engineering

GLOBAL THERMOPLASTIC SOLUTIONS

Contents

SIMODRAIN® – for permanently safe traffic routes

Traffic routes are a key element of our technical infrastructure. With this in mind, it is important to keep them in a good, safe condition. Drainage systems that discharge in situ groundwater and surface water help to protect and improve the quality and safety of our traffic networks in the long term.

Static and dynamic load capacity as well as fracture resistance are essential prerequisites in this field of application and all products have to meet exacting standards in this respect.

With SIMODRAIN®, SIMONA offers you a comprehensive, certified product range specially conceived for the drainage of both track and road beds.

Railway engineering and road construction are two typical areas of use for SIMODRAIN® drainage pipes.

Welcome to SIMONA

SIMONA is one of the leading manufacturers and development partners for thermoplastic pipes, fittings and semi-finished products. For all areas of waste water disposal SIMONA offers innovative end-to-end piping systems made of premium-quality plastics.

Expert advice from the very beginning

From project development to planning in the field – SIMONA's experts will be at your disposal to provide all the advice you need. We address every new technical challenge with a keen sense of commitment and enthusiasm. If the focus is on safety-relevant or environmental applications, SIMONA should be your first port of call.

SIMODRAIN® – a system-based range of products

With various types of pipes, fittings, joining pieces, shafts, shaft covers and matching accessories, SIMODRAIN® offers a comprehensive system for the installation of new traffic route drainage and for rehabilitation projects.

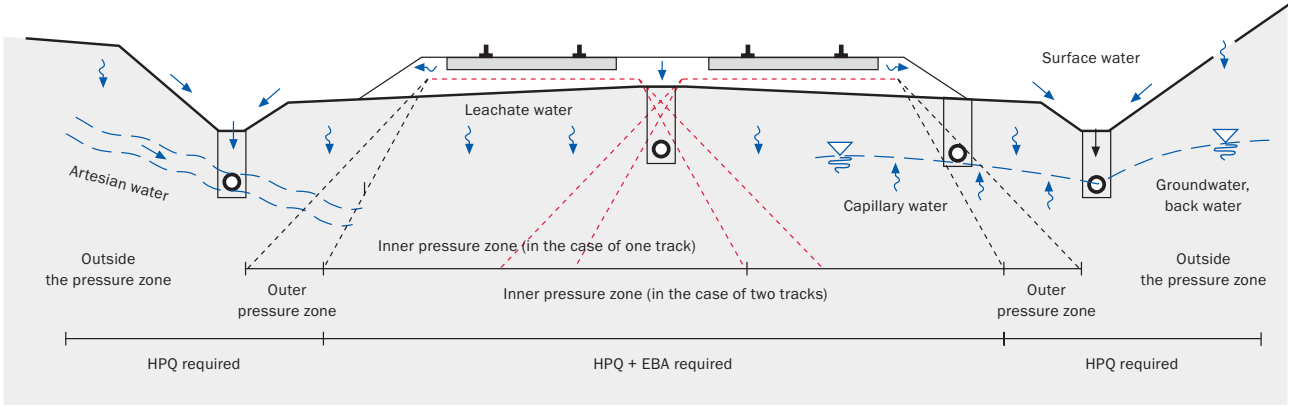
SIMODRAIN® – approved for all applications

Owing to approvals by the German Federal Railways Office (EBA) and manufacturer-related product qualification (HPQ) in accordance with DBS 918 064, the SIMODRAIN® system can be used for all areas of railway engineering. Other applications include road construction, landfill drainage, tunnel construction, general supporting soil drainage and the rehabilitation of existing drainage systems.

Use and performance of SIMODRAIN® drainage pipes

To make sure a traffic route remains operational in the long term, it is essential to have a drainage system that is continuously effective. SIMODRAIN® piping systems ensure controlled discharge of leachate water, surface water and artesian water and provide maximum reliability to ensure the long-term stability of rails and roads.

Exposure of railway lines to water and pressure (DBS 918 064)



Drainage systems in rail zones must have special hydraulic and mechanical properties.

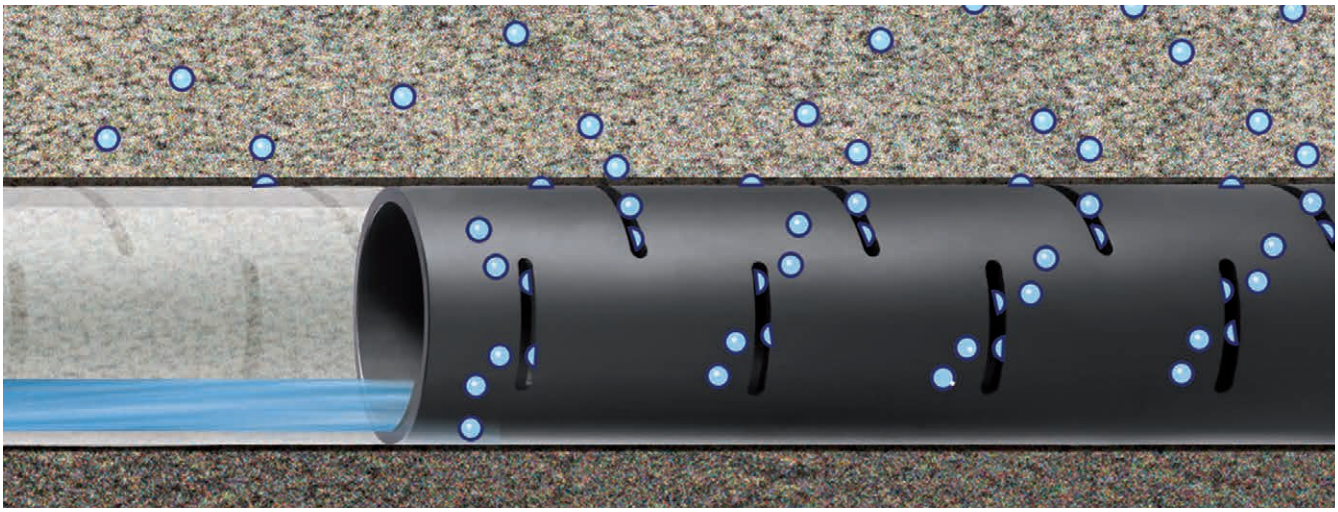
Load capacity and fracture resistance are basic requirements

To be able to use traffic routes safely and without any operating restrictions in the long term, drainage systems have to be not only capable of bearing static and dynamic loads but also resistant to fracture. Static and dynamic live loads and soil loads are the highest mechanical forces acting on traffic routes. The system is also exposed to hydraulic loads due to the influx of water above and below ground.

When it comes to the long-term drainage of traffic route structures, water under pressure and in situ water at the structure has to be discharged directly. That is the only way to avoid water infiltration and prevent associated damage and instabilities in the road or rail network.

Tasks of drainage systems

- Fast interception, collection and discharge of inflowing water
- Absorption and discharge of unbound gravitational water
- Prevention of surface water penetration into the earth structure and supporting medium
- Elimination of further water flow from the supporting medium in order to prevent damage due to frost



Principle of the absorption and discharge of water in an earth structure

SIMODRAIN® pipes in heavy-load traffic

SIMODRAIN® pipes are PE solid wall pipes that are used primarily to cope with heavy-load traffic. Their key benefits include high static and dynamic load capacity and excellent material properties:

- on high-speed lines in categories P230 and M230 as well as
- on main haul-away lines with a very high proportion of goods and/or heavy-load traffic

Possible fields of application:

- Road construction
- Railway engineering
- Landfill drainage
- Tunnel construction
- General supporting soil drainage
- Rehabilitation

Benefits of PE piping systems in traffic route engineering

- Fracture-resistant pipe due to high flexibility
- Can be rinsed out at high pressure in accordance with DIN 19523, Procedure 1
- Ring stiffness in accordance with DIN EN ISO 9969 and DIN EN 12666
- Suitable for very high static and dynamic loads
- Resistant to all substances normally contained in the ground
- Favourable hydraulic conditions due to smooth interior pipe surfaces ($k \leq 0.01$ mm)
- Trouble-free open-air storage due to UV and frost resistance
- Fast laying due to socket connection and long overall lengths
- Slot pattern based on DIN 4266 and 4262; DBS 918 064
- Easy handling due to light weight

SIMODRAIN® – capable of bearing static and dynamic loads

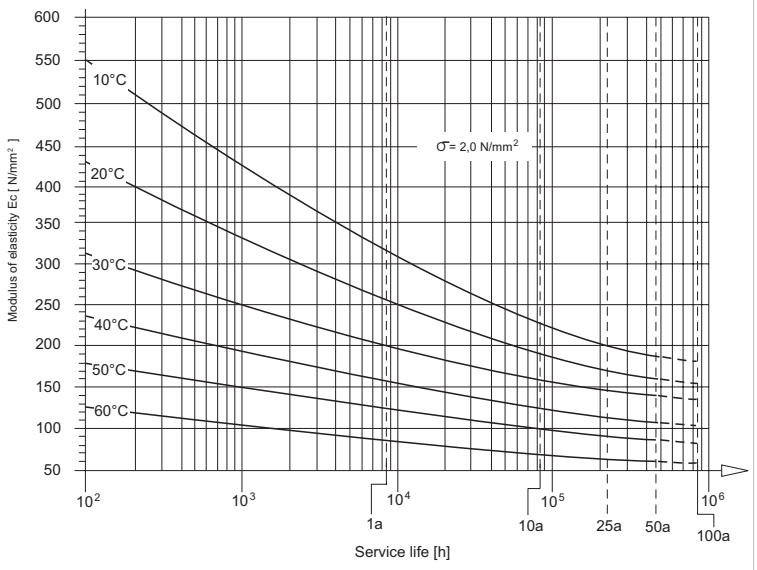
Rail traffic routes are subjected to extreme static and dynamic loads caused by rail traffic. In order to size buried piping systems in the field of traffic route engineering, it is necessary to obtain appropriate long-term data. That data is documented in the modulus of elasticity and in vibration fatigue resistance.

Modulus of elasticity

The time- and temperature-dependent modulus of elasticity describes the relationship between stress and strain during the deformation of a solid body and calculates the static load capacity of the pipe.

Strength values for sizing thermoplastic pipes

Creep modulus for PE 100



Conversion factors for stress range	
σ= 0,5 N/mm²	1,20
σ= 1,0 N/mm²	1,08
σ= 2,0 N/mm²	► 1,00 ◄
σ= 3,0 N/mm²	0,78
σ= 4,0 N/mm²	0,70
σ= 5,0 N/mm²	0,60

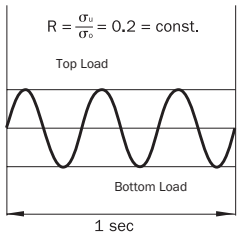
Modulus of elasticity [N/mm²]		
Column	1	2
Temperature	E_{Kr2} 10^{-1} h	E_C 100 min
≤ 10 °C	1100	850
20 °C	800	630
30 °C	550	450
40 °C	390	325
50 °C	270	230
60 °C	190	160

Note:
The figures in column 1 are from DVS 2205-2, Table 6. The figures in column 2 are figures extrapolated between E_{Kr2} (10^{-1} h) and E_{L2} (1 year) in accordance with DVS 2205-1.

Modulus of elasticity values (creep moduli) for the sizing of SIMODRAIN® pipes

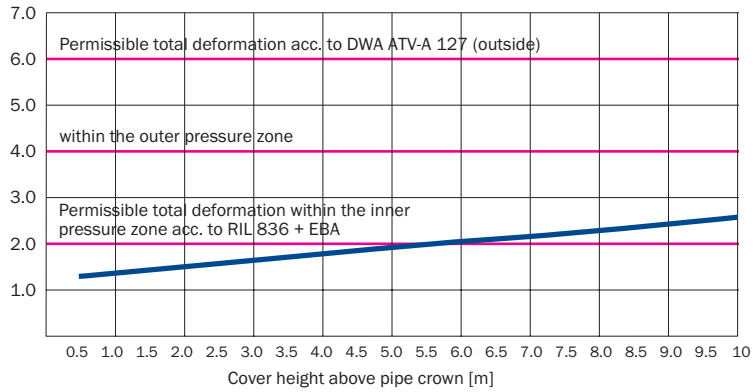
Vibration fatigue resistance

In order to determine the vibration fatigue resistance, test specimens made of PE 100 were subjected, in accordance with DIN EN ISO 527, to a fatigue strength test with pulsating tensile stresses on a dynamic load test rig based on DIN 50100. Analyses demonstrated that SIMODRAIN® PE pipes are particularly suitable for heavy-load traffic on account of their excellent vibration resistance.



Vibration test in accordance with DIN 50100 applying a sinusoidal load at a frequency of 3 Hz and a constant bottom-to-top load ratio of 0.2.

Pipe deformation (SIMODRAIN® PE 100, d=200mm) due to soil load and live load LM 71, multi-track in the case of installation with trench conditions in soil class G1, DPr = 95%



The diagram shows the deformation of PE 100 SIMODRAIN® d=200 mm pipes at installation depths of 0.5 m to 10.0 m subject to the laying conditions of RIL 836 and assuming railway traffic loads. For a detailed structural analysis of SIMODRAIN® pipes, please use the questionnaire on page 30.

SIMODRAIN® pipes withstand high static and dynamic soil stresses in the long term

SIMODRAIN® – your benefits at a glance

Fracture-resistant pipe due to high level of flexibility

SIMODRAIN® pipes and fittings can also be used for high static and dynamic loads.

Trouble-free pipelaying

Only plastic drainage pipes may be used whose properties conform to the technical codes of practice and are verified by recognised testing bodies on a regular basis. Applicable standards and guidelines provide the basis for correct laying of SIMODRAIN® drainage pipes in the railway sector.

Excellent hydraulics due to smooth pipe interior surfaces

Owing to their very smooth interior wall surfaces, SIMODRAIN® pipes achieve excellent discharge capacities ($k \leq 0.01$ mm) – perfect protection against incrustation.

Tested ability to withstand high-pressure jetting

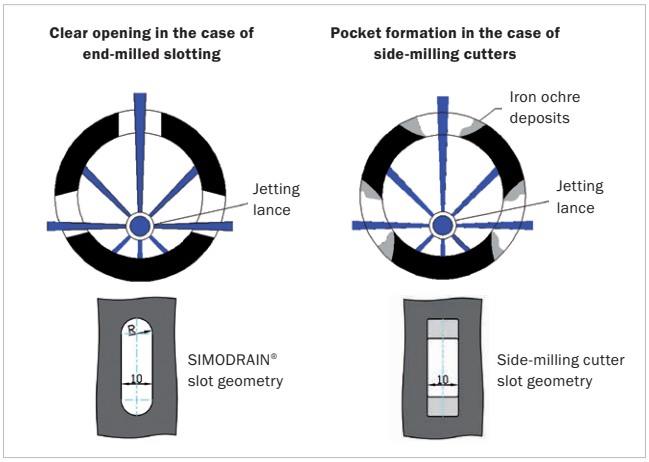
SIMODRAIN® pipes, fittings and shafts can be jetted at high pressure. They were tested for their resistance to high-pressure jetting in accordance with DIN 19523, Method 1, in conjunction with the demanding requirements imposed by German rail network operator DB Netz AG.

Approved for railway construction

- HPQ “Manufacturer-related Product Qualification” in accordance with DBS 918 064
- EBA approval (“German Federal Railways Office”) for pipes and shaft structures

Notch-free slot geometry

The slot geometry of SIMODRAIN® pipes enables optimal rinsability. As opposed to the side-milling cutter method, there are no undercuts, pockets or notch-stress-sensitive radii in which iron ochre deposits and incrustations can develop and accumulate. The slot pattern for water influx is based on DIN 4266 and 4262 in accordance with DBS 918 064.



HPQ Manufacturer-related Product Qualification
DBS 918 064 (Technical notifications)

Plastic tested · Production monitored · TÜV SÜDDEUTSCHLAND · TÜV standard MUC-KSP-A 006

SIMONA offers a complete product range with EBA approval · SIMONA · German Federal Railways Office · Approval 21.41 Sch (010/04) · Pipes

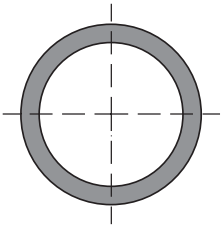
TÜVRheinland® LGA structurally tested · BBIS 0700070 · SIMODRAIN® PE 80/PE 100 EBA approval

SIMONA offers a complete product range with EBA approval · SIMONA · German Federal Railways Office · Approval 21.41-21 · Shaft structures

MFPA

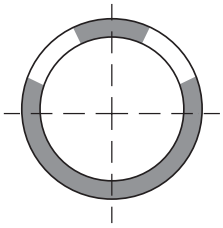
You will find detailed laying information, discharge tables and sample calculations for the hydraulic data in the tech.info SIMODRAIN® Drainage Pipe Systems

SIMODRAIN® overview of types



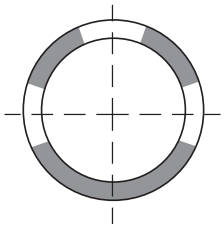
SIMODRAIN® Multi-Purpose Pipes, Unslotted (UP)*

Unslotted pipes are used for the discharge of large flows of water without the water absorption function. They are used as collecting drains, conveying water to the receiving water course via shafts.



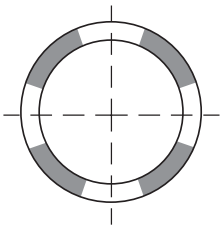
SIMODRAIN® Multi-Purpose Pipes, 1/3 Slotted (MP)*

These not only act as a partial leachate pipe (drainage of the soil material) but also as collecting drains due to their closed cross section at the bottom.



SIMODRAIN® Partial Leachate Pipes, 2/3 Slotted (LP)*

These are embedded in a pipe bottom inclined towards the partial leachate pipe and they absorb leachate water, artesian water and surface water through the slots at the top, conveying it to the next receiving water course in the enclosed bottom area.



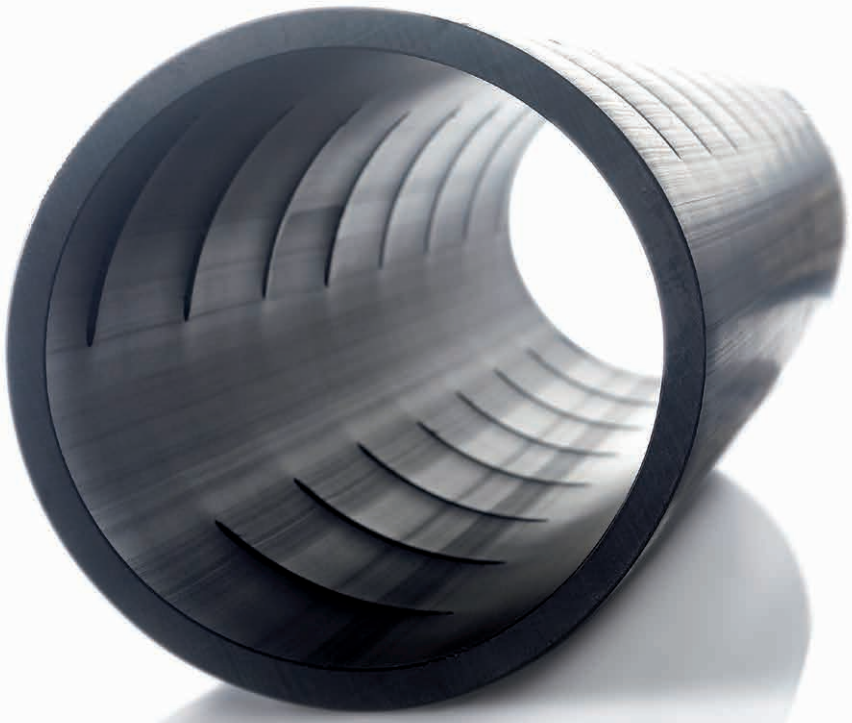
SIMODRAIN® Full Leachate Pipes, 3/3 Slotted (TP)*

Full leachate pipes are most effective for sections with a supporting medium capable of seepage. Owing to their slots distributed around the circumference of the pipe and a bedding course made of filter material, not only leachate water and artesian water but also water pressing from below (unbound gravitational water) can be absorbed and taken to the nearest collecting drain.

* Designation based on DIN 4262-1

Product range – SIMODRAIN® pipes

SIMODRAIN® drainage systems meet the high demands imposed by the German Federal Railways Office for the safety of piping systems in areas exposed to high static and dynamic loads.



SIMODRAIN® PE pipes with HPQ and EBA approval

Material
- PE/PE 100

Colour
- Black

Dimensions
- DIN 8074
- Module length L_M = 6.0 m
- Overall length L_B = see product range table on pages 14/15

Connection technology
- Integral socket connection (WIMU)
- Seal: O-ring (drip-tight), axial locking
- Smooth inside and outside walls without any interfering socket assembly
- Laying does not require any socket recesses in the pipe support

In those cases in which laying conditions are different, it is possible to supply verifiable structural analyses based on ATV-DVWK-A127. The calculations are subject to a charge.

Approvals

HPQ Manufacturer-related Product Qualification
DBS 918 064 (Technical notifications)

TÜV SÜDDEUTSCHLAND – Plastic Tested – Production monitored – TÜV standard MUC-KSP-A 006

Multi-purpose pipe (UP), unslotted

Multi-purpose pipe (MP), 1/3 slotted

Partial leachate pipe (LP), 2/3 slotted

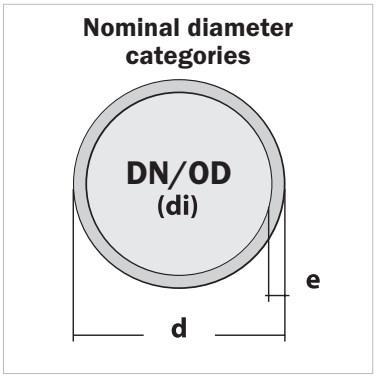
Full leachate pipe (TP), 3/3 slotted

As an alternative to the integral socket connection (WIMU) pipes are also available with smooth ends for connecting to the SIMODRAIN® double socket.

You will find detailed tender modules for SIMODRAIN® pipes at: **www.simona.de/simodrain**

Nominal diameter categories in relation to pipe outside diameter for SIMODRAIN® PE pipes with HPQ and EBA approval

For a specific application the pipe inside diameters, di, listed in the table have to be matched to the nominal diameters DN/OD need in hydraulic terms. As regards the hydraulic sizing of drainage pipes, it is important to note: the discharge capacity of SIMODRAIN® pipes can be determined with the aid of our "tech.info SIMODRAIN® Drainage Pipe Systems".



DN/OD is the outside diameter-related nominal size as defined by DIN EN 12666-1

DN nominal diameter categories for pipe outside diameter d

		SDR 21			SDR 17			SDR 11		
DN/OD mm	**d** mm	**e** mm	**di** mm	**kg/m**	**e** mm	**di** mm	**kg/m**	**e** mm	**di** mm	**kg/m**
110	110	5.3	99.4	1.79						
125	125	6.0	113.0	2.29						
	140	6.7	126.0	2.86						
160	160	7.7	144.6	3.75	9.5	141.0	4.57	14.6	130.8	6.74
	180	8.6	162.8	4.71	10.7	158.6	5.77	16.4	147.2	8.51
200	200	9.5	181.0	5.84	11.9	176.2	7.12	18.2	163.6	10.5
	225	10.8	203.4	7.37	13.4	198.2	9.03	20.5	184.0	13.3
250	250	11.9	226.2	9.02	14.8	220.4	11.1	22.7	204.6	16.3
	280	13.7	252.6	11.4	16.6	246.8	13.9	25.4	229.2	20.5
315	315	15.0	285.0	14.3	18.7	277.6	17.6	28.6	257.8	25.9
355	355	16.9	321.2	18.2	21.1	312.8	22.4	32.2	290.6	32.9
400	400	19.1	361.8	23.1	23.7	352.6	28.3	36.3	327.4	41.7
450	450	21.5	407.0	29.3	26.7	396.6	35.8	40.9	368.2	52.8
500	500	23.9	452.2	36.1	29.7	440.6	44.2	45.4	409.2	65.2
	560	26.7	506.6	45.1	33.2	493.6	55.4	50.8	458.4	81.7
630	630	30.0	570.0	57.0	37.4	555.2	70.2	57.2	515.6	103.0
	710	33.9	642.2	72.6	42.1	625.8	89.0			
800	800	38.1	723.8	92.0	47.4	705.2	113.0			

Dimensions / tolerances acc. to DIN 8074

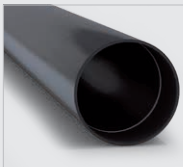
SIMODRAIN® PE pipes with HPQ, SDR 21/SN 8 and integral socket connection (WIMU)

SIMODRAIN® PE pipes with HPQ are used in the outer pressure zone and outside the pressure zone of railway traffic loads.

Approvals/external monitoring

HPQ Manufacturer-related Product Qualification
DBS 918 064 (Technical notifications)

TÜV SÜDDEUTSCHLAND – Plastic tested – Production monitored – TÜV standard MUC-KSP-A 006



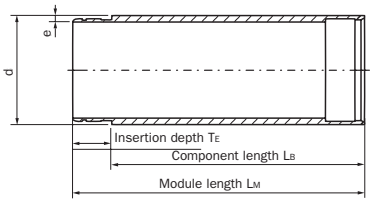
Multi-purpose pipe (UP), unslotted

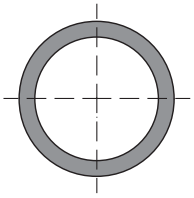
Multi-purpose pipe (MP), 1/3 slotted

Partial leachate pipe (LP), 2/3 slotted

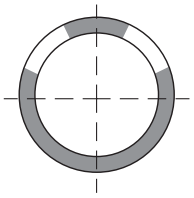
Full leachate pipe (TP), 3/3 slotted

SIMODRAIN®PE pipes with HPQ, SDR 21, ring stiffness SN 8

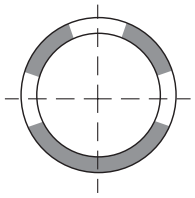




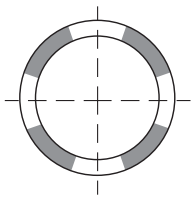
Multi-purpose pipe (UP), unslotted



Multi-purpose pipe (MP), 1/3 slotted



Partial leachate pipe (LP), 2/3 slotted



Full leachate pipe (TP), 3/3 slotted

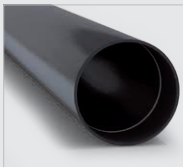
d mm	e mm	di mm	L_M mm	L_B mm	Art. No.	Art. No.	Art. No.	Art. No.
160	7.7	144.6	6000	5940	010021922	010021928	010021924	010021926
180	8.6	162.8	6000	5940	010021923	010021929	010021925	010021927
200	9.6	181.0	6000	5940	010019471	010019503	010019482	010019492
225	10.8	203.4	6000	5920	010019472	010019504	010019483	010019493
250	11.9	226.2	6000	5920	010019473	010019505	010019484	010019494
280	13.4	252.6	6000	5910	010019474	010019506	010019485	010019495
315	15.0	285.0	6000	5900	010019475	010019507	010019363	010019496
355	16.9	321.2	6000	5890	010019476	010019508	010019486	010019497
400	19.1	361.8	6000	5880	010019477	010019509	010019487	010019498
450	21.5	407.0	6000	5865	010019478	010019510	010019488	010019499
500	23.9	452.2	6000	5850	010019479	010019511	010019489	010019500
560	26.7	506.6	6000	5830	010019480	010019512	010019490	010019501
630	30.0	570.0	6000	5810	010019481	010019513	010019491	010019502
710	33.9	642.2	6000	5780	On request	On request	On request	On request
800	38.1	723.8	6000	5755	On request	On request	On request	On request

You will find detailed tender modules for SIMODRAIN® pipes at:
www.simona.de/simodrain

SIMODRAIN® PE 100 pipes with EBA approval SDR 17/SN 16, SDR 11/SN 64 and integral socket connection (WIMU)

SIMODRAIN® PE pipes with EBA approval are used inside the pressure zone of railway traffic loads.

Approvals



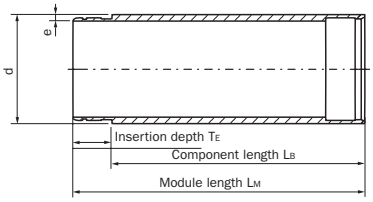
Multi-purpose pipe (UP), unslotted

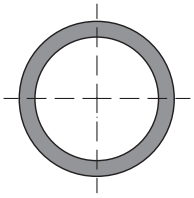
Multi-purpose pipe (MP), 1/3 slotted

Partial leachate pipe (LP), 2/3 slotted

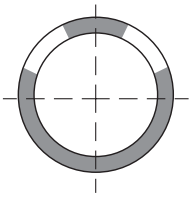
Full leachate pipe (TP), 3/3 slotted

SIMODRAIN® PE 100 pipes with EBA approval, SDR 17, ring stiffness SN 16

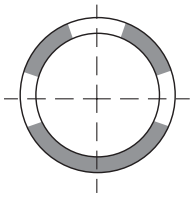




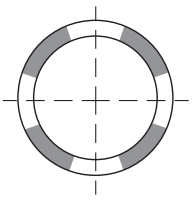
Multi-purpose pipe (UP), unslotted



Multi-purpose pipe (MP), 1/3 slotted



Partial leachate pipe (LP), 2/3 slotted



Full leachate pipe (TP), 3/3 slotted

d mm	e mm	di mm	L_M mm	L_B mm	Art. No.	Art. No.	Art. No.	Art. No.
160	9.5	141.0	6000	5940	010021973	010022025	010021999	010022051
180	10.7	158.6	6000	5940	010021974	010022026	010022000	010022052
200	11.9	176.2	6000	5940	010021975	010022027	010022001	010022053
225	13.4	198.2	6000	5920	010021976	010022028	010022002	010022054
250	14.8	220.4	6000	5920	010021977	010022029	010022003	010022055
280	16.6	246.8	6000	5910	010021978	010022030	010022004	010022056
315	18.7	277.6	6000	5900	010021979	010022031	010022005	010022057
355	21.1	312.8	6000	5890	010021980	010022032	010022006	010022058
400	23.7	352.6	6000	5880	010021981	010022033	010022007	010022059
450	26.7	396.6	6000	5865	010021982	010022034	010022008	010022060
500	29.7	440.6	6000	5850	010021983	010022035	010022009	010022061
560	33.2	493.6	6000	5830	010021984	010022036	010022010	010022062
630	37.4	555.2	6000	5810	010021985	010022037	010022011	010022063

SIMODRAIN® PE 100 pipes with EBA approval, SDR 11, ring stiffness SN 64

d mm	e mm	di mm	L_M mm	L_B mm	Art. No.	Art. No.	Art. No.	Art. No.
160	14.6	130.8	5920	5940	010021960	010022012	010021986	010022038
180	16.4	147.2	5920	5940	010021961	010022013	010021987	010022039
200	18.2	163.6	5920	5940	010021962	010022014	010021988	010022040
225	20.5	184.0	5920	5920	010021963	010022015	010021989	010022041
250	22.7	204.6	5920	5920	010021964	010022016	010021990	010022042
280	25.4	229.2	5910	5910	010021965	010022017	010021991	010022043
315	28.6	257.8	5900	5900	010021966	010022018	010021992	010022044
355	32.2	290.6	5880	5890	010021967	010022019	010021993	010022045
400	36.3	327.4	5875	5880	010021968	010022020	010021994	010022046
450	40.9	368.2	5860	5865	010021969	010022021	010021995	010022047
500	45.4	409.2	5845	5850	010021970	010022022	010021996	010022048
560	50.8	458.4	5830	5830	010021971	010022023	010021997	010022049
630	57.2	515.6	5810	5810	010021972	010022024	010021998	010022050

Product range – SIMODRAIN® shafts and shaft covers

SIMODRAIN® PE maintenance and inspection shafts are available in various configurations for use inside the pressure zone, in the outer pressure zone and outside the pressure zone. Depending on the load profile, SIMONA offers matching shaft covers.

SIMODRAIN® PE maintenance and inspection shafts

Material
PE 100

Colour
Black

Dimensions

- Shaft jacket and connection nozzles conforming to DIN 8074
- Shafts are available as channel shafts or sand trap shafts. In the case of sand trap shafts the sand trap has a minimum depth of 150 mm.
- Connection using double socket
- Double socket available separately, see page 20
- For exceptional cases, shafts can be structurally customised in accordance with ATV-DVWK-A127 to meet the client's specifications.

The requirements issued in the EBA approval certificate must be taken into account in all cases. Any configurations differing from these standards must be agreed in advance.

Approvals

SIMONA offers a complete product range with EBA approval
SIMONA
Shaft structures

HPQ
Manufacturer-related Product Qualification
DBS 918 064
(Technical notifications)

For use in the outer pressure zone/outside the pressure zone of railway traffic loads:

SIMONA® maintenance and inspection shaft SDR 21/SN 8 with HPQ

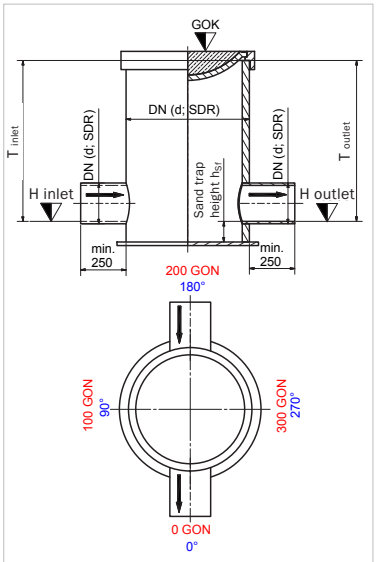
DN/OD mm	e mm	di mm	h mm	Nozzle d mm
630	30.0	570.0	As per spec.	160 – 500
670	31.9	606.2	As per spec.	160 – 500
710	42.1	625.8	As per spec.	160 – 500
900	53.3	793.4	As per spec.	160 – 630
1,000	59.3	881.4	As per spec.	160 – 630
1,200	70.6	1,058.8	As per spec.	160 – 800

For use in the inner pressure zone of railway traffic loads:

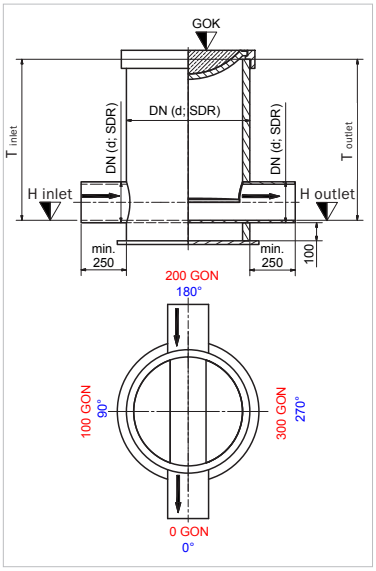
SIMONA® maintenance and inspection shaft SDR 17/SN 16 with EBA approval

DN/OD mm	e mm	di mm	h mm	Nozzle d mm
450	26.7	396.6	As per spec.	160 – 355
500	29.7	440.6	As per spec.	160 – 400
560	33.2	493.6	As per spec.	160 – 400
630	37.4	555.2	As per spec.	160 – 500
680	40.0	600.0	As per spec.	160 – 500
710	42.1	625.8	As per spec.	160 – 500
900	53.3	793.4	As per spec.	160 – 630
1,000	59.3	881.4	As per spec.	160 – 630

SIMODRAIN® Sand Trap Shaft



SIMODRAIN® Channel Shaft

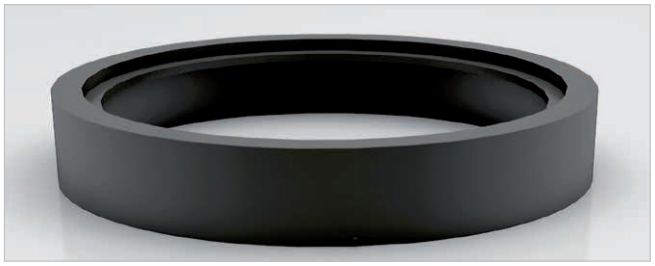


For questionnaires on shaft configuration, please refer to page 32 ff. You will find detailed tender modules for SIMODRAIN® shafts at: **www.simona.de/simodrain**

Shaft covers for SIMODRAIN® shafts

SIMODRAIN® PE shafts with HPQ and EBA approval have proved ideal for use in the drainage of railway traffic systems on account of their monolithic design. To an increasing extent, structural conditions call for a space-saving, jobsite-friendly configuration of shaft covers. The SIMODRAIN® PE support ring is a product that meets special requirements for the construction of a deep drainage system in the vicinity of railway traffic loads.

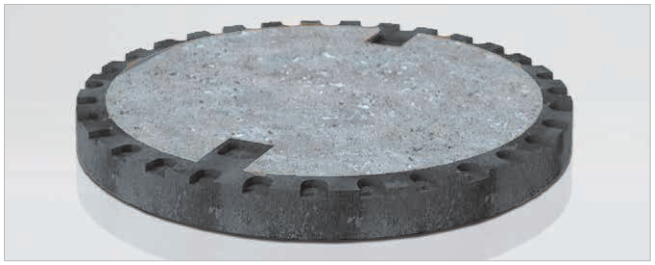
In accordance with the present EBA approval certificate, shaft covers for SIMODRAIN® shafts are directly placed on the shaft jacket, as a result of which the loads are directed into the body of the shaft axially. Given their compact design compared to the conventional method using an external concrete support, installation can therefore also be performed under the confined conditions often encountered in railway construction.



SIMODRAIN® PE support ring for SIMONA® plastic shaft
For accommodating a concrete or cast iron cover plate, class B125, without locking

Shaft DN mm	Shaft OD mm	OD of support ring mm	Art. No.
600	670/680	739	010026951
400	450	560	5307

Locked version on request



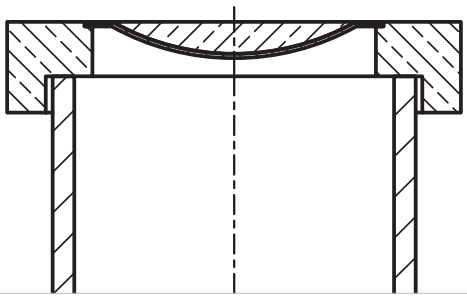
Concrete or cast iron cover plate matching SIMODRAIN® PE support ring
Class B125, without locking, without ventilation

Shaft DN mm	Shaft OD mm	Art. No.
600	670/680	010026999
400	450	5307

Variants of shaft covers for SIMODRAIN® shafts

Shaft cover consisting of
- Concrete transition plate (smooth or non-displaceable) for LKW 12 vertical load application
- Concrete-cast iron shaft cover, load class B (D) according to DIN EN 124, DIN 1229

Concrete-cast iron shaft cover, load class B (D)



Technical configuration according to project-related agreement. Our staff look forward to advising you:
pipingsystems@simona.de

Product range – SIMODRAIN® fittings

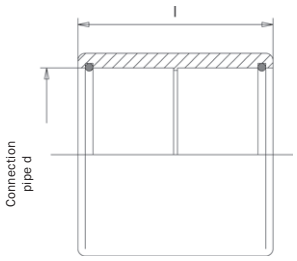
SIMONA offers a system matched to customer requirements with specific fittings and system components – everything from a single source for your piping projects.

SIMODRAIN® PE Double Sockets with O-ring

Material
PE

Colour
Black

Note
- Available machined with stop and without stop



PE Double Sockets with O-ring

d mm	l mm	Art. No. with stop	Art. No. without stop
110	200	010005842	010026076
125	200	010005843	010026077
160	250	010005844	010026078
180	250	010005845	010026079
200	250	010005846	010026080
225	250	010005847	010026081
250	250	010005848	010026082
280	300	010005849	010026083
315	300	010005850	010026084
355	300	010005851	010026085
400	300	010005852	010026086
450	400	010005853	010026087
500	400	010020771	010026088
560	400	010024080	010026089
630	400	010024081	010026090

d = pipe outside diameter
l = component length

Matching fittings

We also supply matching fittings for weldable piping systems – e. g. for connections using an electrofusion socket. Contact us! We look forward to assisting you:

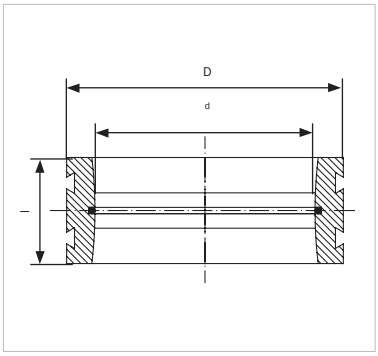
Phone +49 (0) 67 52 14-327
sales@simona.de

SIMODRAIN® PE Shaft Liners for Concreting

Material
PE

Colour
Black

Notes
- Machined with O-ring
- Non-standard lengths on request



PE shaft liners for concreting

d mm	D mm	l mm	Art. No.
110	140	135	010005767
125	160	135	010005768
160	200	135	010005769
180	225	135	010005770
200	250	135	010005771
225	280	135	010005772
250	315	135	010005773
280	355	135	010005774
315	400	135	010005775
355	450	135	010005776
400	500	135	010005777
450	560	135	010005778
500	630	135	010024077
560	710	135	010024078
630	800	135	010024079

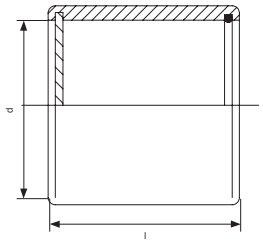
d = pipe outside diameter
D = outside diameter of the component
l = component length

SIMODRAIN® PE End Caps with O-ring

Material
PE

Colour
Black

Type
- Machined



PE end caps with O-ring

d mm	l mm	Art. No.
110	120	016700004
125	120	016700001
140	120	016700005
160	120	016700002
180	140	016700006
200	140	016700007
225	140	016700008
250	140	016700009
280	170	016700010
315	170	016700011
355	170	016700012
400	170	016700013
450	170	016700014
500	220	On request
560	220	On request
630	220	On request

d = pipe outside diameter
l = component length

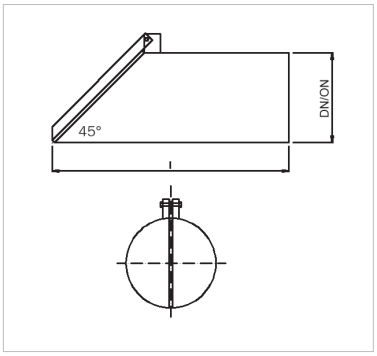
SIMODRAIN® PE Outlet Pieces with Frog Flaps (SDR 21/17/11)

Material
PE

Colour
Black

Type
Machined

Note
- Connection using double socket
- Double socket available separately, see page 20



PE outlet pieces with frog flaps, SDR 21/17/11

d mm	l mm	Art. No.
110	1,000	On request
125	1,000	On request
140	1,000	On request
160	1,000	On request
180	1,000	On request
200	1,000	On request
225	1,000	On request
250	1,000	On request
280	1,000	On request
315	1,000	On request
355	1,000	On request
400	1,000	On request
450	1,000	On request
500	1,000	On request
560	1,000	On request
630	1,000	On request

d = pipe outside diameter
l = component length

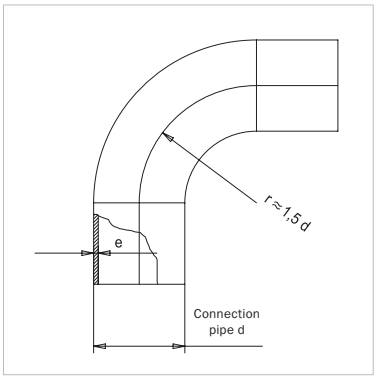
SIMODRAIN® PE Bends, Seamless or Segment-welded (SDR 17)

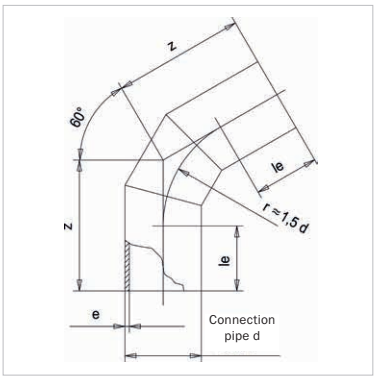
Material
PE 100

Colour
Black

Type
- Seamless (r ~ 1.5 d) or segment-welded, made from SDR 17 pipes

Notes
- Without the client's consent, bends > 15° may only be used outside the inner pressure zone of railway traffic loads
- Connection using double socket
- Double socket available separately, see page 20
- SDR 21 and SDR 11 on request





PE 100 Bends 11° to 90°, SDR 17, seamless or segment-welded

d mm	e mm	di mm
110	6.6	96.8
125	7.4	110.2
140	8.3	123.4
160	9.5	141.0
180	10.7	158.6
200	11.9	176.2
225	13.4	198.2
250	14.8	220.4
280	16.6	246.8
315	18.7	277.6
355	21.1	312.8
400	23.7	352.6
450	26.7	396.6
500	29.7	440.6
560	33.2	493.6
630	37.4	555.2

d = pipe outside diameter
e = pipe wall thickness
di = pipe inside diameter

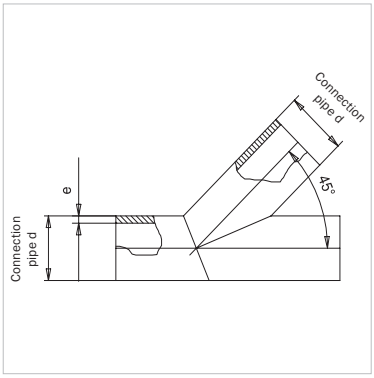
SIMODRAIN® PE Branches 45° (SDR 17)

Material
PE 100

Colour
Black

Type
- Segment-welded from pipes

Notes
- 60° branches available on request
- Without the client's consent, branches may only be used outside the inner pressure zone of railway traffic loads
- Connection using double socket
- Double socket available separately, see page 20
- SDR 21 and SDR 11 on request



PE branches 45° (SDR 17)

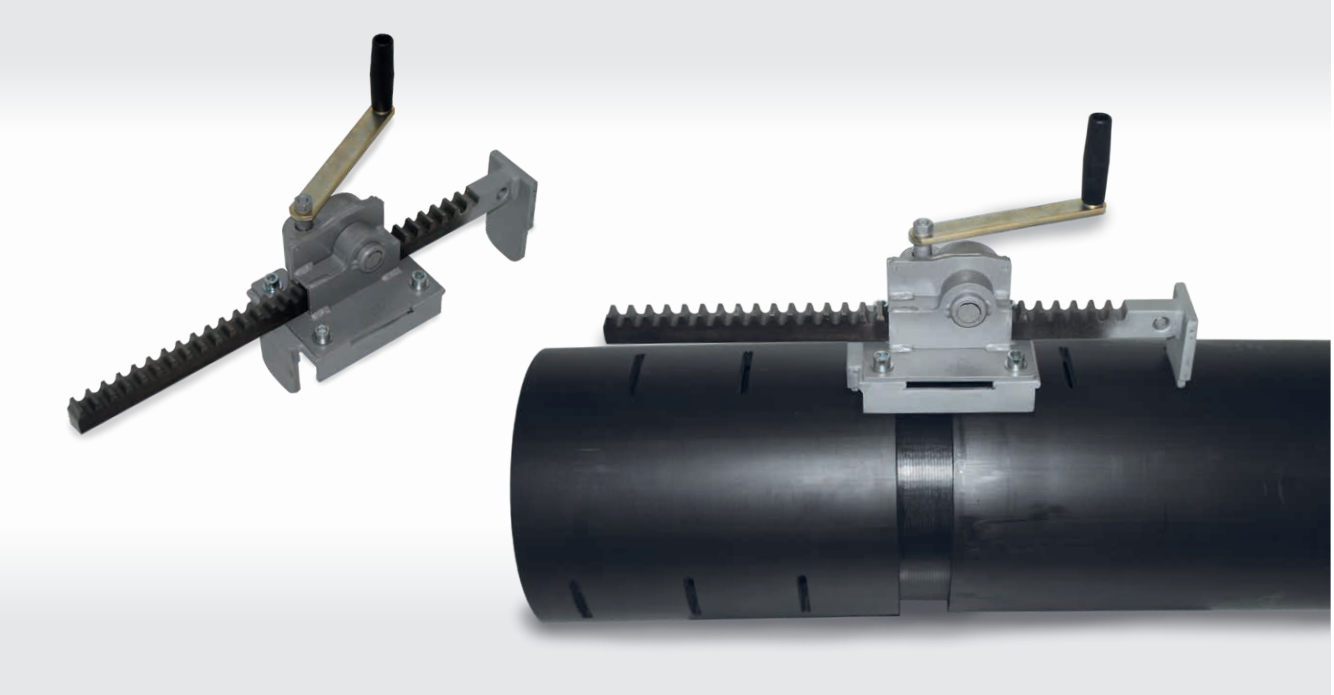
d mm	e mm	di mm
110	6,6	96,8
125	7,4	110,2
140	8,3	123,4
160	9,5	141,0
180	10,7	158,6
200	11,9	176,2
225	13,4	198,2
250	14,8	220,4
280	16,6	246,8
315	18,7	277,6
355	21,1	312,8
400	23,7	352,6
450	26,7	396,6
500	29,7	440,6
560	33,2	493,6
630	37,4	555,2

d = pipe outside diameter
e = pipe wall thickness
di = pipe inside diameter

Services

As a customer, you always take centre stage: from project development and raw materials purchasing to production and on-site planning, we are business partners you can rely on. Take advantage of the expertise we have acquired over many years.

SIMONA accessories



Manual insertion tool for slotted SIMODRAIN® pipes

For assembly on the construction site SIMONA offers a manual insertion tool for hire or purchase. The laying aid specially developed for installation on site greatly simplifies the task of joining the slotted SIMODRAIN® pipes.

Naturally, our members of staff will be only too pleased to offer their advice, enabling you to benefit from their experience and the necessary technical expertise.

Phone +49 (0) 67 52 14-268
Fax +49 (0) 67 52 14-211
pipingsystems@simona.de

Advice and information

Advisory service

Our customers benefit from our customised solutions, all of which are designed to help them operate successfully within their specific markets. SIMONA has many years of experience in the machining of sheets, pipes and fittings. You can always rely on our extensive know-how and our high level of technical expertise. Our staff at the Technical Service Centre will be only too pleased to advise you:

Phone +49 (0) 67 52 14-254
Fax +49 (0) 67 52 14-211
pipingsystems@simona.de

SIMONA Academy

At our Technology Centre and at our training facilities in Kirn you have an opportunity to attend various product training sessions, learn new processing techniques and train under supervision. On request, we will also be pleased to hold training sessions at your premises. Contact us at:

Phone +49 (0) 67 52 14-251
Fax +49 (0) 67 52 14-60251
mail@simona.academy

Information service

You can obtain further information in the form of catalogues, brochures, case studies, project reports, DVDs, technical data sheets and product samples. Contact our Marketing Department at:

Phone +49 (0) 67 52 14-383
Fax +49 (0) 67 52 14-738
marketing@simona.de

Delivery service

Our central warehouses and distribution centres throughout the world keep our standard products available from stock, thus guaranteeing speedy and flexible delivery. For further information about dimensions and availability, please contact our Sales Department:

Phone +49 (0) 67 52 14-327
Fax +49 (0) 67 52 14-211
sales@simona.de

Questionnaire on the structural sizing of pipes

Download from: www.simona.de/fb-rohr
Return to: pipingsystems@simona.de

SIMONA AG
Pipes and Fittings Division
Teichweg 16
55606 Kirn

Phone
+49 (0) 6752 14-254
Email
pipingsystems@simona.de

Your details

Construction project

Company

Contact person

Address line 1

Address line 2

Telephone number

Email

Pipe

- ☐ MP Multi-purpose pipe, 1/3 slotted — DN/OD
- ☐ LP Partial leachate pipe, 2/3 slotted
- ☐ TP Full leachate pipe, slotted all round
- ☐ UP Multi-purpose pipe, solid wall pipe without perforation

Laying conditions

- ☐ Embankment conditions (trench width ≥ 4 x OD)
- ☐ Trench conditions

Angle of slope β

Trench width at pipe crown height b

Cover height h

Cover fill condition ① please place cross on the right

Embedding condition ② please place cross on the right

Groundwater

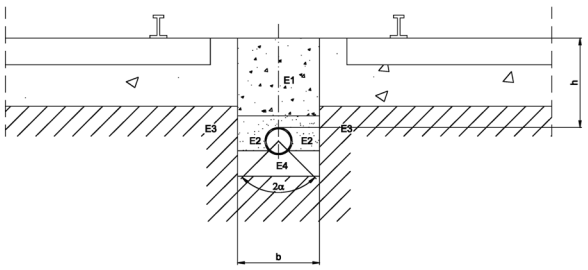
- ☐ None
- ☐ _____ (mm) groundwater above pipe bottom

Live loads

Next to the shaft:
- ☐ LM 71 multi-track
- ☐ LM 71 single-track

On the shaft:
- ☐ SLW 60
- ☐ SLW 30
- ☐ Lkw 12
- ☐ Please specify

Soil characteristics



E1 _____ D_{Pr} _____

E2 _____ D_{Pr} _____

E3 _____ D_{Pr} _____

E4 _____ D_{Pr} _____

G1: non-cohesive soils (GE, GW, GI, SE, SW, SI)
G2: slightly cohesive soils (GU, GT, SU, ST)
G3: cohesive mixed soils, silt (GU*, GT*, SU*, ST*, UL, UM)
G4: cohesive soils (TL, TM, TA, OU, OT, OH, OK, UA)

Place, date

Project Manager

Signature

①

- ☐ **A1:** Trench fill compacted against the natural soil in layers (without proof of degree of compaction); also applies to horizontal sheeting (lagging)
- ☐ **A2:** Vertical sheeting for the trench with trench piling that is only removed after filling. Bracing boards or devices that are removed step by step as the trench is filled. Uncompacted trench fill. Washing in of fill (only suitable for soils in group G1).
- ☐ **A3:** Vertical sheeting for the trench with sheet pile walls, light sheet pile walls, planking, bracing boarding or devices that are only removed after filling.
- ☐ **A4:** Trench fill compacted against the natural soil in layers with proof of degree of compaction; also applies to horizontal sheeting (lagging). The A4 cover fill condition does not apply to soils in group G4.

②

- ☐ **B1**: Embedding compacted against the natural soil in layers or in the embankment fill in layers (without proof of degree of compaction); also applies to horizontal sheeting (lagging)
- ☐ **B2**:Vertical sheeting within the pipe zone with trench piling that extends to the floor of the trench and is only removed after filling and compaction. Bracing boards or devices, provided compaction of the soil takes place after the sheeting is removed.
- ☐ **B3**: Vertical sheeting within the pipe zone with sheet pile walls or light sheet pile walls and compaction against the sheeting, which extends below the floor of the trench. Vertical sheeting with planking, bracing boards or devices that are only removed from the pipe zone after filling and compaction; it cannot be included in any reliable computational model.
- ☐ **B4**: Embedding compacted against the natural soil in layers or in the embankment fill in layers, with proof of the degree of compaction. The B4 embedding condition does not apply to soils in group G4.

Questionnaire on the structural sizing of shafts

Download from: www.simona.de/fb-schacht
Return to: pipingsystems@simona.de

SIMONA AG
Pipes and Fittings Division
Teichweg 16
55606 Kirn

Phone
+49 (0) 6752 14-254
Email
pipingsystems@simona.de

Your details

Construction project

Company

Contact person

Address line 1

Address line 2

Telephone number

Email

Dimensions

Outside diameter

Height of shaft jacket

Diameter of the shaft pit

Placement depth

Lateral distance of the shaft from the track

Accessible shaft ☐ Yes ☐ No

Shaft cover
☐ Class A 15 ☐ Class D 400
☐ Class B 125 ☐ Class E 600
☐ Class C 250 ☐ Class F 900

Groundwater

☐ None

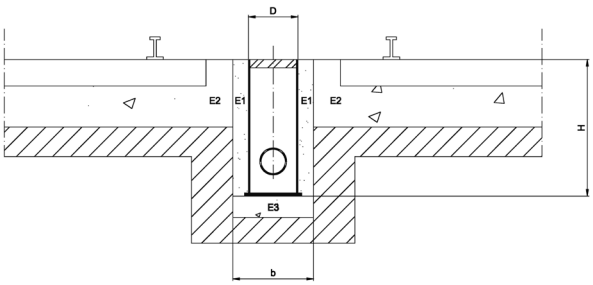
☐ _____ (mm) groundwater above shaft bottom

Live loads

Next to the shaft:
☐ LM 71 multi-track
☐ LM 71 single-track

On the shaft:
☐ SLW 60
☐ SLW 30
☐ Lkw 12
☐ No live load
☐ Man load
☐ Please specify _____

Soil characteristics



Next to the shaft E1 _____ D_{Pr} _____

Surrounding soil E2 _____ D_{Pr} _____

Under the shaft E3 _____ D_{Pr} _____

G1: non-cohesive soils (GE, GW, GI, SE, SW, SI)
G2: slightly cohesive soils (GU, GT, SU, ST)
G3: cohesive mixed soils, silt (GU*, GT*, SU*, ST*, UL, UM)
G4: cohesive soils (TL, TM, TA, OU, OT, OH, OK, UA)

Other information

Place, date

Project Manager

Signature

Questionnaire on the shaft configuration of sand trap shafts

Download from: www.simona.de/fb-schacht
Return to: pipingsystems@simona.de

SIMONA AG
Pipes and Fittings Division
Teichweg 16
55606 Kirn

Phone
+49 (0) 6752 14-254
Email
pipingsystems@simona.de

Your details

Construction project

Shaft no.

Company

Contact person

Address line 1

Address line 2

Telephone number

Email

Shaft diameter

DN d (mm)

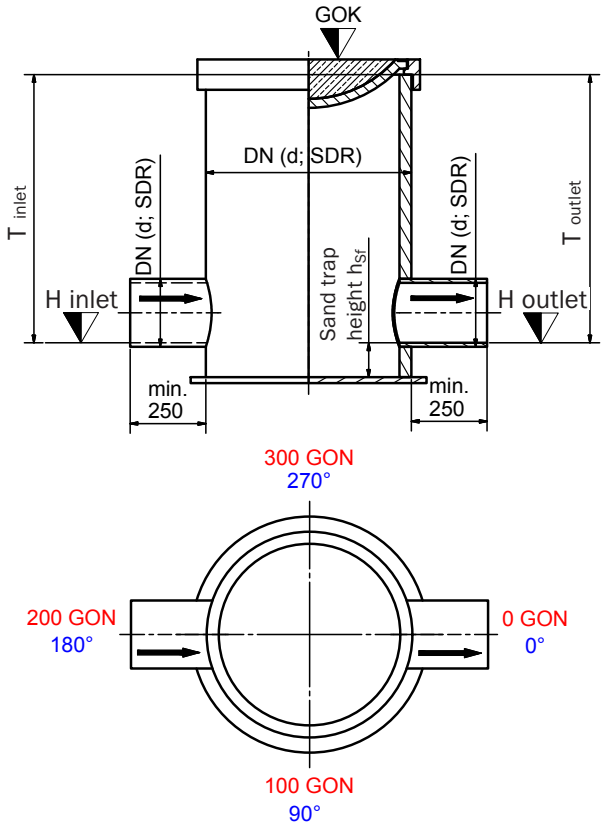
Floor plate

- ☐ For concrete foundation
- ☐ Sand-gravel supporting fill
- ☐ Inside the pressure zone of railway traffic loads
- ☐ Outer pressure zone, outside the pressure zone

Inlets

	Inlet 1	Inlet 2
DN		
d (mm)		
Inlet depth T_{Inlet} (mm)		
Position (degrees)		
Position (gon)		

SIMODRAIN® Sand Trap Shaft



Sand trap height

Sand trap height h_{sf} (mm)

Shaft ladder

- ☐ Stainless steel ☐ Plastic
- ☐ Following position gon degrees
- ☐ No ladder

Place, date

Signature

Questionnaire on the shaft configuration of channel shafts

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Your details

Construction project

Shaft no.

Company

Contact person

Address line 1

Address line 2

Telephone number

Email

Shaft diameter

DN d (mm)

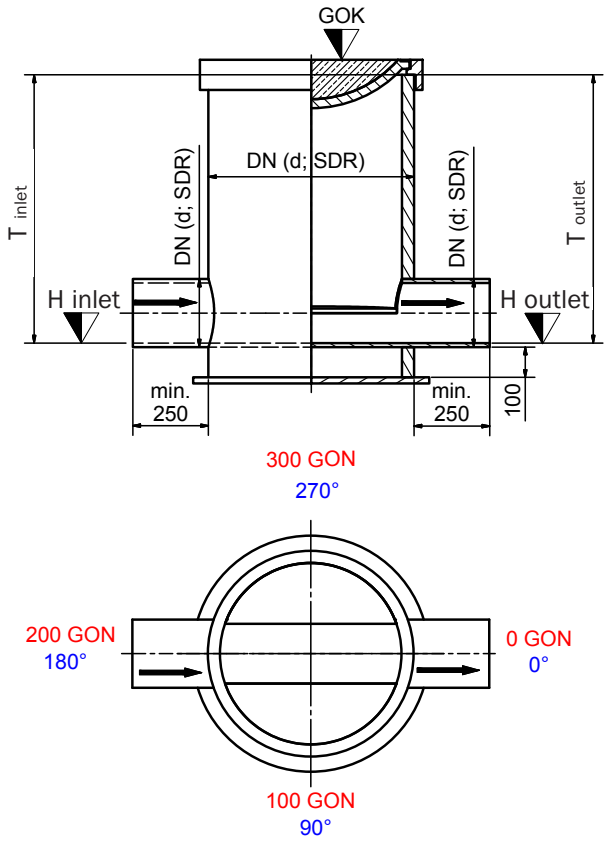
Floor plate

- ☐ For concrete foundation
- ☐ Sand-gravel supporting fill
- ☐ Inside the pressure zone of railway traffic loads
- ☐ Outer pressure zone, outside the pressure zone

Inlets

	Inlet 1	Inlet 2
DN		
d (mm)		
Inlet depth T_{Inlet} (mm)		
Position (degrees)		
Position (gon)		

SIMODRAIN® Channel Shaft



Outlet of channel shaft

DN d (mm)

T_{Outlet} (mm)

Shaft ladder

- ☐ Stainless steel ☐ Plastic
- ☐ Following position gon degrees
- ☐ No ladder

Place, date

Signature

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